Norwegian School of Economics

Bergen, Fall 2014

Determinants of the Chinese Footprint in Sub Saharan Africa

The effects of energy resources

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Master thesis in Economics/Finance

NORWEGIAN SCHOOL OF ECONOMICS

Preface

This thesis has been written as the concluding part of a Master of Science in Economics and Business Administration at the Norwegian School of Economics (NHH) and combines our majors in finance and economics.

While working on this thesis we have encountered some challenges along the way, but it has been both educational and interesting. Working together as a team has led to surprisingly few arguments and we have learned a great deal from each other in the process.

Several people have contributed in the course of writing this thesis. Firstly, we would like to thank Torfinn Harding, our supervisor at NHH, for giving us valuable feedback on our ideas and advising us on some of the econometric issues we have encountered along the way. Our meetings have been very inspirational and we have appreciated the rapid responses to all our questions.

Furthermore, we would like to thank CMI for accepting us as affiliated students and letting us be part of such an inspiring environment. We would especially like to thank Ivar Kolstad for giving us constructive feedback on our analysis.

We would also like to thank Ingelin Orten for giving us valuable comments on our drafts.

Finally, we would like to thank our family and friends for offering support and motivation throughout the last few months.

Abstract

The aim of this thesis is to explore the determinants of the Chinese global economic footprint with a particular focus on Sub Saharan Africa (SSA). We argue that China's recent economic growth has created a booming demand for energy resources and that this is a significant determinant for Chinese foreign economic engagement (FEE). Sub Saharan African countries are attractive targets for energy investment because they have many of the resources that China needs. At the same time, China has had a large impact on the development of these countries through its involvement in infrastructural development.

The scope of the thesis is twofold: Firstly, we wish to see if energy resources attract Chinese foreign economic engagement. Secondly, we wish to see if there is a potential link between energy resources and the Chinese engagement in the infrastructure sectors of SSA countries.

By using instrument variable approach on a pooled cross-sectional dataset we find that energy resources are significant in attracting Chinese foreign economic engagement, and that this attraction is stronger for SSA countries. We also find that energy resources attract additional FEE into the infrastructure sector in general, and especially for SSA countries.

Contents

Abbreviations

SSA	Sub Saharan Africa
SOE	State-owned enterprises
GDP	Gross domestic product
FEE	Foreign economic engagement
FDI	Foreign direct investments

1 Introduction

After decades of communist regime and slow economic development, China has impressed the world with sustained economic growth, averaging 10% over the past 30 years (OECD 2008). During the same period, the Chinese economy has gone from being nearly closed to having large scale foreign economic activity. It is today the second largest economy in the world measured by GDP.[1] When a country that is home to about 20% of the world's population[2] undergo such a sharp change in a short period of time, this is bound to be noticed globally.

The foundation of the transition of the modern Chinese economy was laid by the "Open Door Policies" initiated in 1978, which aimed at opening up the Chinese economy to the world. Initially, the focus of these policies was to attract foreign investment to China in order to increase domestic development and very few outward investments took place. Until the mid-1980s only a few selected state owned enterprises (SOE) were allowed to invest abroad. The restrictions were gradually loosened and by the end of the1990's, also privately owned companies were allowed to apply for outward investment (Cheung and Qian 2009).

At this time, the Chinese government also started to encourage and promote outward investments (OECD 2008). By the turn of the millennium, the amount of Chinese outward FDI displayed a sharp uprising when outward investment were further promoted by the so-called Go Global strategies (Cheung and Qian 2009). These policies encouraged outwards investment in order to support economic development and reform in China (Cheung et al 2011).

China has now become a main player among international investors. In 2013, China was the third largest outward investor globally, with foreign investments valued at $ 101 million, only beaten by the United States ($ 338 million) and Japan ($ 136 million) (UNCTAD 2013).

[1] Nominal GDP of $10 000 billion in 2014 (IMF 2014).

[2] China's population estimated by the World Bank to 1,4 billion in 2013

In the context of Chinese outward economic engagement, its relationship with Sub-Saharan African (SSA) countries has increasingly become a subject of public interest and controversy. There are no sure measures of how much Chinese companies have invested in China, but official figures suggest that annual flows have increased from $50 million per year in the early 2000s to around $ 400 million per year in 2004-2005 (Foster et al. 2009). Chinese governmental data estimated the flows in 2012 to be $2.52 billion in 2012. However, because the Chinese governmental data does not track funds that go through a tax haven before it reaches its final destination, this figure is likely to be heavily undervalued (Brautigam 2014).

Along with increased FDI activities to the SSA region, Chinese companies have a large-scale presence as contractors in infrastructure projects in the SSA region. Overseas construction and engineering projects were an integrated part of the Go Global policies and have been actively encouraged by the Chinese government (Cheung & Qian 2009).

After decades of low and unstable economic growth in most SSA countries, many economies in the region have recently had high economic growth rates[3] and the IMF have forecasted that among the ten fastest growing economies globally in the period 2011-2015, 7 countries will be Sub Saharan African. Yet, despite this, the SSA region remains the least developed in the world and is associated with substantial risk for investments (The Economist 2012).

Media and academia often speculate what China's agenda for SSA might be. It has been argued that the relationship between China and the SSA region resembles the one China itself had with Japan during the 1990s, which turned to be a promoting factor for Chinese development (Brautigam, 2009). Other argue that the Chinese engagement in Africa is of a highly exploitive character, driven by a need to secure energy and mineral supply to fuel own economic expansion and consolidate its global authority (Mbaye 2011).

In this thesis, we will explore the determinants of the Chinese global economic footprint with a particular focus on Sub-Saharan Africa. We argue that China's recent economic growth has created a domestic demand for energy resources such as oil and gas, and that this is one of the main motivations for the Chinese activities abroad. As we will develop further,

[3] Ethiopia (8,1%), Mozambique (7,7%), Tanzania (7,2%), Congo (7%), Ghana (7%), Zambia (6,9%) and Nigeria (6,8%), annual economic growth rates in parentheses (The Economist, IMF 2011).

the Chinese government has a large impact on investment decisions of Chinese firms, hence governmental goals of securing energy resources will be reflected in their investment decisions.

We employ a detailed dataset collected by the Heritage Foundation that contains project level information of investments and contracts from China to 121 different countries globally in the period of 2005 to 2014. The dataset contains detailed information on which sectors the transactions are directed to, which enables us to investigate how energy resources affect economic engagement in the infrastructure sector. We will in the following refer to investments and contracts combined as Chinese foreign economic engagement, abbreviated FEE[4].

The thesis is built up as follows: **Section 2** gives a brief backdrop and present theoretical considerations. **Section 3** presents the data employed. **Section 4** describes the empirical strategy of the thesis. **Section 5** presents the results and **section 6** summarizes and concludes.

2 Motivations of Chinese foreign economic engagement

2.1 Theoretical motivations for foreign direct investment

Foreign direct investments have been subject to many studies during the last decades. A large literature has arisen attempting to explain the motivational factors to why companies invest abroad. Typically, three main motives for foreign direct investments are highlighted. These are referred to as market-seeking, efficiency-seeking and natural resource-seeking.

Market-seeking investments include both investments to explore new markets as well as the strengthening of a company's existing position in a foreign market (Voss 2011). Such investments are often conducted to facilitate trade and to secure access to distribution channels in markets that are attractive to the investor (Buckley, et al. 2007). Attractive market characteristics for investors with market-seeking motives are large markets or markets in growth (Voss 2011).

Several studies have found that market-seeking motives are important when explaining Chinese investments to developed countries, but not in the case of developing economies (Buckley, et al. 2007, Cheung and Qian 2009, Kolstad and Wiig 2012). However, a study conducted by Cheung, et al. (2011) finds indications that market-seeking motives are important in the case of African countries as well. As early as 2008, an OECD-report claimed that Chinese manufacturers have started to view African markets as an important destination for their products. Many SSA countries have recently experienced periods of high economic growth, and the market potential of these countries is on its rise. Hence, we recognize that market seeking motives may be significant determinants for Chinese companies' foreign economic engagement. We also believe that this motive might be more important over time, as the SSA economies experiences more economic growth and development.

Efficiency-seeking investments aim to lower cost of doing business through realization of economies of scale or scope or by moving production to lower-cost locations. Such investments are normally conducted in countries with lower production costs than the home country of the investing company, such as the cost of labor, machinery and materials (Voss 2011).

Buckley, et al. claimed in 2007 that efficiency-seeking motives were less important in explaining investment motives of Chinese firms, as China had comparatively low costs in its own home economy. However, the labor costs in China have increased sharply in recent times. Factory pay in Chinese industrial cities such as Henan and Guangdong has risen by 103% and 80% respectively between 2008 and 2013 (China Labour Bulletin 2013). In contrast, labor costs in the SSA region are among the lowest globally (The Economist 2011). Many SSA countries also experience increasing unemployment as a consequence of a transition from agricultural based economy to a more industrialized one, which has caused an increased supply of blue-collar workers. Several African leaders try to establish favorable conditions for foreign investment, e.g. by facilitating the start-up process for foreign companies and establishing industrial zones with higher quality of infrastructure and institutions (Hamlin, Gridneff and Davison 2014). Cheung and Qian (2009) found that developing countries that had lower wages than China attracted more Chinese FDI, and attributes this finding to the Chinese seeking lower cost locations for their production. Because of these reasons, it is possible that Chinese investors are efficiency-seeking when investing in SSA countries. We therefore regard efficiency seeking motives to be a possible determinant for explaining Chinese foreign economic engagement in SSA.

Resource-seeking investments aim at gaining access to technology, strategic assets or natural resources. Technology seeking investments can be motivated both by the desire to tap into existing knowledge bases or to participate in the development of new technologies, while strategic asset investments are made to access the distribution systems, brand names and managerial knowledge of local firms (Voss 2011). According to Cheung and Qian (2009), both the access to advanced technologies and managerial practices are important motivations for Chinese investments in countries that are more developed than China. Accordingly, we believe such effects to be more relevant for Chinese investments in countries that are on the same or higher development state than China itself and not so much for the Chinese economic engagement in SSA countries.

Natural resource investments provide capital to the exploitation of resources and are typically motivated by the desire to capitalize on the resource rents or to secure the supply of scarce resources in the home economy (Voss 2011). We will place the focus of this thesis on investigating to which extent Chinese outward economic activities are driven be a search for resources. In the following section, we will develop our rationale for this.

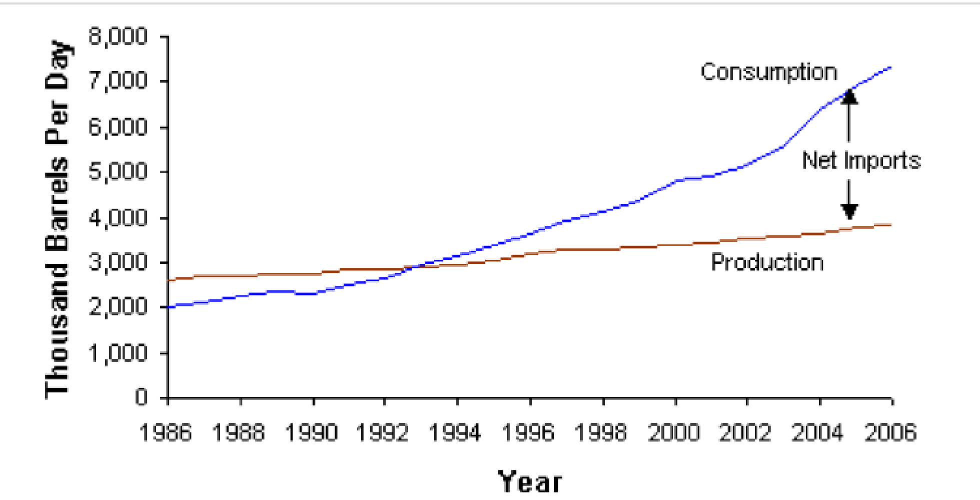
2.2 The importance of natural resources

The recent large-scale economic growth in China has sharply increased the country's demand for natural resources. Since 2001, China's energy consumption has been growing by approximately 13% per year. Much of this energy demand can be traced back to a domestic focus on energy-intensive industry, as steel and related metal products consumes up to 70% of the total energy in the economy (IDE-JETRO 2009)

In 2010, domestic crude oil production was only able to meet 50 to 55% of demand. By 2020, this number is predicted to be down somewhere between 34 and 40%. Similarly, the coal shortage has been estimated to amount to 700 million by 2020 (IDE-JETRO 2009).

In 2008, China was the second largest oil importer in the world. This is in contrast to the fact that the country was the largest oil exporter in East Asia only two decades ago (OECD 2008). Figure 2.1 shows the relationship between Chinese production and consumption of oil in the period of 1986 to 2006. Since the early 1990s China has been a net importer of oil.

Figure 2.1 China's Oil Production and Consumption 1986-2008



Source: IDE-JETRO (2009)

The African continent is abundant in the resources that China needs. In fact, 10 percent of the world's oil reserves are estimated to be located in Africa (Roxburgh, et al. 2010). It is also commonly believed that the exploration of Africa's resource reserves is still so recent that a large bulk of existing reserves are lying undiscovered (Kaplinski and Morris 2009). China has become increasingly reliant on natural resource imports from African countries. In, 2001, Africa's share of Chinese total oil imports was below 23%. The number had increased to 29% in 2006 (Foster, et al. 2009).

Recently, Chinese oil companies have also begun to bid for oil blocks in SSA countries, expanding their interaction to direct investments as well. Direct investments in resources that are important to the domestic economy may increase reliable supply of energy in the long run (OECD 2008), which may explain why the Chinese government encourages this instead of being reliant on imports. According to a report by the Japan External Trade Organization (IDE-JETRO 2009), the vast size of the Chinese population[5] makes the country especially vulnerable if it is not self-sufficient by energy resources. A critical component of the Chinese Go Global policies launched at the beginning of the millennium is attempting to lock in resources that they would otherwise have to buy on the open market. Chinese interest for Africa is said to have been accelerated by the 9/11 crisis which highlighted China's dependence on Middle Eastern oil supplies. At the time of the crisis, China obtained approximately 60 percent of its oil imports from the Middle East (IDE-JETRO 2009).

The Chinese economy is subject to a high degree of government control, which is likely to affect the investment decisions of Chinese firms (Buckley, et al. 2007). Even though privately owned companies are increasing in share, most of the largest companies in China remain state owned. In the period 2004-06, the share of China's outward FDI flows conducted by SOE's accounted for 83.7 % of the total outflows (OECD 2008). Being state owned implies that the investment decisions made by these companies are not only motivated by profit maximization, but are also likely to be motivated by political objectives (Kolstad and Wiig 2012).

The Chinese government also affects the investment decisions of privately owned firms by offering several financial incentives. These include access to below-market rate loans for

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[5] 1.3 billion (World Bank 2013)

investments in priority sectors, tax incentives, direct capital contributions and subsides stemming from official aid programs (OECD 2008). Such incentive policies increase the profitability of projects in prioritized sectors and thereby tilt the investment patterns of Chinese companies towards these sectors. Priority projects are (i) projects focused on resource extraction, (ii) projects that support the exports of Chinese products, technologies and labor, (iii) R&D projects, and (iii) M&As that can benefit the Chinese when they are entering foreign markets (UNCTAD 2007).

2.3 The Chinese involvement in African infrastructure projects

In addition to conducting direct investments, Chinese companies have also become increasingly involved in infrastructure development in SSA countries, both as contractors and as financers. In 2009, Chinese contractors were involved in infrastructure deals in 35 African countries, focused in the areas of power generation and transport (Foster, et al. 2009). Most of the Chinese contracts in the power generation group are hydropower projects. In 2009, only 5% of the hydro potential in the SSA region was developed, so such schemes are seen as crucial contributions to the development of the SSA region (Foster, et al. 2009). In the transport sector, the building and rehabilitation of railways has been the main focus of the Chinese involvement. In 2009, Chinese companies were involved in the construction and rehabilitation of railways equivalent to 5% of the existing capacity in the SSA region (Foster, et al. 2009).

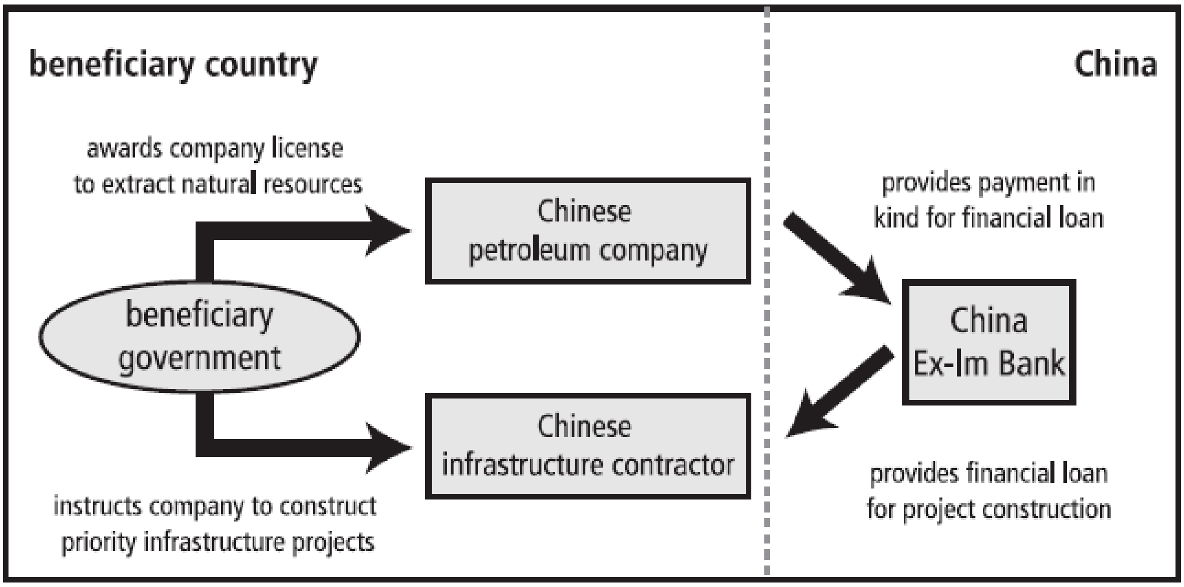
In addition to carrying out construction projects in SSA, China is also offering finance for such projects. Chinese contractors have been winning contracts in the African infrastructure sector valued at $ 738 million over the period 2001-06. At the same time, the value of the Chinese commitments to infrastructure finance over the same period is estimated at more than $ 12 billion (IDE-JETRO 2009). The vast majority of infrastructure financing arrangements by China in Sub Saharan Africa is being financed by the China Export-Import Bank (Exim Bank)[6]. The bank has an official mission to carry out foreign economic, diplomatic and trade policies with a focus on overseas projects. Among other things, the

[66] 92 percent in the period 2001-2007 (Foster, et al. 2009).

bank offers concessional and non-concessional loans for investment and construction projects abroad (Foster, et al. 2009). Concessional loan agreements entail that minimum 50% of the materials, equipment, services or technology involved in the project must be bought from a Chinese company. Also, it requires that the work is being performed by a Chinese contractor or exporter (Foster, et al. 2009).

In some cases, infrastructural finance is coupled with natural resource development. As many African countries lack the sovereign guarantee needed to back concessional loans, the Exim-Bank is increasingly using the so-called “Angola model” when offering financing to African countries. A main trait of the model is that loans are repaid in natural resources (Foster, et al. 2009). The structure of the model is illustrated by figure 2.2 below. The beneficiary government can instruct Chinese contractors to engage in infrastructure development, paid for by the Chinese Exim Bank. In return, a Chinese company can start production in the country, and the resources extracted by the Chinese company are used to repay the loan (Foster, et al. 2009).

Figure 2.2: Structure of the Angola model



Source: Foster, et al. (2009)

According to Foster, et al. (2009), the involvement of China as a main financier of African infrastructure projects is driven by economic complementarities between the two. The quality of infrastructure in Sub Saharan Africa lags far behind other regions, including other developing countries. The poor infrastructure in the region is hindering economic growth by increasing the costs of exports, hence making SSA countries less competitive in the export market. Also, production is made more difficult through unreliable power supply. The funds needed to close the infrastructure deficit in Africa are estimated to be as high as 5% of GDP in the region, with an additional 4% for maintenance and operations (Foster, et al. 2009). At the same time, China has one of the most effective and low-cost construction industries in the world and China is in great need of resources that are abundant in the African economy. Infrastructural improvements enhance the ability of African countries to export resources, which accelerates the economic development in these countries at the same time as it gives China access to the resources that it needs (Foster, et al. 2009).

Chinese companies also sometimes bundle investments into natural resources with finance of projects like rails, ports and power that are needed to export these resources. These financing deals were in 2009 estimated to account for about 10 % of the total Chinese infrastructure financing (Foster, et al. 2009).

According to OECD (2008) the Chinese government is actively using its aid programs for facilitating foreign direct investments. It has also been argued that the Chinese government offers to build politically important buildings and infrastructure in the expectation of winning political support for resource extraction projects.

2.4 Empirical findings on the importance of natural resources

In this section we give a brief summary of studies exploring natural resources as a determinant for Chinese investments. None of the empirical studies we have encountered have made an attempt to look for heterogeneities between SSA and non-SSA countries specifically. Only one study focus on African countries, but this study does not include investments to other countries for comparison. We have also not come across any studies examining the effects of natural resources on infrastructure projects.

Buckley, et al. (2007) use official panel data on FDI approved by the Chinese government, covering 49 countries (22 OECD countries and 27 non-OECD countries) in the time period 1984 to 2001. They find that Chinese FDI was significantly resource-seeking (using the ratio of ores and metals exports to merchandise exports as a proxy of natural resources), but only after 1992. They argue that the growth of the Chinese economy has created a need to secure important natural resources, which has led to an increased focus on such investments in recent times.

Cheung and Qian (2009) use data on government approved Chinese outward FDI in the time period 1991 to 2005. They find that resource abundance (proxied by the ratio of fuels, ores and metals exports to total merchandize exports) is significantly important in attracting FDI for both developed and developing countries. They also conduct tests to determine whether investments in African countries are geared towards natural resources sectors, but they only find limited evidence for this. Their findings indicate that natural resources is only one of the motives for investing in these countries. However, when adding binary variables to capture different periods they do find indications of increased investments in natural resources from Chinese companies in the period after 1998. This could be a sign that the Chinese are catching up on their resource investments, but the authors do not conclude in one way or the other.

Cheung, et al. (2011) use data from 1991 to 2007 on FDI approved by the Chinese government. This study is of special importance for our analysis, as it explores the relationship between China and Africa in particular. They find that natural resources (proxied by energy and metals output of the host country) do not impact the probability of receiving investments, but that Chinese investors tend to invest more money in oil producing African countries once such countries has been chosen as targets. They find indications of an increased focus on natural resources after the “Go Global” policies of 2002. The same authors also find that African countries that have interaction with China in the form of contracted projects and trade receive more investments. They argue that the number of contracted projects is an indication of the economic, and possibly ideological, ties between China and the host country because such projects must be endorsed by local authorities. These ties will facilitate Chinese investments. Also, the contracted projects can work as pioneer projects, giving the Chinese companies first-hand knowledge about the investment climate in the host country.

Ramasamy, Yeung and Laforet (2012) examine the relationship between firm ownership and location choice, using a constructed dataset of investments made by listed Chinese companies in the time period 2006 to 2008 and dividing them into groups of SOEs and privately owned companies. They find that natural resources (proxied by the host country's ore and mineral exports) attract investments from both SOEs and privately owned companies, but that privately owned companies tend to be more risk averse than SOEs and focus their involvement on providing value-adding services rather than exploiting the resources. SOEs invest in resource-rich countries that have higher levels of political risk.

Kolstad and Wiig (2012) use data provided by UNCTAD, covering outward FDI flows going to 104 countries in the period 2003 to 2006. They find that the effect of natural resources (proxied by the shares of fuels, ores and metals exports in GDP) depend on the quality of institutions and the characteristics of the host country. For non-OECD countries (79 countries in the dataset) the Chinese investors are attracted to natural resources, and especially so if the country has low quality institutions. They conduct tests to see if these results could appear due to a latecomer[7] effect, but conclude that the most likely explanation for the results is that China takes advantage of countries with large natural resource reserves and weak institutions. For OECD countries, natural resources are not significant.

2.5 Hypotheses

Based on the review of existing literature and studies, we believe that resource-seeking motives are a significant driver for Chinese foreign economic engagement. As developed previously, there is a growing demand for energy in the Chinese economy. This, combined with the fact that the Chinese government has a substantial influence on Chinese companies' decisions through direct ownership and incentive policies, translates into Chinese companies investing abroad.

Adding on that Chinese companies are highly active in the Sub-Saharan region, we wish to examine whether Chinese FEE is relatively more attracted to energy resources in SSA countries compared to the world in general.

[7] The possibility that China, being a latecomer in the markets for foreign direct investments, only have poorly governed countries left to choose from when conducting investments (Kolstad and Wiig 2012).

A special interest for resources in SSA can be grounded in the fact that SSA countries have much of the resources China needs. Furthermore, SSA countries comprise a group of the least developed countries in the world. It might therefore be easier for Chinese companies to get access to energy resources in these countries by offering lucrative financing deals bundled with investments.

Our first hypothesis therefore state:

(1) Chinese foreign economic engagement is attracted to energy resources. The attraction is stronger in SSA countries.

In addition to Chinese companies' engagement related to energy resources, there is also large scale Chinese engagement in the infrastructure sector, which seems to be especially important in SSA countries. For example, many African countries have made use of the Angola model as a financing source, which entails financing for infrastructure projects through Chinese official aid programs with backing in natural resources extracted by Chinese companies.

These observations induce us to speculate about a potential link between energy resources in SSA countries and infrastructure projects conducted by Chinese companies in the region.

If such a link exists it could have several potential explanations. Firstly, the Chinese government can offer finance for infrastructure projects in return for access to resources. Secondly, infrastructural development can be necessary to secure reliable export routes for the resources that China is investing in. As outlined above, infrastructure in SSA countries tend to be poorly developed, which increases the costs of extracting activities.

Lastly, there could be an apparent link between energy resources and infrastructure development because Chinese companies invest where there is already a Chinese presence. It is possible that having close ties to a host country through a high number of contracted projects will attract additional investments to the same host. Chinese energy companies may prefer foreign locations where Chinese contractors are already present, and the other way around. If resource abundant countries are highly represented among countries receiving Chinese investments, contractors tend to end up in resource abundant countries as well. This would create a link between energy resources and infrastructure development that is not motivated by energy resources directly.

Hence, our second hypothesis states that

(2) Energy abundant SSA countries attract Chinese economic engagement into the infrastructure sector.

3 Analysis of data

3.1 Dataset and representability

We employ a dataset collected by the Heritage Foundation (HF), covering Chinese economic activity in the period of May 2005 to July 2014. The details of the data are collected from corporate reporting and business media. Every transaction in the data set is backed by a source the Heritage Foundation claims to be fairly or highly trustworthy, such as the investor, the partner, Dow Jones or similar (Scissors 2014). This is different from data sources such as OECD and IMF, which uses governmentally reported FDI.

The HF data differ from such data sources in several further aspects. A first major difference is the minimum value limit of projects included. The HF dataset includes only projects with a transaction value greater than $100 million, whereas sources such as UNCTAD and OECD also track smaller projects. Compensating for the HF data's exclusion of smaller projects is the fact that the dataset contains information on sectors engaged in as well as names of companies involved.

The Heritage Foundation also argues that by keeping their focus on large projects and using corporate level information sources, they are able to track the FEEs to its final destination. Tracking investment flows to its end destination is a major challenge, because a significant fraction of Chinese foreign investment flows are directed through tax havens. This makes it difficult to discern the ultimate destination of those funds. For example, official data from the Chinese government treats Hong Kong as a separate economy and official data register these investments to be to Hong Kong, although most of it just passes through Hong Kong's economy. The purpose of much of such tax havens investment is so-called "investment-roundtripping" of capital, a term that refers to the practice of taking money out of China and investing it back in China as foreign investment in order to qualify for certain tax breaks (Kolstad and Wiig 2012). Additionally to "roundtripping", Hong Kong is often used as a "stopover" for Chinese funds going outwards (USCC 2011). Since governmental data tend to register only the first country the capital reaches after leaving the economy, such data underestimate Chinese investments in many countries to a large extent.

In addition to investments, the dataset also contain contracts. Contracts refer to legal agreements between a Chinese company and a contracting partner in the host country.

Investments and contracts are approximately equally represented in the data material. The HF data tracks the full estimated value of *intended transactions*, which is different from governmental data from e.g. the Chinese and US government, which record *annual flows*. In this sense, HF reports intentions of economic engagements rather than actual flows. Transactions that do not go through are controlled for by characterizing them as troubled transactions.

By comparing the HF with corresponding data material from UNCTAD, we find that the HF data is significantly more diversified across continents than the UNCTAD data. Due to the practice of only registering the first country that an investment reaches, investments in the three tax havens Hong Kong, Cayman Islands and the British Virgin Islands account for 79% of Chinese outward investments in 2009 (USCC 2011) Hong Kong alone received 67%[8].

Researchers using data from sources such as UNCTAD normally removes FDI going to tax havens in order to receive a more correct geographical distribution. However, by doing this, one is only left with roughly a third of the actual Chinese outflows. The aggregated value of FDI summarizes to $254 billion in the UNCTAD data and $297 billion in the HF data over the 6 year period. Dismissing the 67% of the FDI that first goes to Hong Kong leaves $84 billion left to analyze when using the UNCTAD data.

Graph 3.1 shows the distribution of foreign direct investments to different continents in the HF dataset compared UNCTAD in the period of 2005-2011. To be able to compare the two, we have only used the part of the HF dataset classified as investments[9] and excluded Hong Kong from the UNCTAD data.

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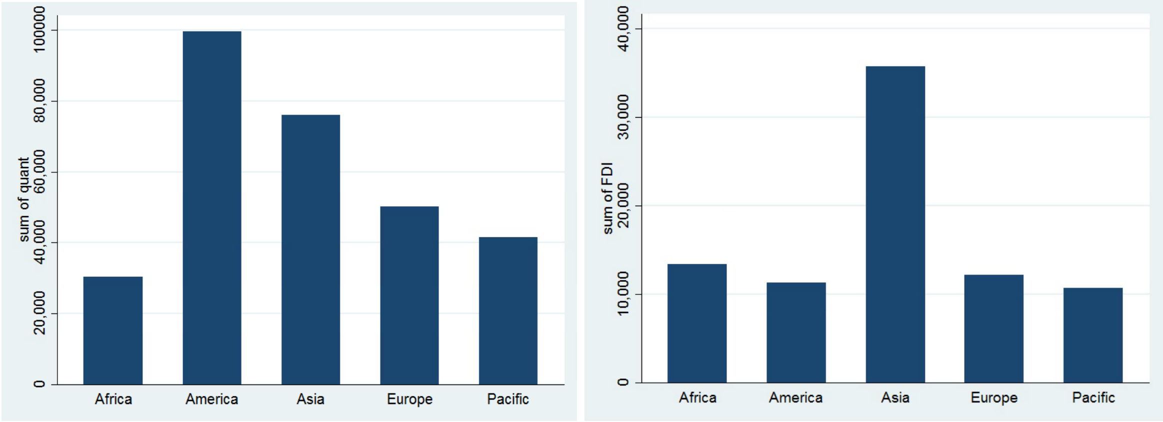
[8] A comparison between the HF investment data and the full UNCTAD dataset including Hong Kong can be found in the Appendix A1.

[9] A graph showing the total value of FEE going to different continents can be found in the Appendix A1.

Graph 3.1: Chinese FDI in the period 2005-2007



FDI in million dollars in the period 2005-2011 according to HF 2014 (left) and UNCTAD 2013 (right). For UNCTAD data, Hong Kong is excluded. Source: Heritage Foundation (2014) and UNCTAD (2013).

Comparing the two graphs reveals that the FDI towards America is overrepresented, whereas Africa and Asia are underrepresented in the HF data relative to the UNCTAD data.

The HF data is also prone to biases, such as towards English and Chinese language sources, which are the dominating sources for the HF's data collection. Accordingly, we may expect to see an overrepresentation of FEEs going into English speaking countries. As apparent from graph 3.1, America (including North and South) is indeed the continent that receives the highest volume of FDI in the HF data. Furthermore, as we will see later, the countries in our dataset receiving the highest amounts of total FEE are also English speaking (USA, Australia and Canada). This supports the suspicion that there is a bias towards USA and English speaking countries in the HF data. The difference could, however also be explained by the fact that the HF data only tracks projects above $100 million. It is plausible that Africa and Asia are underrepresented in the HF data relative to the UNCTAD data because they receive more small projects that are excluded from the HF data.

As we hypothesize about the effect of energy resources and infrastructure projects, both of which can be quite capital intensive, our results might be affected by the HF's focus on projects valued over $ 100 million. The exclusion of small projects in the HF data may also cause FEE by SOEs to be overrepresented in the dataset, as many of the largest Chinese companies are SOEs. This implies that the motives of the Chinese government might be more evident in our dataset compared to data sets containing small investments as well.

Another potential bias relates to the political views of the collector. The Heritage Foundation is a conservative think tank that seeks to “formulate and promote conservative public policies based on the principles of free enterprise, limited government, individual freedom, traditional American values, and a strong national defense” (Heritage Foundation 2014). This might cause a focus on certain geographical areas, e.g. the US, in order to strengthen evidence for its own political agenda.

The HF’s use of media and corporate reporting may also be questionable, as one cannot be sure about the trustworthiness of such sources. There could also be systematic differences in reporting, e.g. that reporting in developing countries may be of poorer quality compared to developed countries.

3.2 Descriptive analysis

Our dataset contains 1234 investments, contracts and troubled transactions in the time period 2005-2014. There are 134 different countries in the data, whereof 32 are SSA countries. South Africa is not included in the SSA group, due to its development level being significantly different from the remaining countries in the region.

Top recipient countries

The top 10 host countries based on FEE volume are given in table 3.2 below. The right part of the table show the top host countries in the world and the left part show the top host countries in Sub Saharan Africa. In the Sub Saharan Africa ranking we have added the country’s total world ranking as well as the ranking in the SSA-group.

According to the BP dataset, all the countries on the world top 10 list have large energy reserves. Russian Federation and Iran are ranked as number 1 and 2, USA and Nigeria are number 5 and 6, and the other countries on the top 10 list follow closely behind. For SSA countries, the same pattern appears. Nigeria, Angola and Chad, all of which have high ranks on the top 10 list for SSA countries, have considerable energy resource reserves.

Table 3.2: Top 10 host countries based on FEE volume (numbers given in US $ millions)

The World			**Sub Saharan Africa**			
World rank	*Country*	*Value of FEE*	*World rank*	*SSA rank*	*Country*	*Value of FEE*
1	USA	111 810	7	1	Nigeria	31 000
2	Australia	105 130	17	2	Ethiopia	16 150
3	Canada	44 770	21	3	Angola	15 220
4	Iran	42 370	28	4	DRC	10 930
5	Brazil	34 460	33	5	Guinea	9 210
6	Indonesia	31 420	40	6	Mozambique	8 110
7	Nigeria	31 000	43	7	Chad	7 490
8	Britain	25 010	45	8	Uganda	7 060
9	Kazakhstan	24 880	46	9	Kenya	6 970
10	Russian Federation	23 380	49	10	Zimbabwe	5 590

Source: Heritage Foundation (2014)

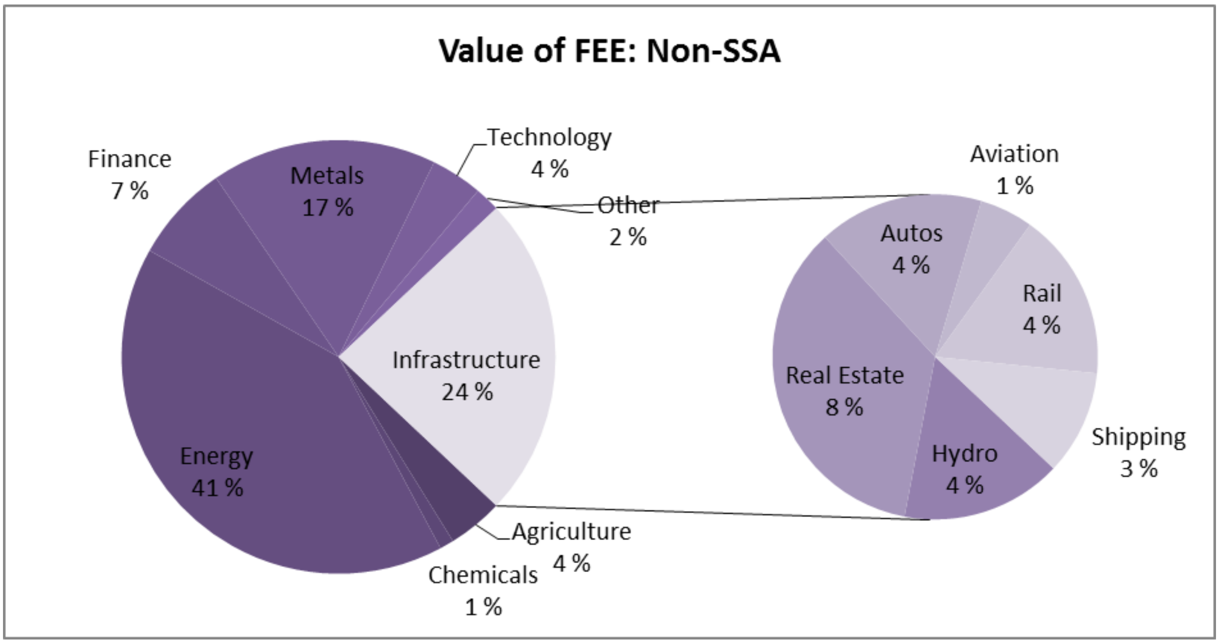
According to Cheung og Qian (2009), Chinese companies have had an increased focus on developing countries as targets for their foreign investments. However, according to our dataset, USA, Australia and Canada are the three countries receiving most FEE from China, measured in value, which are all among the most developed countries in the world[10]. Looking further into this, we find that 11 % of Chinese FEE go to the 16% countries in the world that are characterized by low-income. 16 % go to the 23% countries characterized as lower-middle income countries, 30 % to the 26% countries characterized as upper-middle income countries and 43 % go to the 35% countries characterized as high income countries. Hence, according to our data, 73% of Chinese FEE goes to upper-middle income or high income countries. Since the World Bank characterizes low and middle-income countries as "developing" countries, a higher share of the Chinese FEE does indeed go to developing countries. However, it is interesting to note that according to our data, 73% of Chinese FEEs go upper-middle income or high income countries. This might be an indication of market-seeking motives among Chinese investors. According to our data, the investment volume going to SSA countries are generally smaller than the rest of the world. SSA countries comprise 24 % of the HF dataset, but receive only 16 % of the total investment volume. Nigeria is the only SSA country among the top 10 recipient countries worldwide.

[10] According to World Bank classifications (World Bank 2014).

Sectorial distribution of investments

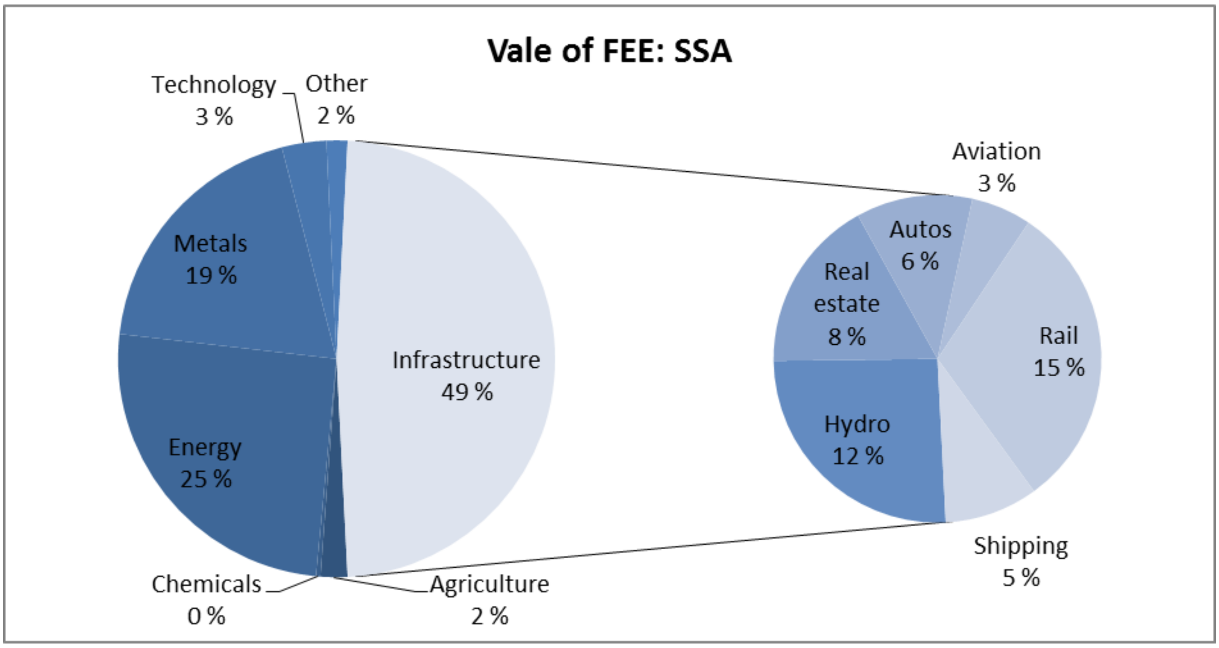
As already mentioned, one desirable trait with the investment tracker data is its detailed information on sectorial distribution of transactions. Figures 3.1 and 3.2 show relative investment value of sectors for non-SSA and SSA countries respectively. The three sectors attracting most Chinese FEE in both country groups are energy, metals and infrastructure. In the non-SSA group, energy is the largest sector. Metals also receive a large bulk of the investments, hence the two extractive sectors combined attract over half the FEE volume in non-SSA. In the SSA group, the infrastructure sector is by far the largest sector, receiving almost half of the FEE volume. About one quarter of the FEE goes to the energy sector, and combining energy with metals the extractive sectors account for approximately 45 % of the FEE volume. Only 7 % of the FEE volume in SSA goes to sectors outside of the three main sectors, compared to 18 % for non-SSA countries, suggesting that Chinese companies have a more narrow focus in SSA countries compared to non-SSA countries.

Figure 3.1: The sectorial distribution of non-SSA FEE



Source: Heritage Foundation (2014)

Figure 3.2: The sectorial distribution of SSA FEE



Source: Heritage Foundation (2014)

The large FEE volume going into the energy sector is in line with our first hypothesis stating that Chinese investors are attracted to energy resources. However, there are more energy investments in non-SSA countries, which is inconsistent with our belief that the effect of energy resources will be stronger for SSA countries. We have presented one line of argumentation for our second hypothesis, which suggests that Chinese investors conduct infrastructure development to facilitate or access energy resources in the energy sector in SSA. In this regard, it is somewhat surprising that infrastructure receives almost twice the FEE volume that the energy sector does. In the following we will look closer at the subsectors within the energy and infrastructure sector. This can help us get a better image of what the Chinese FEE to these sectors are directed towards.

The infrastructure sector

The smaller circles of figures 3.1 and 3.2 show the distribution of FEEs among different infrastructure subsectors. Hydro, rail, real estate and autos are the main subsectors in both

SSA and non-SSA countries. The subsectors rail and hydro are relatively large in SSA countries, which is consistent with the common perception.

81% of the FEE volume into infrastructure projects in the SSA group are one a contract base[11], suggesting that these are construction projects.

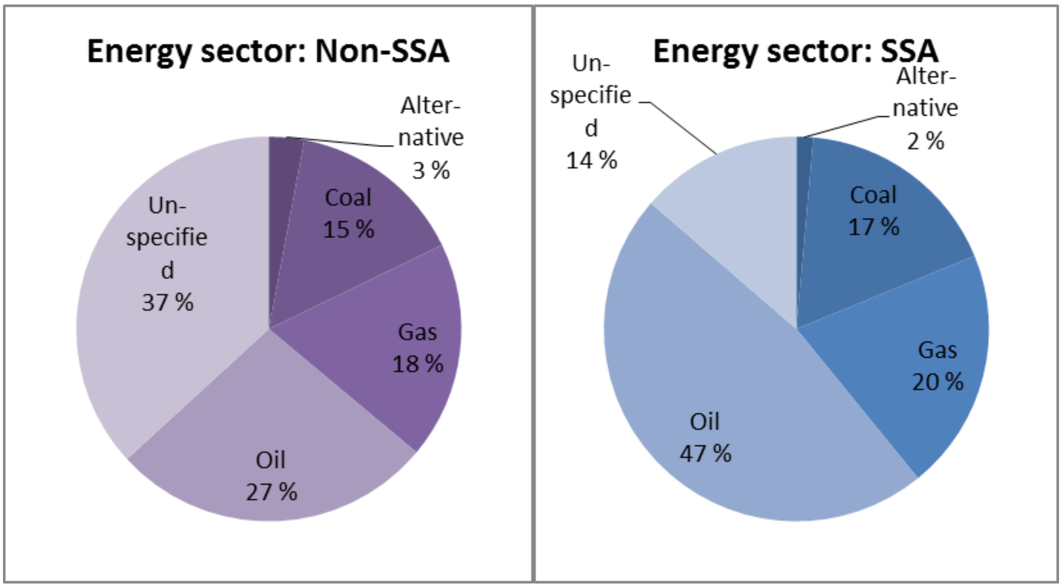
For non-SSA countries, the share of contracts in the infrastructure sector is 57%, but these countries receive considerably more investments (31%) than SSA countries. Investments are particularly frequent for projects related to aviation, shipping and real estate in non-SSA countries, where approximately half of the FEEs are investments. Hence, Chinese companies in the infrastructure sector in SSA are more often construction companies conducting engineering projects. By contrast, in non-SSA countries they are often investors.

The energy sector

Figure 3.3 shows the distribution of FEE among the energy subsectors in non-SSA and SSA countries. The energy sector contains the subsectors oil, coal, gas, electric, alternative and unspecified. In non-SSA countries, unspecified subsectors constitute an especially large bulk of the FEE volume (37%). A little more than a quarter of the energy FEE in non-SSA goes to the oil sector. The rest of the FEE is approximately evenly distributed between the subsectors gas and coal, with gas receiving a few percentages more than coal. Only 3% goes to the subsector alternative energy. For SSA countries, oil is by far the largest sector, receiving approximately half of the energy FEE. Gas and coal receive about 20% each and the rest go the unspecified and alternative subsectors. That a relatively small share of the energy FEE in the SSA group goes to unspecified subsectors, might be an indication that the projects in SSA are more narrowly orientated i.e. easy to classify compared to FEE into the non-SSA group.

[11] SSA: 81 % of FEE value is contracts, 14 % is troubled transactions and 5 % is investments. For non-SSA countries only 57 % is contracts, 12 % is troubled transactions and 31 % is investments.

Figure 3.3: The distribution of FEE in the energy sector



Source: Heritage Foundation (2014)

We would have liked to closer examine infrastructure FEE that is directly linked to energy resource extraction, as we believe this might be a motivation for Chinese involvement in SSA countries. However, the subsectors specified in the infrastructure sector are exclusively related to transport and there are no subsectors directly relatable to resource extraction, e.g. the construction of pipelines and refineries. Roads, shipping and rails are important facilitators for the utilization of commodities, but they can also be related to the local needs of country and have no linkages to resource extraction. Without knowing the exact locations of these projects we cannot know their true purpose.

We suspect that projects directly linked to resource extraction are registered as energy projects in our data. About half of the FEE volume in the energy sector is investments and a quarter is contracts[12]. It seems plausible that contracts related to oil, gas and coal could be engineering projects related to the construction of infrastructure for resource extraction. However, since we cannot know this for sure without more detailed information we can only speculate.

[12] The total value of FEE going to contracts and investments is: Worldwide and non-SSA: Investments 53 %, contracts 27 % and troubled transactions 20 %. SSA: Investments 56 %, contracts 23 % and troubled transactions 21 %.

SOE presence

According to our dataset, 84% of Chinese companies engaging in SSA are state owned enterprises, whereas the equivalent number for non-SSA countries is 67%[13]. This finding may suggest that projects executed in SSA to a higher extent reflect objectives by the Chinese government. Given that there are relatively more projects in energy resources in SSA, the finding may also reflect a higher share of SOEs among Chinese utility companies in general.

[13] However, SOEs might be overrepresented in our dataset, given that only projects above $ 100 million are included.

4 Empirical strategy

In this section we will first outline our model, before we follow up with an overview of our variables. Lastly we will discuss some potential econometric issues and their remedy.

4.1 The model

Our basic specification of our empirical model is

$$lnFEE_{i,t} = \alpha + \beta_1 lnEnergy\ resources_{i,t-1} + ln\beta_2 Energy\ resources_{i,t-1} * SSA_i + \beta_3 SSA_i + controls_{i,t-1} + u$$

Our dependent variable includes investments, contracts and troubled transactions.[14] We use control variables according to standard models for foreign FDI (in accordance with e.g. Buckley, et al. 2007, Cheung and Qian 2009, Harding and Javorcik 2007). The proxies used for the main independent variables and the sources of data are presented in table 4.1:

Table 4.1: Independent variables

Variable	Proxy	Theoretical justification	Source
Energy resources	Oil and gas proved reserves	Resource seeking	British Petroleum Statistical Review
Controls			
Landlocked	Binary variable	Transaction costs	CEPII GeoDist database
Distance	Distance between China and the host country	Transaction costs	CEPII GeoDist database
Market opportunities	GDP	Market seeking	World Bank Development Indicators
Macroeconomic stability	GDP deflator	Risk	World Bank Development Indicators
Institutions	Polity IV	Transaction costs	The Center for Systemic Peace

[14] Troubled transactions are included to because they reflect the motivations of Chinese investors.

Energy resources

Energy resource endowment is our main variable of interest and we have chosen to proxy this using data on energy reserves published by British Petroleum. We have included the proven reserves of oil and gas, merged into one variable, where gas levels are measured as oil barrel equivalent[15]. This variable reflects the geology of the host countries and captures the long-term potential of production.

Using a measure for energy resources that attempt to directly reflect a country's geology is in contrast to several previous studies on Chinese determinants of FDI, where instead measures for natural resource exports are used. The rationale for using exports is based on the presumption that the rents, directly reflecting the profitability of certain investments, are the decisive component for investors (Kolstad and Wiig 2012). However, as developed in section 2, Chinese companies are predominately state-owned and are therefore likely to have a long-term perspective and be less risk-averse than other investors[16]. This implies that Chinese investors might be less concerned with resource rents that yield short-term profits and more concerned with building up a business relationship in regions that have large resource reserves in order to secure supply of these resources in the future.

In addition to looking at the isolated effect of energy resources on Chinese FEE, we also interact energy resources with a SSA dummy variable. This is to examine whether China's interest in natural resources is stronger in SSA countries than countries outside of SSA. We also use the SSA variable to explore general differences between SSA and non-SSA countries.

[15] The conversion from cubic meters to barrels was done using the following equation: 1 cubic meter LNG (m^3) = 6.6 barrels of oil.

[16] This is in line with argumentation presented by Kaplinski and Morris (2009).

Control variables

In line with gravity models of FDI we include landlockedness and geographical proximity[17] between China and the host country. Both are assumed to have a negative impact on investments as they increase transportation costs. Some observers suggest that geographical proximity is becoming increasingly important in explaining FDI flows, as large amounts of bilateral flows between countries in the same regions tends to be observed more frequently (UNCTAD 2007). These variables have been found to be significantly negative in several studies examining FDI determinants (e.g. Cheng and Ma 2010, Ramasamy, Yeung og Laforet 2012, Kolstad og Wiig 2012).

As a proxy for the market size of the host economy we use GDP from the World Bank Indicators[18]. GDP measures as proxies for market-seeking motives are found to be positively correlated with Chinese FDI in a number of studies, e.g. Kolstad & Wiig (2012), Buckley et al (2007), Cheng & Ma (2010) and Cheung & Qian (2009).

To control for financial stability, we use a GDP deflator as proxy, taken from the World Bank Indicators. Lower inflation indicates financial stability and thereby lower risk. It is therefore generally associated with increased inflow of FDI. Some authors do, however, argue that in the case of Chinese firms, the relationship might be different. Buckley, et al. (2007) find a positive relationship between higher inflation rates and Chinese FDI inflows to a country. They argue that countries experiencing moderate inflation might be more attractive to Chinese firms because inflation often accompanies economic growth. Also, Chinese companies might be more willing to invest in economically unstable environments because their experiences in their own home environment have made them especially equipped to do so (Buckley, et al. 2007).

In order to control for institutional quality we use the Polity IV index, developed by the Center for Systemic Peace. The Polity IV index attempts to measure the level of democracy in a given country, including general political participation, openness, and political

[17] We use a weighted distance measure based on bilateral distances between the largest cities in the two respective countries, weighted by the share of the overall country population living in these cities.

[18] We would have liked to control for GDP per capita as well as a control for the efficiency-seeking motive, as this measure captures the effect of the wage levels of a country. Including both GDP and GDP per capita introduce multicollinearity issues, we therefore dropped GDP per capita.

competitiveness and extent of checks on executive authority (Center for Systemic Peace 2013)[19]. Institutions of high quality in the host country are assumed to positively influence a country's attractiveness for FDI as it reduces the risk and costs of doing business. It is also associated with countries that have high economic growth (Walsh og Yu 2010). However, several studies have found that Chinese investors are attracted to poor institutions in the host country (Kolstad og Wiig 2012, Buckley, et al. 2007). A possible explanation for these findings is that Chinese investors have a comparative advantage when investing in countries with weak institutions because it has experience with corruption and capital market imperfections in its own home market (Kolstad og Wiig 2012).

4.2 Econometric issues

The choice of econometric approach

We have chosen to use a pooled cross-sectional approach for our regression analysis by combining observations on single transactions from the period 2005-2014. We will not regard time in our study as we are interested in the cross-sectional variation rather than time-variation.

Endogeneity issues

Endogeneity occurs when one or more of the explanatory variables are correlated with the error term. In the presence of endogeneity, all coefficients included in the regression may be biased. A trustworthy treatment of the sources of endogeneity is therefore critical.

There are three main sources of endogeneity. Firstly, endogeneity may arise when at least two variables are jointly determined and simultaneously affecting each other. This form of

[19] Ideally, we would have liked to use a more general measure for institutions that included institutions in a more broadly meaning of the word to catch effects of e.g. educational, religious, juridical and cultural institutions. Such a measure is, however, difficult to find. We tried including the Rule of Law indicator from the World Bank but had to drop this because if was highly correlated with GDP.

endogeneity is called reverse causality, as the independent variable determines one or more of the explanatory variables at the same time as they determine the independent variable (Woolridge 2013).

A second main source of endogeneity is when a variable that has predictive power on our dependent variable and is correlated with one or more of the explanatory variables is omitted from the model. The omitted variable will then be reflected in the error term and cause the error term to be correlated with the explanatory variable, with which the omitted variable is correlated (Woolridge 2013).

Thirdly, endogeneity may arise when there are measurement errors in our dataset. Both the inaccurately measured variable and the error term will be dependent on the "measurement noise" introduced by the measurement error. They will therefore be correlated and thereby introduce bias in the regression results (Woolridge 2013).

Endogeneity of control variables

Whereas the explanatory variables SSA, landlocked and distance to China are strictly exogenous, the variables GDP, inflation and institutions are likely to be subject to reverse causality from the dependent variable when using estimates from the same time period. GDP can be influenced by FEE because increased investments and construction activity is likely to increase the income of a country. Inflation can be influenced as an increase in FEE may positively influence demand, and thereby also put upward pressure on a country's inflation rates. Inflows of FEE may also influence the quality of institutions, e.g. through increased economic stability. To reduce endogeneity caused by reverse causality, we use variables one year before our estimation period[20].

[20] This solution is somewhat imprecise, as especially inflation level and GDP may vary substantially within a period of ten years previous to our estimation period. A possible alternative would have been to use an average value of the variables over time (in line with the study conducted by Kolstad & Wiig, but we regard the solution of using only 2004 to be a satisfactory one.

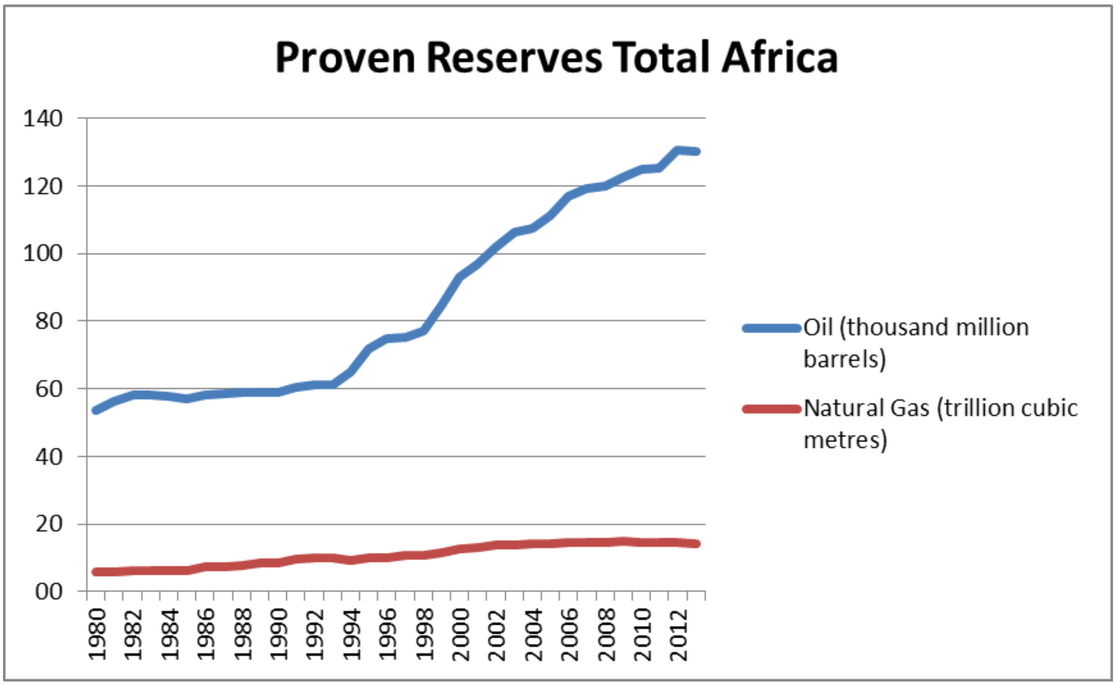
However, control variables might also be subject to omitted variable bias if there are unobservable factors captured in the error term influencing both the level of FEE and the control variables. Lagging the variable does not correct for this (Woolridge 2013).

Endogeneity of energy resources

In the relationship between Chinese FEE and energy resource endowments, we might find all the three common sources of endogeneity mentioned above.

A first potential source of endogeneity in the energy resource variable is reverse causality. As is apparent from the graph, proven oil reserves have more than doubled between 1980 and 2012, growing from about 60 billion barrels in 1980 to 130 billion barrels in 2012. Proven gas reserves have nearly doubled within the same period. Although there has been an impressive increase in the known resource endowments of Sub-Saharan Africa over the last decade, the region still remains undiscovered in terms of natural resources (Kaplinski and Morris 2009). Figure 4.1 illustrates that the discovered reserves can be quite dynamic. Because energy resource discovery can require intricate technology and knowledge, new resource reserves tend to be disclosed as a country develops. Increased amounts of FEE can aid the development of a country and contribute to the discovery of resources by providing capital to the host economy. Similarly, economic activities introduced by Chinese FEE may increase extraction rates and thereby contribute to depletion of energy resources. Hence, there could be reverse causality issues between Chinese FEE and the proven reserves of energy resources.

Figure 4.1 Proven reserves of oil and gas 1980-2012



Source: British Petroleum (2005)

If reverse causality was the only source of endogeneity, it would have been sufficient to use predetermined variables to control for the endogeneity. Yet, solely using predetermined variables does not correct for endogeneity caused by omitted variables and measurement errors (Woolridge 2013).

Omitted variable bias refers to endogeneity caused by unobservable omitted variables that affect both Chinese foreign engagement in the estimation period and the known level of resource endowments. To better understand what the omitted variable bias entails, one can contemplate on the effects e.g. a research institution may have on both attractiveness for FEE as well as the known level of energy resources. Establishment of research institutions will increase the general level of education in the economy. This may cause the population to improve their infrastructure, crime rates to fall, quality of institutions and sophistication of economic activities to increase and similar effects. All these effects are likely to increase the country's attractiveness as host country for FEE today. At the same time, a higher education level is also likely to cause the country's resource endowments to be better discovered, through increased competence and enhanced technology, more skilled engineers and geologists in the country and similar.

Such a variable, which has influence on both explanatory variables as well as the dependent variable, will be reflected in the error term and introduce a bias. Other variables that are likely to influence both FEE and the known level of natural resources are culture, conflicts, political changes and several more. It is obvious that it is impossible to include all such relevant variables in our model[21].

Cheung and Qian (2009) address endogeneity due to omitted variables, by including country fixed effects in a panel data estimation of determinants of Chinese FEE. If there is reason to believe that the omitted variable does not change over time, using fixed effects estimation cause time invariant country specific omitted variables to be controlled for (Woolridge 2013). However, controlling for fixed effects in our estimation would suck up information about effects of resource endowments on a country's attractiveness for FEE that we wish to obtain by using our explanatory variables. In addition, the methods possible when using panel data do also not solve the problem of endogeneity caused by time-varying omitted variables that are correlated with the explanatory variables (Woolridge 2013). Using fixed effects to control for endogeneity is therefore not a reasonable option in our case.

Another solution would be to use a proxy for the omitted variables, but the range of possible influencing variables that are omitted in our case makes this an infeasible option. Adding control variables could even cause our model to be over specified, which would influence the variance of our coefficients and thereby also the confidence intervals and significance level (Woolridge 2013).

The energy resource variable may also contain measurement errors. If an explanatory variable is measured with random errors additive to the true values it will induce correlation between a wrongly measured variable and the error term. This will in turn introduce bias towards zero – attenuation bias – of the coefficient of wrongly measured variables and biases in unknown directions of other variables (Woolridge 2013).

[21] We attempt to control for institutions in our regressions, but our variable only includes the Polity IV variable that controls for level of democracy. Other possible variables controlling for institutions, such as the World Bank's Rule of law-measures and the HDI-index, are subject to collinearity issues when included together with variables such as GDP.

To which extent this applies to the data on energy resources leads us to a discussion on how the data is collected. As we use public data for energy resources, we can assume that these represent a minimum of what is known and that it is quite likely that big investors have more information than the public information. In effect, the wrongly measured variable will be correlated with the error term and hence introduce bias.

In the presence of endogeneity we could take the bias into account when interpreting the coefficients if we knew its direction. The direction of the bias is dependent on the correlation with the error term, so that e.g. a positive relationship gives an upward bias, which would overestimate the impact of natural resources on FEE. However, given on the several potential sources of endogeneity the direction of the bias will be impossible to disclose.

4.3 The instrument variable approach

A suitable way to deal with the potential issues of endogeneity of the sources outlined above is to use an instrument variable (IV) method of estimating our regression model. The principle of the IV method is finding a variable that is correlated with the potentially endogenous explanatory variable that we wish to replace. We then use the variance between the instrument variable and the independent variable to construct a new variable that will not be endogenous to the system. Hence, the idea is that we circumvent endogeneity by constructing a replacement for our explanatory variable that is based on its relationship with an exogenous variable (Woolridge 2013).

The main difficulty related to the instrument variable approach, is to find a variable that is suitable as instrument. A good instrument must formally fulfill two restrictions. Firstly, the so-called relevance criterion states that the instrument must be relevant for explaining the endogenous variable we wish to replace. Secondly, the co-called exclusion criterion states that the instrument must be exogenous to the structural equation. We have chosen energy resources from 1980[22] as our instrument and will discuss its validity as an instrument in the following.

[22] For the Russian Federation and Kazakhstan, the data is from 1998, since the resources in these regions are significantly large and there were no available results from 1980. If these regions had been excluded from the natural resource measure, we would run the risk of generating wrong results.

The relevance criterion can be expressed mathematically as ($Cov(z,x) \neq 0$), where z is the instrument variable and x is the independent variable. This condition can be statistically tested by regressing the instrument on the dependent variable. Significant coefficients of the regression output implies that the instrument is relevant for explaining the independent variable.

The exclusion criterion is given when the instrument variable is uncorrelated with the error term u. This condition cannot be tested statistically, but must be assured through economic reasoning. Given the many sources of endogeneity, the main challenge of finding a good instrument lays in finding an instrument that fulfills this criterion, i.e. is strictly exogenous.

Mathematically, the restriction can be expressed as ($Cov(z,u) = 0$), where z is the instrument and u is the error term. This restriction contains two further characteristics: the first states that the instrument can have no partial effect on the dependent variable beyond the effect of the endogenous variable it replaces and the variables included in the model. The second characteristic contained in the restriction is that the instrument must be uncorrelated with other possibly omitted variables (Wooldridge 2009:492).

With regard to the first restriction, we expect a positive correlation between the instrument, energy resource endowments in 1980 and the more recent measure of energy resource endowments in 2004.

In the case of energy resources, sources of time variation are new discoveries and depletion. As apparent from figure 4.1 the known level of oil reserves in Africa have increased substantially in the past 30 years. Conversely, there may also be countries with large discoveries in 1980 that were nearly depleted in 2004. Weak correlation between endowments of 1980 and 2004 would threaten the validity of our instrument. Although there has been a rapid development over the whole world and an intense exploitation of energy resources the recent years, it is this plausible that the correlation will be strong. As new oil and gas fields are often found close to existing fields, i.e., with new technology and drilling mechanisms, the fields may be larger than they appear in 1980. In that sense, new discoveries may counter balance depletion. The restriction of correlation between the instrument and the endogenous variable can be tested, which we will do in the next section.

The second restriction entails that we must be sure that there is no possibility that variables that have influence on our dependent variable, FEE in our estimation period, also affect our instrument variable, observed energy resources in 1980. It is fairly reasonable that by using a predetermined level of energy resources, the effect of this on today's level of FEE will be mainly through its correlation with a more recent measure of the same variable.

However, the use of a predetermined endogenous variable as instrument is often criticized. One danger by using a predetermined value is the possibility that the lagged value of the variable, i.e. past endowments of energy resources, which in the past caused China to engage with that country and continue to do so because of the *historic relationship* with that country rather than because of the resource endowments today, which might be smaller than it was in the past. In this case, the restriction that there cannot be any partial effect on the dependent variable beyond the effect of the variable it replaces may not be fulfilled. However, up until the 1990s, China was a net exporter of oil and gas (IDE-JETRO 2009), making it less likely that the country engaged in large-scale investment activities in resource sectors abroad. We therefore do not regard this to not be an issue. If we had used a more recent measure, i.e. after the Chinese government started promoting foreign economic engagement, this effect would have been a larger concern.

One can, however, argue that energy resources in 1980 may have influence on FEEs today, e.g. through the influence energy resource endowments may have on culture, institutions, economic activity etc. in 1980, which causes a certain country to be more attractive as host for FEEs today.

Another main critic is that using lagged endogenous variables as instrument is problematic if the equation error or the omitted variables are serially correlated (Angrist and Krueger 2001). We attempt to circumvent this by using a more distant lag of 25 years in order to reduce correlation between the instrument and the disturbances in the error term of the original ordinary least squares regression caused by omitted variable (Murray 2006). A drawback with using a more distant lag is normally the threat of weaker correlation between the instrument and instrumented variable, threatening the fulfillment of the first restriction. As we see, endogeneity caused by omitted variables might not be solved by using the IV approach.

In the case of measurement error, the use of IV-approach will provide consistent estimates if the instrument is uncorrelated with the measurement error and equation error (that is the equation error from the model with correctly measured data), but correlated with the correctly measured variable (Angrist and Krueger 2001). We cannot be sure that the instrument is uncorrelated with the measurement error, as similar measurement errors are likely to be present in 1980 as in 2004. However, estimates of reserves in 1980 are likely to be subject to adjustments over time and are therefore likely to be more accurate than estimations from 2004.

A last issue with IV estimation is the so-called LATE-effect. As there were several countries that did not have energy resources endowments in 1980, the use of instrumental variable implies that the IV-approach estimate the causal effect of energy resources for countries that did have energy resources in 1980, and not for those that did not[23]. We would, however, ideally be interested in the effect of energy resources also for countries, which did not have energy resources in 1980, but we miss this information when we apply IV-estimation. Consequently, the parameters identified by instrumental variables may differ from the average effect of interest (Angrist and Krueger 2001)

[23] The term originates from medical experiments where a group of patients received treatment and the other group did not and refers to how the entities, in our case countries, response, in our case, to which extent they receive FEE, from the treatment, in our case having energy resources in 1980.

5 Results

5.1 Preliminary discussions

To be able to give evidence about the robustness of our results, we run our regressions on different specifications of our model. We run our regression once with as few control variables as possible and extend it by adding more control variables. By showing that our results remain similar through different specifications of the model, this will give us confidence that the endogeneity bias in our control variables is not a major issue and reduce the probability that we draw conclusions based on spurious results. Running our regressions on different model specifications will also reveal under which circumstances our results hold and give insights about the drivers of our results.

The different model specifications are illustrated in the figure 5.1 below. We first fit the dataset to a model that only includes the variable energy resources and the SSA dummy in addition to the two exogenous control variables, distance and landlocked. In a second step, we include the interaction variable SSA*energy resources, or its instrument. This allows us to infer about the heterogeneity of the effect on energy resources in SSA countries compared to non-SSA countries. Thirdly, we add our remaining control variables in a third specification[24].

Figure 5.1 Model specifications

$$lnFEE_{i,t} = \alpha + \beta_1 Energy_{i,t-1} + \beta_2 SSA_i + \beta_3 lnDist_i + \beta_4 Landl_i \quad \mathbf{1}$$

$$+\beta_{16} Energy_{i,t-1} * SSA_i \quad \mathbf{2}$$

$$+\beta_{17} lnGDP_{i,t-1} + \beta_{18} Infl_{i,t-1} + \beta_{19} Inst_{i,t-1} + \beta_{20} lnPop_{i,t-1} + u \quad \mathbf{3}$$

[24] In order to check for isolated significance we run the regression one time for each control variable, and one time where we include all control variables in the same regression. These results can be found in the Appendix.

The use of IV-estimation must be balanced against an inevitable loss of efficiency compared to the OLS-estimator (Frankel and Romer 1999). IV estimation will be consistent either way, but less efficient than OLS in absence of endogeneity. Performing a Wu-Hausman test of differences strongly suggest that the estimates are too similar to believe that an endogeneity bias is present[25].

Since there are potential problems associated with both estimation methods, we consequently run all three model specifications with both OLS and IV. This allows us to compare the results and infer about the size and direction of a possible bias.

We have chosen to answer our hypotheses using two different approaches. In the first approach, we aggregate the values of all transactions for each country over the estimation period and use this as our dependent variable[26]. By doing this, we are able to analyze the effect of energy resources on total FEE volume on a country level. We only include countries that received FEE in the estimation period. Hence, the estimated coefficients measure the effect of energy resources given that a country already receives FEE from China. Correspondingly, we will not be able to infer anything about the decisions by Chinese companies' regarding which foreign markets to enter.

The second approach lets us investigate whether energy abundance also attract FEE of higher average value per project. For this estimation, we use the lowest level of aggregation in our dataset, corresponding to 1234 observations[27]. Each observation is a Chinese foreign project. As the number of projects vary across countries, this estimation captures the effect of both mean value of project and the relative number of projects in a certain country. In this approach, we control for time variation by using year dummies.

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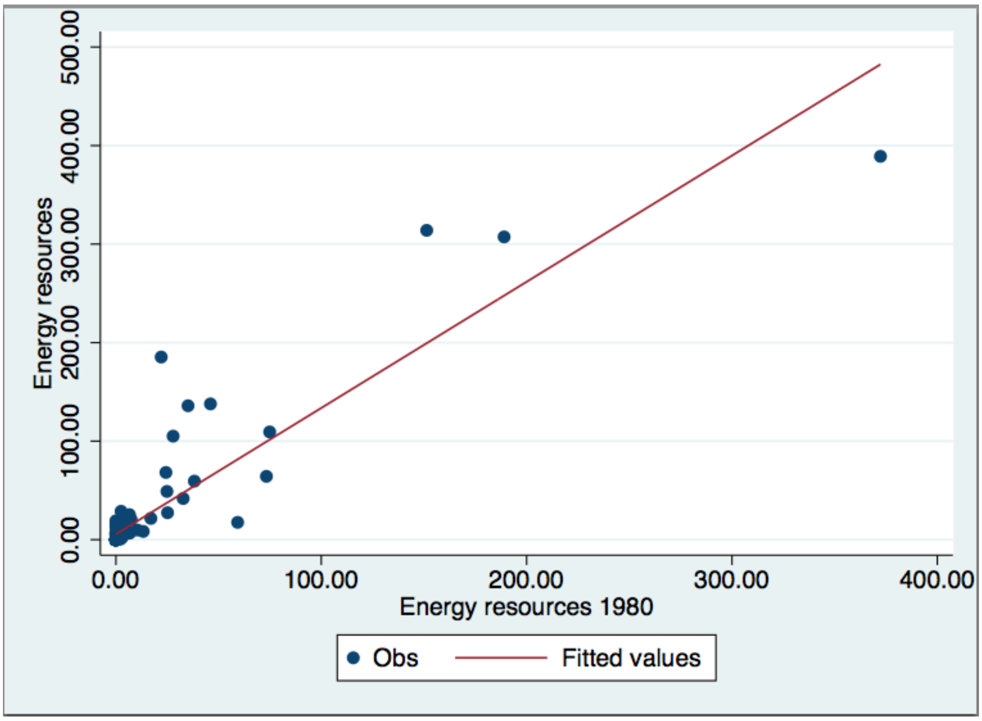
[25] The p-value of Wu-Hausman test was 0.9, strongly indicating that we cannot reject the null hypothesis that there are not systematic differences between the OLS and IV estimates.

[26] For this, we use the *collapse* command in STATA.

[27] We also run regression of project size on a country level by using project mean per country as dependent variable. By doing this, we weigh each *country* equally instead of each project, regardless of the number of projects the country may receive. This method will, however, overestimate the importance of countries that only receive a few large projects relative to countries that receive several smaller ones and is included only as a supplement.

Figure 5.2: Relationship between instrument and endogenous variable



Source: British Petroleum (2005).

The scatterplot in figure 5.2 serves as illustration of the correlation of our instrument with the endogenous variable. It shows that there is a clear positive correlation between energy resources in 1980 and energy resources in 2004, indicating that new discoveries have replaced depletion in most countries. The strong correlation also indicates that our instrument will be well suited to replace the endogenous variable.

We perform two stages least squares regressions[28]. At the first stage regression, the endogenous variable is regressed by normal OLS on the instrument, energy resources in 1980, and all exogenous variables in our model. In our case, this implies that energy resources in 2004 are estimated by our instrument, energy resource endowments in 1980, along with the dummy variables landlocked, distance to China and the SSA dummy (Wooldridge 2013). [29]

[28] Despite the name, 2SLS is done in one step in order to obtain the correct standard errors. Nevertheless, the intuition of a two-step estimation is very useful.

[29] Note that in the regressions including both the energy resource variable and the interaction between SSA and energy resources, this regression will be done twice.

We will show tables of the first stage regression results of the IV-regression of both energy resources alone and interacted with the SSA dummy for all regressions. The strong significance of the energy resources variable of 1980, indicated by strong coefficient significance and high F-value for all our first stage regressions, reveals that the relevance criterion is fulfilled. Also, the values for R-squared are high for all first stage estimations[30]. Consequently, the so-called finite sample bias of instrumental variables, which would cause the OLS estimator to be biased towards the OLS-estimate, is not likely to be a problem in any of our IV-estimations (Frankel and Romer 1999).

As we will see, the coefficients tend to be higher for the IV-estimates compared to those estimated by OLS in the results shown above. This may imply that the part of energy resources of 2004 that is correlated with energy resources in 1980 is stronger in its influence of today’s FEE (Frankel and Romer 1999). This touches into the discussion on whether there are other factors that are determined by having energy resource for a long time, such as through its influence on the general economic situation, culture and institutions (i.e. potential omitted variables) may be reflected through the IV-estimation.

5.2 Hypothesis 1: The effect of energy resources on FEE

Our first hypothesis states that Chinese FEE is attracted to energy resources and that this effect is stronger for SSA countries.

Total value of FEE

Tables 5.1 and 5.2 show the regression results when using the aggregated project volume per country over the whole period as our dependent variable. These estimations will tell us whether countries with energy resources attract higher amounts of FEE.

[30] Only for our robustness checks we conduct IV regressions where the instrument is weak.

Table 5.1: Full sample country level data: First step IV

	Spec 1	*Spec 2*		*Spec 3*	
	(1) lnenergy	(2) lnenergy	(3) ssaenergy	(4) lnenergy	(5) ssaenergy
Energy resources 1980	1.019***	1.011***	-0.007*	0.900***	-0.058**
	(0.049)	(0.049)	(0.004)	(0.060)	(0.027)
Energy resources 1980 * SSA		0.157	1.168***	0.334**	1.218***
		(0.160)	(0.148)	(0.168)	(0.158)
Observations	121.000	121.000	121.000	121.000	121.000
R-sq	0.779	0.779	0.653	0.816	0.699
F instr	440.29	237.54	41.15	138.31	30.62

First step estimations for lnenergy and ssaenergy variables in full sample estimations using aggregated FEE transactions as the dependent variable. Control variables: SSA, Landlocked, Distance, GDP, Inflation and Polity. Robust standard errors. Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5.2: Full sample (county level)

	OLS estimations			*IV estimations 2nd step*		
	(1) Spec 1	(2) Spec 2	(3) Spec 3	(4) Spec 1	(5) Spec 2	(6) Spec 3
Energy resources	0.405***	0.385***	0.218***	0.458***	0.449***	0.215**
	(0.072)	(0.077)	(0.082)	(0.080)	(0.083)	(0.096)
SSA	0.175	0.065	0.725**	0.229	0.164	0.701**
	(0.316)	(0.350)	(0.323)	(0.312)	(0.332)	(0.310)
Distance	-0.302	-0.297	-0.264	-0.304	-0.301	-0.263
	(0.220)	(0.220)	(0.243)	(0.217)	(0.217)	(0.232)
Landlocked	-0.229	-0.204	0.105	-0.194	-0.176	0.109
	(0.328)	(0.333)	(0.342)	(0.322)	(0.323)	(0.327)
Energy resources * SSA		0.269*	0.156		0.171*	0.210*
		(0.139)	(0.139)		(0.099)	(0.123)
GDP			0.401***			0.400***
			(0.070)			(0.070)
Inflation			0.028**			0.028**
			(0.012)			(0.013)
Polity			-0.017			-0.017
			(0.021)			(0.020)
Constant	10.400***	10.376***	0.092	10.336***	10.314***	0.122
	(1.925)	(1.930)	(2.930)	(1.912)	(1.909)	(2.830)
R^2	0.212	0.217	0.381	0.209	0.213	0.381
Observations	121	121	121	121	121	121

Estimations are done using country level aggregated FEE transactions as dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. Robust standard errors. Standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

As apparent from the table, the coefficient of the energy resource variable is positively significant at maximum 5 % significance level across all model specifications and for both estimation methods. The coefficients indicate that a 1 % increase in the energy resource reserves of a country will increase the value of FEE by 0.215% - 0.458%. The estimated effect of energy resources is largest in model specification 1. Inclusion of more control variables in specification 2 and 3 causes the estimated effect of energy resources to fall, indicating that some of the effects of other variables were captured in the coefficient of energy resources in specification 1.

The estimated effect of being an energy abundant SSA country lies within the range of 0.16% to 0.27%. The estimations are significant on a 10 % level for both OLS and IV estimations of specification 2 and for IV estimation of specification 3.

Among the control variables, GDP seems to have an especially large attraction on Chinese FEE, as it is significant at a 1% level. This effect is in accordance with our findings from the descriptive analysis, that most of the FEE in our dataset go to large industrialized countries, with the US, Australia and Canada as top three host countries. It may reflect a market or technology seeking motive by Chinese companies. The coefficient when using both OLS and IV estimation indicate that a 1 % increase in the GDP of the host country will increase the total FEE by approximately 0.4 %.

Inflation seems to have a significantly positive impact on Chinese FEE as well. Both estimation methods indicate that a 1 percentage point increase in the inflation rates of a host country will increase the total FEE inflows by 2.8 %. When controlling for GDP and inflation, being an SSA country seems to have a large impact on the amount of FEE received.

So far we have used both contracts and investments combined as our dependent variable. In order to check whether the effect of energy resources is different between the two groups we run the same regressions for the groups separately. By doing this, we find that energy resources is significant at attracting Chinese FEE for both contracts and investments. However, the effect of energy resources is only stronger for SSA countries in the case of contracts. This indicates that resource rich SSA countries will attract more contracts than non-SSA countries, but they will not attract more investments. The results from this estimation can be found in the Appendix A6.

Average project value

To investigate whether energy abundance also attracts FEE of higher average value per project, we run regressions with project level FEE as our dependent variable. We now have 1234 observations, where each observation is a Chinese foreign transaction.

Table 5.3 shows the results from the first stage of the IV regression. Table 5.4 shows the estimation results when using project level FEE as our dependent variable.

Table 5.3: Full sample (project level): First step IV

	Spec 1	*Spec 2*		*Spec 3*	
	(1) lnenergy	(2) lnenergy	(2) ssaenergy	(3) lnenergy	(3) ssaenergy
Energy resources 1980	0.907^{***}	0.890^{***}	-0.007	0.811^{***}	-0.063^{**}
	(0.061)	(0.061)	(0.004)	(0.064)	(0.025)
Energy resources 1980 * SSA		0.273^{***}	1.185^{***}	0.435^{***}	1.263^{***}
		(0.078)	(0.055)	(0.082)	(0.064)
Observations	1234	1234	1234	1234	1234
R-sq	0.850	0.854	0.841	0.879	0.877
F instr	221.48	282.08	267.26	190.08	201.42

All estimations have been done using i.year, Landlocked and lnDistance. Specification 3 with additional controls: GDP, Inflation & Polity. Standard errors clustered on country level. Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
..

Table 5.4: Full sample (project level)

	OLS estimations			*IV estimations*		
	(1) Spec 1	(2) Spec 2	(3) Spec 3	(4) Spec 1	(5) Spec 2	(6) Spec 3
Energy resources	0.037	0.026	0.012	0.031	0.019	0.002
	(0.026)	(0.026)	(0.027)	(0.030)	(0.029)	(0.031)
SSA	-0.114	-0.236*	-0.250*	-0.124	-0.293**	-0.322**
	(0.120)	(0.120)	(0.143)	(0.120)	(0.125)	(0.148)
Distance	0.102	0.110	0.099	0.105	0.115	0.116
	(0.076)	(0.075)	(0.084)	(0.074)	(0.074)	(0.080)
Landlocked	0.089	0.127	0.132	0.082	0.142	0.149
	(0.123)	(0.125)	(0.128)	(0.124)	(0.126)	(0.130)
Energy resources * SSA		0.116**	0.135**		0.168***	0.194***
		(0.046)	(0.054)		(0.037)	(0.042)
GDP			0.016			0.016
			(0.028)			(0.027)
Inflation			0.005			0.006
			(0.005)			(0.006)
Institutions			-0.002			-0.002
			(0.006)			(0.006)
Constant	5.036***	4.988***	4.781***	5.024***	4.965***	4.529***
	(0.798)	(0.783)	(0.864)	(0.778)	(0.763)	(0.956)
R^2	0.019	0.022	0.014	0.018	0.021	0.022
Observations	1234	1234	1234	1234	1234	1234

Estimations are done using disaggregated FEE transactions as the dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. All estimations include i.year as a control variable. Standard errors clustered on country level. Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the first step regressions all F-values are high, indicating that the instrument is strong.

The coefficient of energy resources is positive but not significant in this estimation, indicating that the size of the transactions received by a host country is not dependent on its energy resource reserves. None of the coefficients of the control variables are significant.

The interaction between energy resources and SSA is significant and positive for both estimation methods and for both specifications 1 and 2. The coefficients predict that a 1 % increase in energy resources will increase the value per FEE transaction by 0.12-0.19 % for SSA countries. This indicates that having energy resources will attract larger transactions to the SSA region compared to the non-SSA region.

As an additional analysis of the value of transactions, we have also run the model using the mean value of FEE on a country level as our dependent variable. The results from this estimation are available in Appendix A4. Similar to the last regression, using the aggregated mean value of FEE as the dependent variable reveals whether energy resources attracts transactions of average higher value. However, unlike the estimation results we have just shown, this approach does not take into account the number of projects received by each country. A main difference is that the effect of the interaction term is now clearer. This indicates that resource abundant SSA countries receive more small transactions than resource abundant non-SSA countries. Also, the coefficient of energy resources is significant.

5.3 Hypothesis 2: The infrastructure hypothesis

In our second hypothesis, we wish to examine whether resource abundant SSA countries attract FEE into the infrastructure sector. There are 98 countries with 432 transactions related to the infrastructure sector. The explanatory variables remain unchanged.

Total value of FEE

Tables 5.5 and 5.6 shows the regression results when using infrastructure FEE aggregated by country as our dependent variable.

Table 5.5: Infrastructure sector: First step IV

	Spec 1	*Spec 2*		*Spec 3*	
	(1) lnenergy	(2) lnenergy	(3) ssaenergy	(4) lnenergy	(5) ssaenergy
Energy resources 1980	1.017^{***}	1.009^{***}	-0.007	0.913^{***}	-0.062^{**}
	(0.051)	(0.053)	(0.004)	(0.065)	(0.028)
Energy resources 1980 * SSA		0.144	1.160^{***}	0.304^{*}	1.218^{***}
		(0.155)	(0.146)	(0.164)	(0.158)
Observations	98.000	98.000	98.000	98.000	98.000
R-sq	0.815	0.816	0.659	0.841	0.706
F instr	391.63	212.26	39.62	121.58	30.77

First step estimations for lnenergy and ssaenergy variables in infrastructure sector estimations using aggregated FEE transactions as the dependent variable. Estimations include the following control variables: Distance, Landlocked, GDP, Inflation, Institutions and SSA. Robust standard errors. Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5.6: Infrastructure sector (country level)

	OLS estimations			*IV estimations 2nd step*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Spec 1	Spec 2	Spec 3	Spec 1	Spec 2	Spec 3
Energy resources	0.296***	0.260***	0.121	0.328***	0.306***	0.155*
	(0.072)	(0.074)	(0.083)	(0.076)	(0.077)	(0.085)
SSA	0.636**	0.432	0.617*	0.678**	0.503*	0.604*
	(0.295)	(0.313)	(0.347)	(0.291)	(0.300)	(0.331)
Energy resources * SSA		0.423***	0.389**		0.398***	0.488***
		(0.122)	(0.159)		(0.095)	(0.112)
Constant	12.266***	12.189***	5.950**	12.315***	12.262***	6.586**
	(1.886)	(1.886)	(2.929)	(1.848)	(1.837)	(2.724)
R-sq	0.205	0.229	0.304	0.204	0.226	0.301
Observations	98	98	98	98	98	98

Estimations are done using aggregated FEE transactions to the infrastructure sector as the dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. All estimations include i.year, Distance, Landlocked, GDP, Polity and Inflation as a control variables. Robust standard errors. Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The coefficients of the energy resource variable predict that a 1 % increase in energy resource reserves will increase the total FEE by 0.121%-0.328%. With IV estimation, the coefficient is significant across all model specifications. When conducting OLS estimation, the coefficients are significant only when the controls are excluded. Comparing coefficients from OLS and IV pairwise by specification shows that their estimated values are very similar[31].

The interaction term is significantly positive, indicating that a 1 % increase in the energy resource reserves of SSA countries will lead to a 0.389-0.488% increase in FEE to the infrastructure sector. Hence, energy resources are attractive for FEE into the infrastructure sector in general but the effect is stronger for SSA countries.

The coefficient of the SSA dummy is also significantly positive, indicating that SSA countries in general will receive more FEE to the infrastructure sector.

[31] Control variables have been left out of the table, but the full estimation results are available in the Appendix A7.

Average project value

Tables 5.7 and 5.8 show the first step and results from estimations using the disaggregated FEE value to the infrastructure sector as our dependent variable[32]. All F-values are high, indicating that we have a strong instrument here as well.

Table 5.7: Infrastructure sector (project level): First step IV

	Spec 1	*Spec 2*		*Spec 3*	
	(1) lnenergy	(2) lnenergy	(3) ssaenergy	(4) lnenergy	(5) ssaenergy
Energy resources 1980	0.981***	0.960***	-0.013*	0.859***	-0.079***
	(0.051)	(0.053)	(0.007)	(0.066)	(0.027)
Energy resources 1980 * SSA		0.183**	1.159***	0.369***	1.253***
		(0.076)	(0.059)	(0.084)	(0.070)
Observations	432.000	432.000	432.000	432.000	432.000
R-sq	0.881	0.883	0.853	0.910	0.890
F instr	370.37	326.09	203.89	198.77	162.18

Estimations are done using disaggregated FEE transactions to the infrastructure sector as the dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. All estimations include i.year as a control variable. Standard errors clustered on country. Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[32] Control variables have been left out of the table, but the full estimation results are available in Appendix A9.

Table 5.8: Infrastructure sector (project level)

	OLS estimations			IV estimations 2nd step		
	(1) Spec 1	(2) Spec 2	(3) Spec 3	(4) Spec 1	(5) Spec 2	(6) Spec 3
Energy resources	0.069**	0.051*	0.049	0.077**	0.058*	0.074*
	(0.029)	(0.028)	(0.031)	(0.033)	(0.033)	(0.040)
SSA	0.316**	0.182	0.124	0.330**	0.149	0.057
	(0.147)	(0.147)	(0.172)	(0.141)	(0.149)	(0.181)
Energy resources * SSA		0.111**	0.124*		0.157***	0.188***
		(0.051)	(0.074)		(0.045)	(0.053)
Constant	6.066***	6.037***	6.638***	6.088***	6.061***	7.226***
	(1.182)	(1.178)	(1.310)	(1.155)	(1.149)	(1.289)
R2	0.037	0.043	0.059	0.037	0.042	0.054
Observations	432	432	432	432	432	432

Standard errors in parentheses
All estimations have been done using i.year.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The coefficients of the energy resource variable are significant across all specifications and for both estimation methods, except for specification 3 in the OLS estimation. The coefficients predict that a 1 % increase in energy resource reserves will increase the average value of FEE transactions by 0.05-0.08 %.

The effect of energy resources is stronger for SSA countries, indicated by a positive and significant interaction term. The coefficient of the interaction term predicts that a 1 % increase in energy resource reserves will increase the value of FEE transactions by an additional 0.11-0.19 % for the SSA region.

Using the mean value of FEE aggregated on a country level as our dependent variable we find similar results as in the disaggregated analysis. Hence, the number of projects does not seem to affect the results. The results from this analysis are available in Appendix A8.

5.4 Further robustness checks

We conducted a Breusch-Pagan test to check whether the errors are heteroscedastic. The results are displayed in the table A2.2.1 in the appendix, which suggests that heteroscedastic standard errors are present. We therefore conducted our analysis using robust standard errors for the country level analysis and clustering standard errors on a country level when conducting the average project value analysis. This let us obtain consistent estimates also in the presence of heteroscedasticity (Wooldridge 2013).

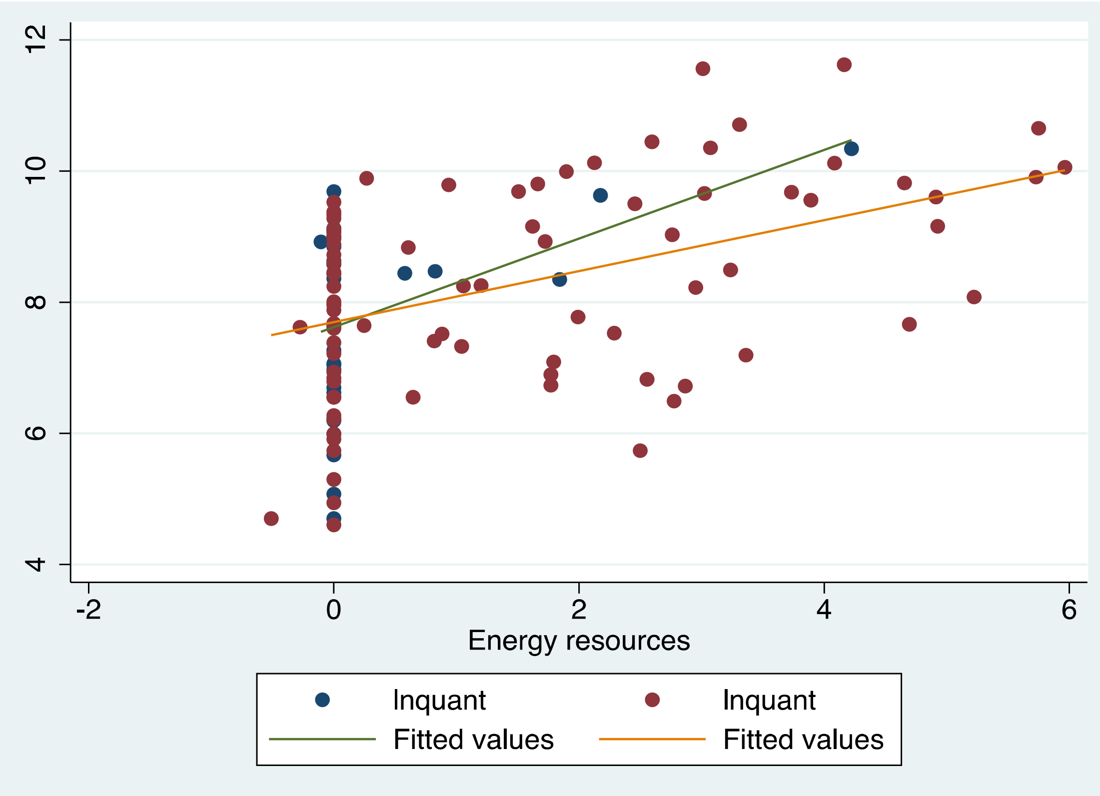
We also ran tests for the variance inflation factors (VIF) in order to examine multicollinearity among our variables. As a rule of thumb, this value should be below 10, which applies for all our variables. The highest collinearity existing between two variables is 0.6 between GDP and FEE, which is below a common rule of thumb to drop variables with collinearity above 0.7. Generally, interaction variables are often correlated with the variables it is comprised of. However, as displayed in the table, this is not an issue in our case.[33]

In order to further check robustness of our results, we also tried excluding Nigeria from the dataset. As shown in the scatterplot, the results for SSA seem to be driven by a few countries with considerable energy resource reserves, of which Nigeria is the country with the largest reserves. The results from this estimation are available in Appendix A10. Energy resources still attract larger amounts of FEE in the full sample, but the interaction term is negative and is no longer significant. The IV estimate may also be biased, since the F-value of the first step of the IV regression is very low (3.25). To check the robustness of results for the infrastructure hypothesis as well, we tried running the regression on infrastructure FEE without Nigeria. It appears that Nigeria has a large impact on both the effect of energy resources and the interaction term, as none of these are significant when Nigeria is excluded.

Hence, Nigeria seems to be an important driver for our results in SSA. The importance of just one country can be attributed to the fact that the resource variable employed, assign zeroes to all countries that do not have proven gas reserves over 0.09 trillion cubic meters and oil reserves over 0.47 billion barrels. Consequently, only 55 out of 121 countries have a value for its resource endowments assigned in the dataset. In SSA, only 6 out of 34 countries have a value assigned. Therefore, for several countries that might have smaller resource endowments, this is not registered. We would like to have known the resource endowments also for SSA countries with smaller reserves to get more robust estimates.

[33] The correlation between the interaction term and SSA is 0.2 and Energy is 0.07. For correlation matrix, see Appendix A2.1.

Figure 5.3 The relationship between FEE and Energy resources. Vertical axis shows ln FEE, horizontal axis shows ln energy resources, blue dots are SSA and red dots are non-SSA.



Source: Heritage Foundation (2014), British Petroleum (2005)

6 Conclusion

The aim of this thesis has been to investigate the determinants of the Chinese foreign economic engagement (FEE) with a particular focus on Sub Saharan Africa. According to prevalent literature, FDI is typically driven by three main motivations: market-seeking, efficiency-seeking and resource-seeking. In the case of China in SSA, both market seeking and efficiency seeking motives may play a role, yet the focus in this thesis is on the importance of energy resources for Chinese foreign economic engagement.

Our scope has been twofold: Firstly, we hypothesized that energy resources attract Chinese FEE and that the attraction to energy resources in SSA countries is stronger than in non-SSA countries. Secondly, we hypothesized that energy resource abundance attract Chinese FEE to the infrastructure sector. Our motivations for our hypotheses were the observations that China seemed to have a large engagement in energy extractive industries and infrastructure in SSA countries. Based on findings from our data analysis combined with notions from prevalent literature, we will in the following suggest some interpretations for our findings.

1st hypothesis: Chinese FEE's attraction to energy resources

The results with regard to our first hypothesis indicated that having energy resources will attract more Chinese FEE. They also indicated that the effect is stronger for SSA countries. Hence, SSA countries receive more FEE relative to their resource endowments than non-SSA countries. This was the case for both contracts and investment, yet, the effect for contract activities was stronger in SSA. Furthermore, our results showed that having energy resources attract significantly larger average transaction value per project, yet that this effect is only significant for SSA countries.

That Chinese companies are attracted to energy resources is in line with our expectations that the country wish to secure energy supply in order to be able to meet its growing demand.

China has experienced impressive economic growth during the past decades, which has created a domestic demand for energy resources in China. In order to be able to secure energy supplies for the future, the Chinese government has encouraged Chinese companies to engage in resource-seeking activities abroad through SOEs and financial incentives for privately owned companies.

That China is more attracted to energy resources in SSA countries than elsewhere may be rooted in a combination of several factors. Since SSA countries are among the least developed in the world they may be more easily accessible for countries willing to offer aid and cheap financing in return for access to natural resources, a method commonly used by the Chinese government when facilitating business for Chinese companies abroad.

Furthermore, a general attraction to the SSA region based on further attractive characteristics beyond their resource abundance, may contribute to increase the attraction to energy resources in this region. As touched upon in part 2, China may see an attractive long term business potential in Africa with regard to efficiency seeking and market seeking motives. Hence, characteristics of the SSA region that may appear attractive for other Chinese business segments induces the Chinese government to encourage Chinese companies, including energy companies, to engage in this region, to a larger extent than elsewhere.

Adding to this, many Western companies are subject to various constraints such as international agreements and standards that are deterring for business relations with SSA countries. In contrast, Chinese companies operate relatively unconstrained in SSA, which give Chinese companies special incentives to engage economically with the SSA region compared to more regulated environments (Kaplinski and Morris 2009).

As extraction of energy resources tends to be capital intensive, it is peculiar that the effect of energy resources on average project value only appears in SSA. One possible explanation is the possibility that there are more investment options and contracting projects in non-SSA countries, where Chinese companies choose to direct large transactions per project that are not related to energy extractive industries. This is likely to be due to the fact that non-SSA economies are more sophisticated than SSA. Correspondingly, engagement in energy resources does not increase average project level in non-SSA energy abundant countries. The lack of investment options in SSA countries equally lucrative to Chinese companies than energy resources is likely to be a reason, why energy abundance causes average value of project FEE to increase in SSA countries.

Another possible explanation for this finding is that Chinese companies more often partner up with local firms when conducting investments and contracts in non-SSA countries. Our data material shows that 32 % of FEE transactions in SSA are performed with a partner and 68 % with no partner. For non-SSA countries, 68 % of FEE transactions are performed with a partner and 32 % with no partner. This might be an indication that China partners up with local companies in countries that are more developed than China itself in order to gain access to advanced technology and knowledge.

2nd hypothesis: The effect of having energy resources on infrastructure for SSA countries

The analysis of energy resource's attraction of FEE in infrastructure indicated that energy resources attract more Chinese FEE, both in terms of aggregated value of Chinese FEE on a country level and at the average sizes of transactions. The effect is present for energy resources in general, but stronger for SSA countries.

As developed in the descriptive analysis, infrastructure projects in the SSA region are more often on a contract base, whereas they in the non-SSA region tend to be investments. This suggests that infrastructure projects in SSA countries to a larger extent are construction projects compared to in non-SSA countries. In part 2, we touched upon potential motivations for directing infrastructure FEE towards energy abundant countries. Firstly, it is possible that the motivation behind increased infrastructure FEE in relation to energy resources to strengthen their relationship with those in power. By offering generous financing schemes and often also aid, this may foster and improve diplomatic and business relationships in the SSA countries.

Secondly, the general low development level in the SSA region might represent a significant impediment for resource extracting companies. Improvement of infrastructure sector may therefore be a prerequisite for obtaining reliable export routes for energy resources.

Thirdly, an apparent link between infrastructure and energy resources may exist because Chinese companies prefer foreign locations where there is already a Chinese presence. This would create a link between energy resources and infrastructure development that is not motivated by energy resources directly.

An analysis on the extent to which FEE into the infrastructure sector actually were related to energy resource extractive projects would possibly have revealed insights on the motivations for Chinese infrastructure FEE into resource abundant countries. If FEE went mostly into infrastructure in relation to extractive industry locations, this would indicate that these transactions where facilitating energy resource export to China. Yet, as previously mentioned, the HF data does not reveal any information on this.

Concluding, we can say that both our hypotheses were confirmed. China is attracted to energy resources and the attraction is stronger in SSA countries. Energy resources also attract Chinese economic engagement in the infrastructure sector in general, and this effect is stronger for SSA as well.

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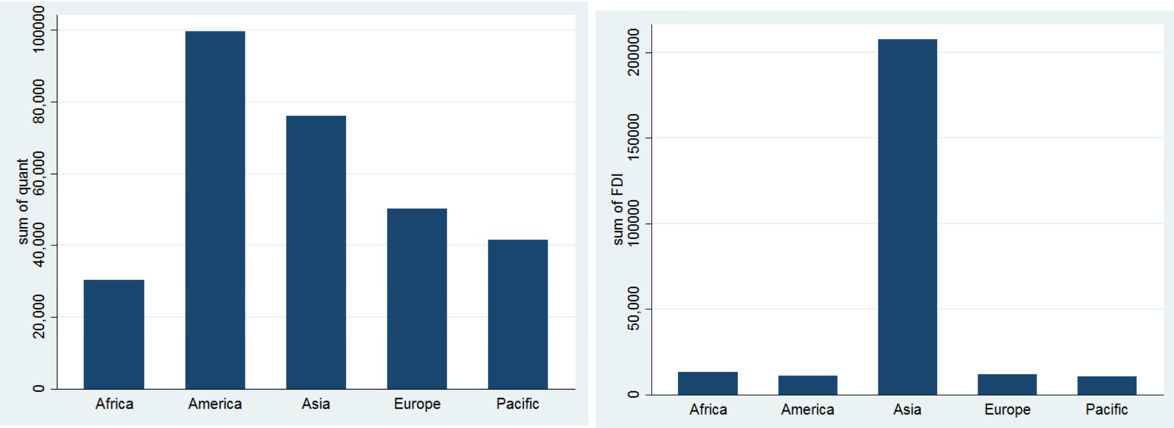
8 Appendix

A1. Descriptive statistics

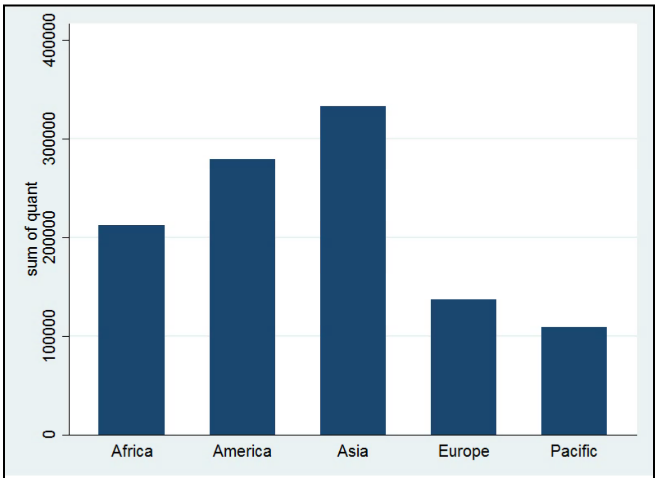
A1.1 Geographical distribution of FDI in HF and UNCTAD data



Geographical distribution of Chinese FDI in million dollars in the period 2005-2011 according to Heritage Foundation 2014 (left) and UNCTAD 2013 (right diagram)

Source: Heritage Foundation (2014) and UNCTAD (2013).

A1.2 Geographical distribution of FEE in HF data



Source: Heritage Foundation (2014)

A1.3 Descriptive statistics for country level data

Variable	Obs	Mean	Std. Dev.	Min	Max
Chinese FEE (mean value)	134	757.17	551.95	100	2800
Chinese FEE (total value)	134	8256.42	14988.76	100	111810
Energy resources 2004	134	17.54	56.23	0	389.01
Energy resources 1980	134	9.75	39.63	0	372.33
SSA	134	0.25	0.43	0	1
Landlocked	134	0.20	0.40	0	1
Distance	130	8755.41	3932.17	1123.94	19110.13
GDP	131	3.02e+11	1.20e+12	1.11e+08	1.23e+13
Inflation	130	8.23	7.24	-1.99	39.79
Polity IV	130	3.14	6.80	-10	10

A1.4 Descriptive statistics for project level data

Variable	Obs	Mean	Std. Dev.	Min	Max
Chinese FEE	1275	867.73	1476.59	100	19500
Energy resources 2004	1275	40.97	83.63	0	389.01
Energy resources 1980	1275	28.10	66.47	0	372.33
SSA	1275	0.18	0.39	0	1
Landlocked	1275	0.12	0.32	0	1
Distance	1259	8543.58	3910.41	1123.94	19110.13
GDP	1258	1.46e+12	3.49e+12	1.11e+08	1.23e+13
Inflation	1267	8.36	7.64	-1.99	39.79
Polity IV	1270	3.76	6.72	-10	10

A.2 Robustness tests

A2.1 Colinearity

Table A2.1.1: Correlation matrix for main specification

	FEE	Energy	SSA	SSA*Energy	Distance	Landlocked	Inflation	Polity	GDP
FEE	1.00								
Energy	0.29	1.00							
SSA	-0.14	-0.17	1.00						
SSA*Energy	0.13	0.07	0.20	1.00					
Distance	0.02	-0.13	0.31	0.07	1.00				
Landlocked	-0.14	-0.14	0.10	-0.06	-0.15	1.00			
Inflation	0.01	0.30	0.15	-0.04	0.01	0.03	1.00		
Polity	0.09	-0.26	-0.13	-0.02	0.25	-0.11	-0.43	1.00	
GDP	0.61	0.07	-0.15	-0.15	-0.02	-0.12	-0.18	0.23	1.00

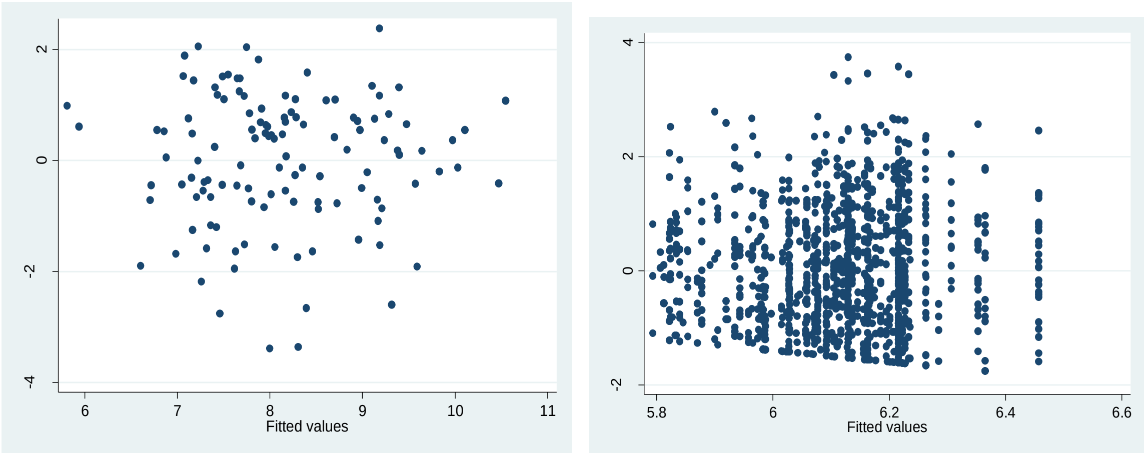
Table A2.1.2 Test for multicolinearity

```
  Collinearity Diagnostics

                      SQRT                   R-
  Variable      VIF     VIF    Tolerance    Squared
----------------------------------------------------
     quant      1.90    1.38    0.5269      0.4731
    energy      1.53    1.24    0.6549      0.3451
       ssa      1.98    1.41    0.5049      0.4951
ssaenergy2      1.77    1.33    0.5635      0.4365
Weighteddistance      1.29    1.13    0.7773      0.2227
Landlocked      1.04    1.02    0.9577      0.0423
 inflation      1.61    1.27    0.6192      0.3808
    polity      1.74    1.32    0.5732      0.4268
       gdp      1.91    1.38    0.5240      0.4760
----------------------------------------------------
  Mean VIF      1.64

                           Cond
        Eigenval          Index
---------------------------------
    1     3.8736          1.0000
    2     1.6287          1.5422
    3     1.3680          1.6827
    4     1.0426          1.9275
    5     0.8165          2.1782
    6     0.5556          2.6404
    7     0.2423          3.9980
    8     0.2242          4.1565
    9     0.1730          4.7324
    10     0.0755          7.1619
---------------------------------
 Condition Number         7.1619
 Eigenvalues & Cond Index computed from scaled raw sscp (w/ intercept)
 Det(correlation matrix)    0.1193
```

A2.2 Heteroscedasticity



Heteroscedasticity test: Aggregated data (left) and disagregated data (right)

Table A2.2.1: Results from Breusch-Pagan test:

Source	SS	df	MS
Model	31.1817023	8	3.89771279
Residual	446.650736	112	3.987953
Total	477.832439	120	3.98193699

Number of obs	=	121
F(8, 112)	=	0.98
Prob > F	=	0.4575
R-squared	=	0.0653
Adj R-squared	=	-0.0015
Root MSE	=	1.997

uhat2	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnenergy	-.0772156	.1514063	-0.51	0.611	-.3772078	.2227765
ssaenergy	-.2532057	.4279774	-0.59	0.555	-1.101188	.5947766
ssa	-.087817	.5554828	-0.16	0.875	-1.188435	1.012801
lndist	.2355517	.4012432	0.59	0.558	-.5594603	1.030564
Landlocked	.8561083	.4659369	1.84	0.069	-.067086	1.779303
lngdp	.0874342	.1261589	0.69	0.490	-.1625335	.337402
inflation	-.0371779	.0297528	-1.25	0.214	-.0961292	.0217734
polity	-.016472	.0353696	-0.47	0.642	-.0865525	.0536084
_cons	-2.558562	4.926136	-0.52	0.605	-12.31907	7.201944

Table A2.2.2: Results from Breusch-Pagan/Cook Weisberg test

```
IV heteroskedasticity test(s) using levels of IVs only
Ho: Disturbance is homoskedastic
    Pagan-Hall general test statistic    :    8.449  Chi-sq(8) P-value = 0.3909
```

A2.3 Endogeneity

Table A2.3.1: Results from Hausmann test:

	Coefficients (b) iv	Coefficients (B) .	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnenergy	.2147565	.2180641	-.0033076	.0630518
ssaenergy	.2096703	.1557484	.053922	.1869134
lndist	-.2629708	-.2639084	.0009375	.021667
Landlocked	.1086474	.1046438	.0040037	.0263811
inflation	.0282412	.0282577	-.0000165	.0046404
polity	-.0169519	-.0170341	.0000822	.0057373
lngdp	.4000726	.4014677	-.0013951	.0247339
ssa	.7009073	.7249441	-.0240368	.0895239

```
                 b = consistent under Ho and Ha; obtained from ivreg
  B = inconsistent under Ha, efficient under Ho; obtained from regress

Test:  Ho:  difference in coefficients not systematic

              chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =        0.08
            Prob>chi2 =      1.0000
```

A2.4 The relationship between Energy resources 1980 and Energy resources 2004

Table A2.4.1: Project level data (1234 obs)

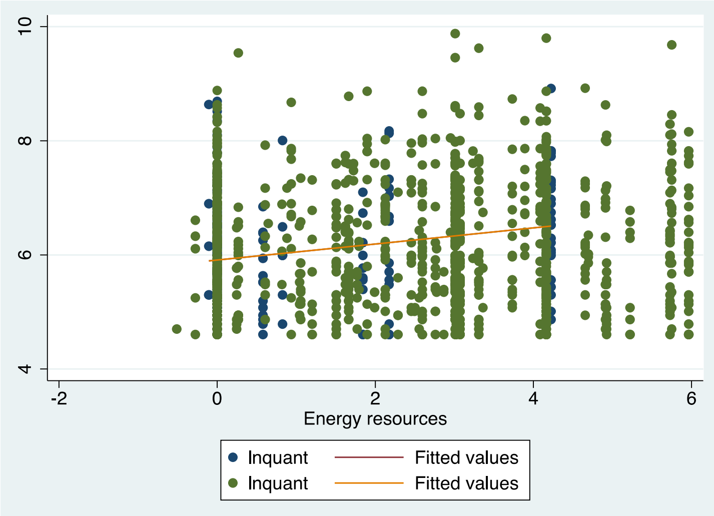
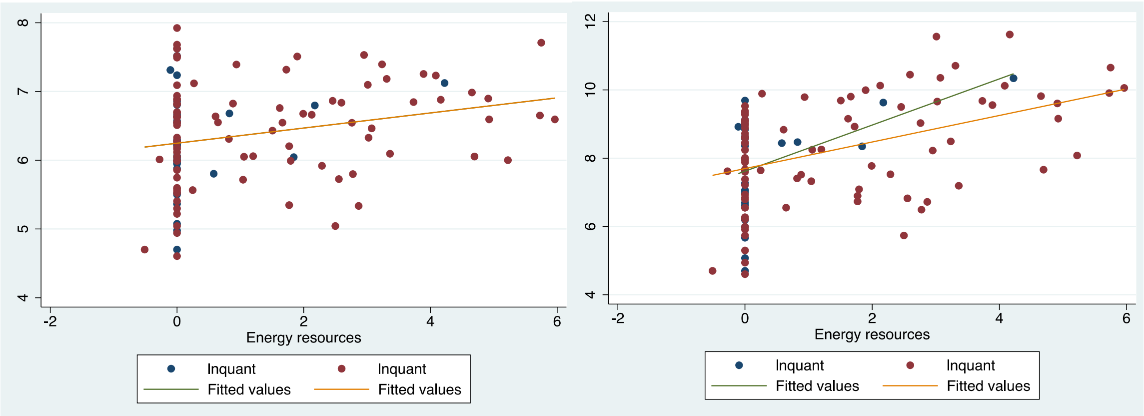


Table A2.4.2: Country level data (121 obs): Mean (left), total value (right)



A.3 Full sample analysis (country level data)

A3.1: All sectors (country level): OLS estimations

	(1) $ FDI	(2) $ FDI	(3) $ FDI	(4) $ FDI	(5) $ FDI	(6) $ FDI
Energy resources	0.405^{***}	0.385^{***}	0.315^{***}	0.387^{***}	0.430^{***}	0.218^{***}
	(0.072)	(0.077)	(0.067)	(0.088)	(0.083)	(0.082)
SSA	0.175	0.065	0.806^{**}	0.071	0.212	0.725^{**}
	(0.316)	(0.350)	(0.318)	(0.350)	(0.366)	(0.323)
Distance	-0.302	-0.297	-0.332	-0.298	-0.396^{*}	-0.264
	(0.220)	(0.220)	(0.239)	(0.219)	(0.216)	(0.243)
Landlocked	-0.229	-0.204	0.112	-0.202	-0.152	0.105
	(0.328)	(0.333)	(0.345)	(0.340)	(0.345)	(0.342)
Energy resources * SSA		0.269^{*}	0.155	0.268^{*}	0.254^{*}	0.156
		(0.139)	(0.131)	(0.142)	(0.145)	(0.139)
GDP			0.335^{***}			0.401^{***}
			(0.066)			(0.070)
Inflation				-0.001		0.028^{**}
				(0.015)		(0.012)
Polity					0.029	-0.017
					(0.020)	(0.021)
Constant	10.400^{***}	10.376^{***}	2.384	10.388^{***}	11.081^{***}	0.092
	(1.925)	(1.930)	(2.826)	(1.904)	(1.891)	(2.930)
R^2	0.212	0.217	0.361	0.217	0.231	0.381
Observations	121	121	121	121	121	121

Estimations are done using country level aggregated FEE transactions as dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. Robust standard errors. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A3.2: All sectors (country level): Second step IV

	(1) $ FDI	(2) $ FDI	(3) $ FDI	(4) $ FDI	(5) $ FDI	(6) $ FDI
Energy resources	0.458^{***}	0.449^{***}	0.314^{***}	0.463^{***}	0.490^{***}	0.215^{**}
	(0.080)	(0.083)	(0.075)	(0.098)	(0.090)	(0.096)
SSA	0.229	0.164	0.833^{***}	0.207	0.341	0.701^{**}
	(0.312)	(0.332)	(0.300)	(0.342)	(0.358)	(0.310)
Distance	-0.304	-0.301	-0.334	-0.305	-0.417^{**}	-0.263
	(0.217)	(0.217)	(0.233)	(0.215)	(0.212)	(0.232)
Landlocked	-0.194	-0.176	0.104	-0.169	-0.131	0.109
	(0.322)	(0.323)	(0.333)	(0.327)	(0.333)	(0.327)
Energy resources * SSA		0.171^{*}	0.086	0.144	0.100	0.210^{*}
		(0.099)	(0.097)	(0.131)	(0.121)	(0.123)
GDP			0.337^{***}			0.400^{***}
			(0.065)			(0.070)
Inflation				-0.007		0.028^{**}
				(0.016)		(0.013)
Polity					0.033	-0.017
					(0.020)	(0.020)
Constant	10.336^{***}	10.314^{***}	2.334	10.392^{***}	11.156^{***}	0.122
	(1.912)	(1.909)	(2.747)	(1.872)	(1.858)	(2.830)
R^2	0.209	0.213	0.361	0.212	0.227	0.381
Observations	121	121	121	121	121	121

Estimations are done using country level aggregated FEE transactions as dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. Robust standard errors. Standard errors in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A3.3: All sectors (aggregated data): First step IV for Energy resources

	(1) lnenergy	(2) lnenergy	(3) lnenergy	(4) lnenergy	(5) lnenergy	(6) lnenergy
SSA	-0.255	-0.273	-0.414*	-0.439**	-0.464**	-0.486**
	(0.168)	(0.172)	(0.212)	(0.176)	(0.179)	(0.196)
Distance	0.040	0.040	0.048	0.059	0.185	0.173
	(0.143)	(0.144)	(0.143)	(0.139)	(0.139)	(0.135)
Landlocked	0.014	0.014	-0.045	-0.032	-0.054	-0.048
	(0.194)	(0.194)	(0.184)	(0.177)	(0.167)	(0.165)
Energy resources 1980	1.019***	1.011***	1.039***	0.942***	0.958***	0.900***
	(0.049)	(0.049)	(0.046)	(0.053)	(0.049)	(0.060)
Energy resources 1980 * SSA		0.157	0.181	0.301	0.254*	0.334**
		(0.160)	(0.165)	(0.199)	(0.137)	(0.168)
GDP			-0.069*			0.035
			(0.038)			(0.044)
Inflation				0.036***		0.027**
				(0.010)		(0.010)
Polity					-0.043***	-0.036**
					(0.013)	(0.014)
Constant	0.106	0.113	1.756	-0.257	-0.953	-1.903
	(1.260)	(1.265)	(1.603)	(1.211)	(1.190)	(1.544)
Observations	121.000	121.000	121.000	121.000	121.000	121.000
R-sq	0.779	0.779	0.784	0.802	0.806	0.816
F instr	440.29	237.54	272.85	188.64	239.71	138.31

First step estimations for lnenergy variable in full sample estimations using aggregated FEE transactions as the dependent variable. Robust standard errors.Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A3.4: All sectors (aggregated data): First step IV for SSA*Energy resources

	(2) ssaenergy	(3) ssaenergy	(4) ssaenergy	(5) ssaenergy	(6) ssaenergy
Distance	-0.017	-0.019	-0.012	0.010	0.014
	(0.021)	(0.023)	(0.022)	(0.020)	(0.023)
Landlocked	-0.107**	-0.097*	-0.121**	-0.120**	-0.098*
	(0.053)	(0.050)	(0.056)	(0.058)	(0.051)
SSA	0.228**	0.253**	0.179*	0.193**	0.227**
	(0.109)	(0.121)	(0.097)	(0.092)	(0.104)
Energy resources 1980	-0.007*	-0.011*	-0.027	-0.016*	-0.058**
	(0.004)	(0.006)	(0.016)	(0.009)	(0.027)
Energy resources 1980 * SSA	1.168***	1.163***	1.211***	1.186***	1.218***
	(0.148)	(0.148)	(0.167)	(0.141)	(0.158)
GDP		0.012			0.045**
		(0.008)			(0.021)
Inflation			0.011		0.011
			(0.008)		(0.008)
Polity				-0.008**	-0.009*
				(0.004)	(0.005)
Constant	0.180	-0.105	0.070	-0.018	-1.220**
	(0.191)	(0.203)	(0.206)	(0.174)	(0.588)
Observations	121.000	121.000	121.000	121.000	121.000
R-sq	0.653	0.655	0.678	0.664	0.699
F instr	41.15	39.23	26.65	44.08	30.62

First step estimations for ssaenergy variable in full sample estimations using aggregated FEE transactions as the dependent variable..Robust standard errors. Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.4 Full sample analysis (country level mean)

A4.1: All sectors (country level mean): OLS estimations

	(1)	(2)	(3)	(4)	(5)	(6)
	$ FDI	$ FDI	$ FDI	$ FDI	$ FDI	$ FDI
Energy resources	0.109***	0.099**	0.076*	0.095**	0.112**	0.033
	(0.038)	(0.040)	(0.041)	(0.041)	(0.044)	(0.048)
SSA	-0.128	-0.177	0.077	-0.188	-0.135	0.041
	(0.171)	(0.191)	(0.182)	(0.191)	(0.203)	(0.186)
Distance	0.055	0.058	0.046	0.059	0.029	0.075
	(0.123)	(0.124)	(0.125)	(0.123)	(0.129)	(0.130)
Landlocked	0.153	0.164	0.272	0.161	0.179	0.269
	(0.195)	(0.197)	(0.206)	(0.201)	(0.205)	(0.207)
Energy resources * SSA		0.120	0.081	0.121	0.116	0.082
		(0.075)	(0.073)	(0.076)	(0.074)	(0.088)
GDP			0.115***			0.144***
			(0.035)			(0.036)
Inflation				0.002		0.012*
				(0.007)		(0.007)
Polity					0.008	-0.007
					(0.012)	(0.013)
Constant	5.751***	5.740***	3.001**	5.719***	5.941***	2.002
	(1.069)	(1.073)	(1.402)	(1.065)	(1.099)	(1.449)
R^2	0.072	0.077	0.149	0.077	0.082	0.165
Observations	121	121	121	121	121	121

Estimations are done using country level aggregated FEE transactions as dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. Robust standard errors. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A4.2: All sectors (country level mean): Second step IV

	(1)	(2)	(3)	(4)	(5)	(6)
	$ FDI	$ FDI	$ FDI	$ FDI	$ FDI	$ FDI
Energy resources	0.114***	0.108***	0.061	0.105**	0.118***	0.012
	(0.039)	(0.041)	(0.044)	(0.044)	(0.046)	(0.053)
SSA	-0.123	-0.172	0.060	-0.179	-0.126	-0.005
	(0.169)	(0.181)	(0.174)	(0.183)	(0.195)	(0.181)
Distance	0.055	0.058	0.046	0.058	0.027	0.082
	(0.121)	(0.121)	(0.121)	(0.120)	(0.125)	(0.122)
Landlocked	0.156	0.171	0.267	0.170	0.182	0.270
	(0.189)	(0.190)	(0.199)	(0.192)	(0.195)	(0.198)
Energy resources * SSA		0.130**	0.100*	0.134**	0.111*	0.160**
		(0.056)	(0.059)	(0.064)	(0.064)	(0.071)
GDP			0.117***			0.148***
			(0.034)			(0.035)
Inflation				0.001		0.014*
				(0.008)		(0.007)
Polity					0.009	-0.009
					(0.011)	(0.012)
Constant	5.745***	5.728***	2.965**	5.716***	5.948***	1.863
	(1.052)	(1.052)	(1.345)	(1.038)	(1.067)	(1.350)
R^2	0.072	0.077	0.148	0.077	0.082	0.162
Observations	121	121	121	121	121	121

Estimations are done using country level aggregated FEE transactions as dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. Robust standard errors. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.5 Full sample analysis (project level data)

A5.1: All sectors (project level data): OLS estimations

	(1) $ FDI	(2) $ FDI	(3) $ FDI	(4) $ FDI	(5) $ FDI	(6) $ FDI
Energy resources	0.037	0.026	0.026	0.019	0.024	0.012
	(0.026)	(0.026)	(0.027)	(0.026)	(0.026)	(0.027)
SSA	-0.114	-0.236*	-0.236*	-0.266**	-0.247*	-0.250*
	(0.120)	(0.120)	(0.139)	(0.125)	(0.126)	(0.143)
Distance	0.102	0.110	0.110	0.115	0.118	0.099
	(0.076)	(0.075)	(0.079)	(0.073)	(0.081)	(0.084)
Landlocked	0.089	0.127	0.126	0.118	0.123	0.132
	(0.123)	(0.125)	(0.128)	(0.126)	(0.125)	(0.128)
Energy resources * SSA		0.116**	0.116**	0.121**	0.117**	0.135**
		(0.046)	(0.046)	(0.054)	(0.047)	(0.054)
GDP			-0.000			0.016
			(0.025)			(0.028)
Inflation				0.004		0.005
				(0.005)		(0.005)
Polity					-0.002	-0.002
					(0.006)	(0.006)
Constant	5.036***	4.988***	4.992***	4.915***	4.923***	4.781***
	(0.798)	(0.783)	(0.939)	(0.746)	(0.787)	(0.864)
R^2	0.019	0.022	0.022	0.023	0.022	0.014
Observations	1234	1234	1234	1234	1234	1234

Estimations are done using disaggregated FEE transactions as the dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. All estimations include i.year as a control variable. Standard errors clustered on country-level. Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A5.2: All sectors (project level data): Second step IV

	(1) $ FDI	(2) $ FDI	(3) $ FDI	(4) $ FDI	(5) $ FDI	(6) $ FDI
Energy resources	0.031	0.019	0.019	0.013	0.018	0.002
	(0.030)	(0.029)	(0.029)	(0.028)	(0.028)	(0.031)
SSA	-0.124	-0.293**	-0.293**	-0.335**	-0.307**	-0.322**
	(0.120)	(0.125)	(0.143)	(0.135)	(0.131)	(0.148)
Distance	0.105	0.115	0.115	0.120*	0.124	0.116
	(0.074)	(0.074)	(0.078)	(0.072)	(0.079)	(0.080)
Landlocked	0.082	0.142	0.142	0.139	0.139	0.149
	(0.124)	(0.126)	(0.128)	(0.127)	(0.125)	(0.130)
Energy resources * SSA		0.168***	0.168***	0.186***	0.171***	0.194***
		(0.037)	(0.037)	(0.041)	(0.037)	(0.042)
GDP			-0.000			0.016
			(0.024)			(0.027)
Inflation				0.005		0.006
				(0.005)		(0.006)
Polity					-0.002	-0.002
					(0.006)	(0.006)
Constant	5.024***	4.965***	4.970***	4.883***	4.886***	4.529***
	(0.778)	(0.763)	(0.901)	(0.728)	(0.766)	(0.956)
R^2	0.018	0.021	0.021	0.022	0.021	0.022
Observations	1234	1234	1234	1234	1234	1234

Estimations are done using disaggregated FEE transactions as the dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. All estimations include i.year as a control variable. Standard errors clustered on country-level. Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A5.3: All sectors (disaggregated data): First step IV for Energy resources

	(1) lnenerg	(2) lnenerg	(3) lnenerg	(4) lnenerg	(5) lnenerg	(6) lnenerg
Energy resources 1980	0.907***	0.890***	0.933***	0.849***	0.868***	0.811***
	(0.061)	(0.061)	(0.062)	(0.052)	(0.052)	(0.064)
Energy resources 1980 * SSA		0.273***	0.287***	0.421***	0.332***	0.435***
		(0.078)	(0.071)	(0.090)	(0.064)	(0.082)
Constant	-0.345	-0.372	1.034	-0.937	-2.071	-3.158
	(1.857)	(1.819)	(2.219)	(1.590)	(1.548)	(2.097)
Observations	1234	1234	1234	1234	1234	1234
R-sq	0.850	0.854	0.859	0.871	0.871	0.879
F instr	221.48	282.08	187.44	270.03	378.17	190.08

First step estimations for lnenergy variable in full data set estimations using disaggregated FEE transactions as the dependent variable. Estimations include the following control variables: Distance, Landlocked, GDP, Inflation, Institutions, SSA and i.year. Standard errors clustered on country-level. Standard errors in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A5.4: All sectors (disaggregated data): First step IV for SSA*Energy resources

	(1)	(2) ssaenerg	(3) ssaenerg	(4) ssaenerg	(5) ssaenerg	(6) ssaenerg
Energy resources 1980		-0.007	-0.008	-0.023	-0.011	-0.063**
		(0.004)	(0.006)	(0.015)	(0.007)	(0.025)
Energy resources 1980 * SSA		1.185***	1.184***	1.244***	1.196***	1.263***
		(0.055)	(0.055)	(0.066)	(0.050)	(0.064)
Constant		0.210	0.153	-0.015	-0.108	-1.444**
		(0.186)	(0.178)	(0.283)	(0.182)	(0.604)
Observations		1234	1234	1234	1234	1234
R-sq		0.841	0.841	0.864	0.846	0.877
F instr		267.26	259.24	199.68	309.22	201.42

First step estimations for ssaenergy variable in full data set estimations using disaggregated FEE transactions as the dependent variable. Estimations include the following control variables: Distance, Landlocked, GDP, Inflation, Institutions, SSA and i.year. Standard errors clustered on country-level. Standard errors in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.6 Contracts and investments

Table A6.1: Full sample (country level): Contracts vs investments

	Contracts		*Investments*	
	(1) OLS	(2) IV	(3) OLS	(4) IV
Energy resources	0.154*	0.136	0.195*	0.233*
	(0.092)	(0.105)	(0.113)	(0.134)
Energy resources * SSA	0.283**	0.414***	-0.109	0.120
	(0.141)	(0.125)	(0.238)	(0.177)
SSA	0.647*	0.578*	0.358	0.268
	(0.338)	(0.330)	(0.451)	(0.460)
Distance	-0.817**	-0.812**	0.151	0.137
	(0.341)	(0.321)	(0.237)	(0.220)
Landlocked	-0.117	-0.102	0.482	0.543
	(0.306)	(0.290)	(0.472)	(0.446)
GDP	0.179**	0.180**	0.421***	0.394***
	(0.082)	(0.075)	(0.071)	(0.073)
Inflation	0.030**	0.031**	0.002	-0.004
	(0.015)	(0.015)	(0.019)	(0.018)
Polity	-0.040*	-0.040*	0.004	0.010
	(0.024)	(0.023)	(0.027)	(0.029)
Constant	9.819**	9.768***	-4.635	-3.876
	(3.830)	(3.519)	(2.880)	(2.724)
R^2	0.331	0.329	0.368	0.362
Observations	98	98	88	88
F-value of excluded instruments		89.71 31.39		451.66 309.04

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.7 Infrastructure sector analysis (country level)

A7.1: Infrastructure sector (country level): OLS estimations

	(1)	(2)	(3)	(4)	(5)	(6)
	$ FDI	$ FDI	$ FDI	$ FDI	$ FDI	$ FDI
Energy resources	0.296***	0.260***	0.227***	0.220***	0.263***	0.121
	(0.072)	(0.074)	(0.072)	(0.080)	(0.081)	(0.083)
SSA	0.636**	0.432	0.727**	0.331	0.442	0.617*
	(0.295)	(0.313)	(0.335)	(0.321)	(0.338)	(0.347)
Distance	-0.610***	-0.596***	-0.576**	-0.600***	-0.602***	-0.505**
	(0.218)	(0.218)	(0.231)	(0.216)	(0.212)	(0.238)
Landlocked	-0.408	-0.356	-0.243	-0.378	-0.354	-0.244
	(0.296)	(0.299)	(0.313)	(0.300)	(0.303)	(0.309)
Energy resources * SSA		0.423***	0.382***	0.434***	0.422***	0.389**
		(0.122)	(0.121)	(0.134)	(0.125)	(0.159)
GDP			0.144**			0.217***
			(0.063)			(0.069)
Inflation				0.020		0.031**
				(0.015)		(0.014)
Polity					0.002	-0.018
					(0.020)	(0.022)
Constant	12.266***	12.189***	8.439***	12.132***	12.233***	5.950**
	(1.886)	(1.886)	(2.710)	(1.855)	(1.828)	(2.929)
R^2	0.205	0.229	0.267	0.242	0.229	0.304
Observations	98	98	98	98	98	98

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A7.2: Infrastructure sector (country level): Second step IV

	(1)	(2)	(3)	(4)	(5)	(6)
	$ FDI	$ FDI	$ FDI	$ FDI	$ FDI	$ FDI
Energy resources	0.328***	0.306***	0.250***	0.277***	0.313***	0.155*
	(0.076)	(0.077)	(0.073)	(0.087)	(0.084)	(0.085)
SSA	0.678**	0.503*	0.756**	0.409	0.539	0.604*
	(0.291)	(0.300)	(0.319)	(0.314)	(0.331)	(0.331)
Distance	-0.622***	-0.613***	-0.585***	-0.616***	-0.635***	-0.529**
	(0.213)	(0.212)	(0.222)	(0.210)	(0.208)	(0.223)
Landlocked	-0.384	-0.326	-0.232	-0.332	-0.321	-0.218
	(0.291)	(0.292)	(0.302)	(0.291)	(0.295)	(0.296)
Energy resources * SSA		0.398***	0.364***	0.455***	0.384***	0.488***
		(0.095)	(0.094)	(0.114)	(0.110)	(0.112)
GDP			0.140**			0.198***
			(0.060)			(0.064)
Inflation				0.016		0.029**
				(0.015)		(0.014)
Polity					0.006	-0.014
					(0.020)	(0.021)
Constant	12.315***	12.262***	8.587***	12.218***	12.420***	6.586**
	(1.848)	(1.837)	(2.605)	(1.805)	(1.787)	(2.724)
R^2	0.204	0.226	0.266	0.237	0.226	0.301
Observations	98	98	98	98	98	98

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A7.3: Infrastructure sector (country level): First step IV for Energy resources

	(1) lnenergy	(2) lnenergy	(3) lnenergy	(4) lnenergy	(5) lnenergy	(6) lnenergy
SSA	-0.245	-0.266	-0.379	-0.412*	-0.456**	-0.475**
	(0.205)	(0.210)	(0.244)	(0.209)	(0.220)	(0.231)
Distance	0.134	0.135	0.126	0.119	0.263	0.234
	(0.174)	(0.174)	(0.175)	(0.171)	(0.175)	(0.174)
Landlocked	-0.121	-0.120	-0.165	-0.142	-0.159	-0.146
	(0.194)	(0.196)	(0.189)	(0.192)	(0.180)	(0.182)
Energy resources 1980	1.017***	1.009***	1.034***	0.948***	0.962***	0.913***
	(0.051)	(0.053)	(0.050)	(0.056)	(0.054)	(0.065)
Energy resources 1980 * SSA		0.144	0.165	0.273	0.234*	0.304*
		(0.155)	(0.159)	(0.191)	(0.138)	(0.168)
GDP			-0.061			0.030
			(0.042)			(0.049)
Inflation				0.032***		0.024**
				(0.009)		(0.011)
Polity					-0.037***	-0.031*
					(0.014)	(0.017)
Constant	-0.709	-0.711	0.875	-0.749	-1.651	-2.306
	(1.491)	(1.496)	(1.897)	(1.454)	(1.473)	(1.929)
Observations	98.000	98.000	98.000	98.000	98.000	98.000
R-sq	0.815	0.816	0.820	0.833	0.833	0.841
F instr	391.63	212.26	236.36	173.36	208.45	121.58

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A7.4: Infrastructure sector (country level): First step IV for SSA*Energy

	(2) lnenergy	(3) lnenergy	(4) lnenergy	(5) lnenergy	(6) lnenergy
Distance	-0.005	-0.004	-0.011	0.026	0.032
	(0.025)	(0.026)	(0.027)	(0.026)	(0.033)
Landlocked	-0.140**	-0.132*	-0.149**	-0.150**	-0.124*
	(0.070)	(0.067)	(0.070)	(0.072)	(0.066)
SSA	0.254**	0.276**	0.200*	0.208**	0.235**
	(0.121)	(0.131)	(0.109)	(0.100)	(0.111)
Energy resources 1980	-0.007	-0.011*	-0.029	-0.018*	-0.062**
	(0.004)	(0.007)	(0.018)	(0.010)	(0.028)
Energy resources 1980 * SSA	1.160***	1.156***	1.209***	1.183***	1.218***
	(0.146)	(0.146)	(0.168)	(0.138)	(0.158)
GDP		0.012			0.048**
		(0.009)			(0.023)
Inflation			0.012		0.012
			(0.008)		(0.009)
Polity				-0.009**	-0.011
				(0.005)	(0.007)
Constant	0.078	-0.228	0.063	-0.153	-1.461**
	(0.219)	(0.278)	(0.236)	(0.216)	(0.686)
Observations	98.000	98.000	98.000	98.000	98.000
R-sq	0.659	0.661	0.686	0.671	0.706
F instr	39.62	38.66	26.35	44.55	30.77

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.8 Infrastructure sector analysis (country level mean)

A8.1: Infrastructure sector (country level mean): OLS estimations

	(1) $ FDI	(2) $ FDI	(3) $ FDI	(4) $ FDI	(5) $ FDI	(6) $ FDI
Energy resources	0.099^{**}	0.085^{**}	0.071^{*}	0.052	0.097^{**}	0.029
	(0.038)	(0.039)	(0.041)	(0.036)	(0.040)	(0.041)
SSA	0.317^{*}	0.237	0.359^{*}	0.155	0.285	0.313
	(0.177)	(0.194)	(0.193)	(0.202)	(0.200)	(0.202)
Distance	-0.318^{**}	-0.313^{**}	-0.304^{**}	-0.316^{**}	-0.344^{**}	-0.332^{**}
	(0.145)	(0.145)	(0.145)	(0.143)	(0.141)	(0.144)
Landlocked	-0.051	-0.030	0.017	-0.048	-0.019	0.014
	(0.194)	(0.195)	(0.206)	(0.196)	(0.201)	(0.211)
Energy resources * SSA		0.167^{**}	0.150^{**}	0.176^{*}	0.162^{**}	0.154
		(0.074)	(0.072)	(0.101)	(0.071)	(0.115)
GDP			0.060^{**}			0.078^{**}
			(0.030)			(0.034)
Inflation				0.017^{*}		0.025^{***}
				(0.008)		(0.009)
Polity					0.009	0.007
					(0.010)	(0.012)
Constant	8.685^{***}	8.655^{***}	7.100^{***}	8.609^{***}	8.881^{***}	6.746^{***}
	(1.248)	(1.253)	(1.624)	(1.237)	(1.217)	(1.733)
R^2	0.097	0.111	0.134	0.140	0.117	0.189
Observations	98	98	98	98	98	98

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A8.2: Infrastructure sector (country level mean): Second step IV

	(1) $ FDI	(2) $ FDI	(3) $ FDI	(4) $ FDI	(5) $ FDI	(6) $ FDI
Energy resources	0.107^{***}	0.094^{**}	0.072^{*}	0.067^{*}	0.106^{***}	0.033
	(0.039)	(0.039)	(0.042)	(0.037)	(0.039)	(0.044)
SSA	0.328^{*}	0.227	0.330^{*}	0.139	0.284	0.260
	(0.173)	(0.182)	(0.180)	(0.192)	(0.187)	(0.189)
Distance	-0.321^{**}	-0.316^{**}	-0.305^{**}	-0.319^{**}	-0.350^{***}	-0.338^{**}
	(0.140)	(0.140)	(0.139)	(0.138)	(0.134)	(0.135)
Landlocked	-0.045	-0.011	0.027	-0.017	-0.002	0.033
	(0.192)	(0.193)	(0.201)	(0.193)	(0.197)	(0.203)
Energy resources * SSA		0.230^{***}	0.216^{***}	0.285^{***}	0.209^{***}	0.283^{***}
		(0.059)	(0.057)	(0.060)	(0.059)	(0.060)
GDP			0.057^{**}			0.069^{**}
			(0.029)			(0.032)
Inflation				0.015^{*}		0.024^{**}
				(0.008)		(0.009)
Polity					0.010	0.008
					(0.009)	(0.011)
Constant	8.698^{***}	8.667^{***}	7.169^{***}	8.626^{***}	8.918^{***}	7.001^{***}
	(1.214)	(1.214)	(1.549)	(1.195)	(1.163)	(1.613)
R^2	0.097	0.108	0.132	0.131	0.115	0.181
Observations	98	98	98	98	98	98

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.9 Infrastructure sector analysis (project level)

A9.1: Infrastructure sector (project level): OLS estimations

	(1) $ FDI	(2) $ FDI	(3) $ FDI	(4) $ FDI	(5) $ FDI	(6) $ FDI
Energy resources	0.069**	0.051*	0.062*	0.032	0.049*	0.049
	(0.029)	(0.028)	(0.032)	(0.025)	(0.027)	(0.031)
SSA	0.316**	0.182	0.113	0.117	0.169	0.124
	(0.147)	(0.147)	(0.170)	(0.160)	(0.159)	(0.172)
Distance	-0.070	-0.061	-0.037	-0.073	-0.051	-0.100
	(0.131)	(0.131)	(0.131)	(0.125)	(0.137)	(0.126)
Landlocked	0.012	0.060	0.041	0.054	0.058	0.048
	(0.148)	(0.153)	(0.159)	(0.166)	(0.153)	(0.170)
Energy resources * SSA		0.111**	0.116**	0.131*	0.114**	0.124*
		(0.051)	(0.051)	(0.077)	(0.051)	(0.074)
GDP			-0.031			-0.020
			(0.032)			(0.031)
Inflation				0.014		0.014
				(0.009)		(0.009)
Polity					-0.002	0.008
					(0.009)	(0.008)
Constant	6.066***	6.037***	6.580***	5.952***	5.951***	6.638***
	(1.182)	(1.178)	(1.215)	(1.129)	(1.228)	(1.310)
R^2	0.037	0.043	0.046	0.058	0.044	0.059
Observations	432	432	432	432	432	432

Estimations are done using disaggregated FEE transactions to the infrastructure sector as the dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. All estimations include i.year as a control variable. Standard errors clustered on country-level. Standard errors in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A9.2: Infrastructure sector (project level): Second step IV

	(1) $ FDI	(2) $ FDI	(3) $ FDI	(4) $ FDI	(5) $ FDI	(6) $ FDI
Energy resources	0.077**	0.058*	0.078**	0.042	0.057*	0.074*
	(0.033)	(0.033)	(0.038)	(0.030)	(0.033)	(0.040)
SSA	0.330**	0.149	0.069	0.057	0.140	0.057
	(0.141)	(0.149)	(0.172)	(0.169)	(0.164)	(0.181)
Distance	-0.076	-0.068	-0.039	-0.081	-0.061	-0.111
	(0.128)	(0.128)	(0.127)	(0.122)	(0.132)	(0.123)
Landlocked	0.023	0.097	0.078	0.116	0.097	0.095
	(0.147)	(0.153)	(0.160)	(0.169)	(0.154)	(0.171)
Energy resources * SSA		0.157***	0.161***	0.209***	0.159***	0.188***
		(0.045)	(0.045)	(0.052)	(0.049)	(0.053)
GDP			-0.041			-0.041
			(0.032)			(0.034)
Inflation				0.014		0.013
				(0.009)		(0.009)
Polity					-0.001	0.012
					(0.009)	(0.009)
Constant	6.088***	6.061***	6.791***	5.989***	6.004***	7.226***
	(1.155)	(1.149)	(1.165)	(1.104)	(1.189)	(1.289)
R^2	0.037	0.042	0.044	0.053	0.042	0.054
Observations	432	432	432	432	432	432

Estimations are done using disaggregated FEE transactions to the infrastructure sector as the dependent variable. The variables FEE, Energy resources, Distance and GDP measured in ln. Inflation measured in percentages. Institutions measured in the range -10 to 10. Landlocked and SSA are binary variables. All estimations include i.year as a control variable. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A9.3: Infrastructure sector (project level): First step IV for Energy resources

	(1) lnenergy	(2) lnenergy	(3) lnenergy	(4) lnenergy	(5) lnenergy	(6) lnenergy
Energy resources 1980	0.981***	0.960***	0.994***	0.922***	0.913***	0.859***
	(0.051)	(0.053)	(0.058)	(0.053)	(0.049)	(0.066)
Energy resources 1980 * SSA		0.183**	0.199***	0.317***	0.286***	0.369***
		(0.076)	(0.074)	(0.093)	(0.066)	(0.084)
Observations	432	432	432	432	432	432
R-sq	0.881	0.883	0.886	0.898	0.902	0.910
F instr	370.37	326.09	214.03	318.04	477.03	198.77

First step estimations for lnenergy variable in infrastructure sector estimations using disaggregated FEE transactions as the dependent variable. Estimations include the following control variables: Distance, Landlocked, GDP, Inflation, Institutions, SSA and i.year. Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A9.4: Infrastructure sector (project level): First step IV for SSA*Energy resources

	(1)	(2) ssaenerg	(3) ssaenerg	(4) ssaenerg	(5) ssaenerg	(6) ssaenerg
Energy resources 1980		-0.013*	-0.017*	-0.034**	-0.023*	-0.079***
		(0.007)	(0.010)	(0.017)	(0.013)	(0.027)
Energy resources 1980 * SSA		1.159***	1.157***	1.235***	1.183***	1.253***
		(0.059)	(0.060)	(0.076)	(0.053)	(0.070)
Observations		432.000	432.000	432.000	432.000	432.000
R-sq		0.853	0.853	0.879	0.858	0.890
F instr		203.89	203.87	152.11	252.15	162.18

First step estimations for ssaenergy variable in infrastructure sector estimations using disaggregated FEE transactions as the dependent variable. Estimations include the following control variables: Distance, Landlocked, GDP, Inflation, Institutions, SSA and i.year. Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.10 Excluding Nigeria

Table A10.1: Excluding Nigeria

	Full sample		*Infrastructure*	
	(1) OLS	(2) IV	(1) OLS	(2) IV
Energy resources	0.206**	0.524	0.101	0.283
	(0.086)	(1.669)	(0.085)	(0.896)
Energy resources * SSA	-0.061	4.861	0.049	2.312
	(0.243)	(23.457)	(0.222)	(12.135)
SSA	0.739**	0.020	0.639*	0.329
	(0.325)	(3.497)	(0.350)	(1.874)
Distance	-0.262	-0.346	-0.502**	-0.585
	(0.243)	(0.493)	(0.239)	(0.428)
Landlocked	0.090	0.493	-0.272	-0.020
	(0.345)	(2.027)	(0.310)	(1.367)
GDP	0.408***	0.184	0.228***	0.109
	(0.070)	(1.156)	(0.069)	(0.620)
Inflation	0.032**	-0.051	0.038**	-0.004
	(0.014)	(0.440)	(0.016)	(0.235)
Polity	-0.018	0.022	-0.020	0.002
	(0.021)	(0.200)	(0.022)	(0.112)
Constant	-0.106	6.212	5.649*	9.283
	(2.926)	(32.660)	(2.941)	(18.719)
R^2	0.372	-0.306	0.278	0.026
Observations	120	120	97	97
F instr. lnenergy		107.38		93.24
ssaenergy		3.25		3.23

Aggregated data (sum). Robust standard errors.Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$