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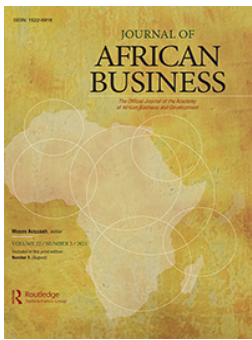
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Determinants of Chinese Foreign Direct Investment in Africa

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ABSTRACT

We investigate the role of institutions in attracting Chinese FDI into Africa. Focusing on market- and resource-seeking motivations, we consider whether the impact of institutions varies by motivation for FDI. Our data relates to 43 African countries over 11 years, and we use the Generalized Method of Moments to show that Chinese MNEs are market-seeking and are attracted by weaker institutions. This negative effect of institutions is especially strong in resource-rich and higher-income countries. Our study also finds that in resource-rich African countries, better infrastructure quality attracts Chinese FDI.

KEYWORDS

China; Africa; FDI; institutions; markets; resources

1. Introduction

Since the end of the 1990s, outward foreign direct investment (FDI) from China has been supported by the government's 'Going Global' Strategy (UNCTAD, 2007). In the period of analysis in this paper, China's OFDI in Africa grew from 12 projects in 2002 to 413 in 2012. Before 2002, Chinese FDI projects were only conducted on an isolated level (UNCTAD, 2007).

In this paper, we aim to consider whether the quality of institutions in a host country might influence FDI and whether this impact depends on the motivation for the FDI. In this context, we will analyze the factors influencing China's decision to invest in Africa and, in particular, the choice of country to invest in. The African context is of particular relevance, as researchers (e.g. Buckley et al., 2007) have argued that institutional weakness within host countries attracts Chinese FDI, and between 2002–2012, the African continent showed the lowest average institutional quality levels – worsening during this period by 6% (Kaufmann, Kraay, & Mastruzzi, 2010). During this period, Chinese FDI flows into Africa outpaced FDI from other countries. While between 2003–2012, global FDI flows (excluding Chinese FDI) into Africa increased by 195%, FDI from China increased by 3264% (Ministry of Commerce, 2020; UNCTAD, 2020). For this period, no other developing region shows a similar growth rate for Chinese FDI – for example, Latin America (2003–2012: 494% FDI growth) (Ministry of Commerce, 2020). Many economies in Africa are rich in resources (Lundgren, Thomas, & York, 2013) and relatively untapped (Pigato & Tang, 2015), making this region a very good case for the question we wish to analyze.

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We bring together data on 43 African countries from 2002 to 2012 and analyze it using a System Generalized Method of Moments (GMM). The growing literature in international business research has focussed on the motivations of Chinese firms (e.g. Kolstad & Wiig, 2011) rather than the role of institutions (c.f. Mourao, 2018). However, it is well known that institutions significantly influence investment decisions (Asiedu, 2006; Shan, Lin, Li, & Zeng, 2018) and are likely to be particularly important in developing countries of Africa (e.g. Kolstad & Wiig, 2011, 2012).

Our paper contributes to the literature on the FDI motivation of emerging market multinationals (EMNEs) when investing in developing countries, as well as on the role of host-country institutions for FDI. We contribute to the institutional literature highlighting that Chinese FDI is especially attracted by weak institutions in the host country. Our analysis covers a longer period and a wider range of countries than most studies to date. Our results contribute to existing knowledge by lending weight to the classic market-seeking argument for Chinese FDI and highlighting that Chinese firms have been especially successful in investing in low-income countries in Africa. In addition, we provide systematic quantitative evidence in relation to the role of infrastructure and resources in attracting FDI. This allows us to move beyond descriptive analyses as provided by, for example, Tang and Pearce (2017).

The paper is structured into seven parts. Following the introduction, the theoretical framework, the empirical literature, and the research hypotheses follow. In section five, we will describe the data and methodology used. Thereafter, we will present and discuss our results. The paper ends with a conclusion.

2. Theoretical framework

Analyses of the determinants of FDI (resource-, market-, efficiency-, strategic asset-seeking) often use the Eclectic Paradigm first put forward by Dunning (1993). This framework argues that a firm may become a multinational because of existing Ownership, Location, and Internalization advantages. Ownership advantages could include proprietary information and intangible ownership rights of a company; location advantages determine where a multinational enterprise (MNE) chooses to locate; and internalization advantages influence whether a firm should produce a particular product in-house or to sub-contract to another firm. While some researchers (e.g. Sanfilippo, 2010) have argued that this paradigm is not appropriate for EMNEs, which might have different motivations and practices, Narula (2006) and Dunning (2006) have countered that the framework can encompass a wide range of firms and OLI advantages. We use the eclectic framework as the context for our study. Before we do so, however, we will consider the empirical literature in this area.

3. Empirical literature

3.1. Resource-seeking FDI

The fast growth and development of the Chinese economy have pushed its firms to look for resource and investment opportunities abroad (Buckley et al., 2007). However, the extent to which it is resources that have attracted Chinese FDI to Africa is uncertain. On

the one hand, data for 1970 to 2013 indicates that the construction sector followed by mining were the largest recipients of investments from China (Cheung, De Haan, Qian, & Yu, 2012; Marukawa, Ito, & Zhang, 2014). On the other hand, some researchers have found an insignificant or even negative relationship between resources and Chinese FDI (Cheung & Qian, 2009; Shan et al., 2018). These differences in results might relate to the way in which resource-intensity is measured across studies – resource production (Cheung et al., 2012), resource rents (Ross, 2015), or resource exports (Cheung & Qian, 2009) – all of which are likely to be endogenous to FDI in the host economy. In particular, if the extraction of certain resources is influenced by the amount of investment in that extraction, then we might expect the production measure of resources to be endogenous to FDI.

3.2. Market-seeking FDI

Researchers have found a positive relationship when studying the effect of a range of proxies for market size, including host country Gross Domestic Product (GDP) (Kolstad & Wiig, 2011; Shan et al., 2018), the ratio of host country GDP to Chinese GDP (Cheung & Qian, 2009), host country population size (Mourao, 2018) and host country GNI (Sanfilippo, 2010). The high rates of growth of African countries in recent decades have also made Africa's markets (World Bank, 2020) attractive to FDI, especially to Chinese investors.

Markets vary by sector as well as by size, and, in the case of Africa, the infrastructure sector has been especially attractive to Chinese investors. Chinese firms have had significant experience in developing infrastructure at home over the last few decades. Therefore they were very well placed to do the same in Africa, with its relatively under-developed infrastructure. As mentioned above, Marukawa et al., (2014) found that between 1970 and 2013, the African construction industry has attracted the largest proportion of Chinese FDI (22%), followed by the Mining (12%), and Retail and Wholesale (10%) sectors. Kolstad and Wiig (2011), in turn, found that a large part of China's FDI to Africa was in the telecommunication sector. Having said this, it is also possible that countries with good quality of existing infrastructure might attract some types of market-seeking FDI (Sanfilippo, 2010; Tang, 2014). Thus, infrastructure stock may have two possible effects on FDI. On the one hand, countries with a large stock of existing infrastructure may attract FDI because they are easy to do business in. On the other hand, those with a small infrastructure stock might attract FDI from firms that wish to invest in this sector.

Sanfilippo (2010), proxying infrastructure with the number of established telephone mainlines, found infrastructure stock to have a significant positive effect on the value of investment from Chinese MNEs. He concluded that Chinese firms were attracted to Africa not because it provided opportunities for infrastructure development but because it provided other markets. Tang (2014), focusing on two ICT firms from China (ZTE and Huawei), also found that both of them were investing in Africa not to close the African ICT infrastructure shortage but rather to sell products that rely on already established infrastructure. In line with these studies, other researchers (e.g. Shan et al., 2018) have found that countries with good infrastructure have attracted investment from Chinese MNEs. This positive result is in line with what Asiedu (2006) found for worldwide FDI to

Africa. However, Shan et al. (2018) found that Chinese FDI in Africa is attracted by an infrastructure gap rather than better quality infrastructure. Pearce and Tang (2011) and Tang (2014) argue that ICT infrastructure is not a classic case of market-seeking for Chinese MNEs because projects are allocated by the host government, they are used by the Chinese government to strengthen political ties, and they might also be related to resource-seeking projects (Tang & Pearce, 2017). It is clear that the impact of infrastructure stock on incoming FDI must depend upon the sector in which such investment is being undertaken.

3.3. Institutional environment

Whether we are considering resource-seeking motives for FDI or market-seeking motives, it is clear that institutions must play a role in facilitating such investment (c.f., Naudé & Krugell, 2007). There is considerable literature (Buckley et al., 2007; Cuervo-Cazurra & Genc, 2008) that argues that firms might be attracted by weak institutional environments. While some literature has considered the role of corruption and risk in attracting investment (Asiedu, 2006), fewer researchers have considered whether these factors have different effects when FDI is motivated by resources (Kolstad & Wiig, 2011, 2012) rather than markets.

Buckley et al. (2007) and Cuervo-Cazurra and Genc (2008) base their arguments on MNEs from developing economies investing in other developing countries. They do not take into consideration the interaction effects of host country institutional quality with its market size and natural resource availability. Kolstad and Wiig (2011, 2012) find that weak institutions in African resource-rich economies attract Chinese FDI. They also argue that these results are not specific to Chinese MNEs since FDI from other countries is also attracted by weak institutions in resource-rich countries. We are unable to comment on the impact of institutions on market-seeking FDI as this literature (e.g. Mourao, 2018; Shan et al., 2018) has, so far, not considered the institutional context of the host country.

In the following section, we will use the above literature to set up hypotheses that can be tested using the data we have collected.

4. Research hypotheses

In this section, we will set up six hypotheses to test the impact that institutions have on the inflows of Chinese FDI into Africa. We are particularly interested in whether the role of institutions varies depending upon whether FDI is attracted by resources or by markets in Africa.

If FDI is resource-seeking (H1), we might expect resource reserves to have positive coefficients. To test this hypothesis, we include two resource variables – oil and gas reserves and the production of other minerals. When FDI is market-seeking (H2), we would expect that it is attracted to countries with larger markets. We would therefore expect the coefficient of our market size variable (host country GDP) to be positive. To analyze whether there is a sectoral effect (H3), we consider whether the infrastructure sector is treated as a market or as an input into production. In the former case, we might expect a country with a poor infrastructure stock to attract more FDI (and thus, for the

Table 1. List of Hypotheses.

No.	Hypotheses
H1	Host Countries with larger natural resource reserves attract FDI
H2	Host Countries with larger domestic markets attract FDI
H3	Host Countries with better ICT infrastructure attract FDI
H4	Host countries with weak institutional environments attract FDI
H5	Host Countries with larger domestic markets and a weaker institutional environment attract FDI
H6	Resource-rich host countries with a weaker institutional environment attract FDI

variable to have a negative coefficient), while in the latter, we might expect the reverse, i.e. countries with good infrastructure stock, which will help ease business transactions, will attract more FDI (and thus, a positive coefficient sign).

Turning to institutional quality in the host country, we hypothesize that countries with lower levels of institutional quality attract more Chinese FDI (H4). Hence, institutional quality variable is expected to have a negative coefficient. Finally, we consider whether institutional quality has different effects in countries with larger and smaller markets (H5) or resource-rich and poor countries (H6).

5. Data and methodology

5.1. Sample

To test the above hypotheses, we analyze data covering Chinese FDI into 43 out of the 54 African countries. As Chinese FDI in Africa started to pick up in 2002 (UNCTAD, 2007) and structured data for Chinese FDI projects to African countries is only available until 2012 from the Chinese Ministry of Commerce, we focus on these 11 years (2002–2012). We exclude 11 countries (Chad, Comoros, Djibouti, Gambia, Guinea-Bissau, Mauritania, Mauritius, Sao Tome & Principe, Seychelles, Somalia, and South Sudan) due to lack of data.

5.2. Variables

5.2.1. Dependent variable

Our dependent variable is the number of OFDI projects undertaken by Chinese firms in Africa, covering 2002 to 2012. Using the count of projects, we follow previous literature on Chinese FDI (e.g. Xia, Ma, Lu, & Yiu, 2014). The data was obtained from Marukawa et al. (2014), who provide information on the number of Chinese FDI projects by host country, year, and industry. Figure 1, showing this data, indicates that in the space of a decade, the number of Chinese FDI projects in Africa increased from about 10 to more than 400 a year by 2012. It shows a monotonic increase during this period, though larger year-on-year changes occurred in 2006–7 and 2008–9.

5.2.2. Independent variables

To test our hypotheses, we include a range of independent variables capturing the classic determinants of FDI, such as the depth of resources and the size of markets (Buckley et al., 2007), as well as the institutional quality in each country. To capture resource-seeking FDI, we follow a similar approach to Cheung et al. (2012) and include two

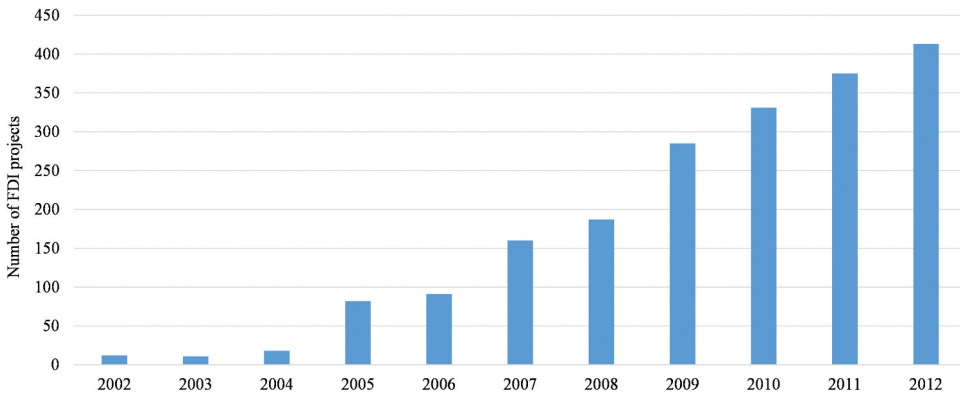


Figure 1. Number of Chinese FDI Projects in 43 African Countries, 2002–2012. Source: Marukawa et al. (2014).

variables proxying the resources available in the host country – oil and gas reserves and production of other minerals. One problem with this variable is that data on the production of resources may be affected by the amount of FDI in resource extraction. In the case of oil and gas, therefore, we were able to obtain data on reserves which is likely to be more exogenous. This data (in billion barrels) was obtained from the U.S. Energy Information Administration (2015). However, even this variable does not fully exclude reverse causality problems, as FDI is also often involved in surveying for reserves. Our second resource variable is the production of a range of other minerals, including Aluminum, Bauxite, Copper, Gold, and Diamonds. Data for this variable was obtained from the Austrian Federal Ministry of Science/Research/Economy (2015). Unfortunately, however, this data only provides production figures and is not available for reserves. To mitigate the problem of endogeneity, we use lagged production figures, though again, it is worth noting that if there is path dependence in these figures, then lagging will only mitigate the problem but not resolve it completely.

For market-seeking FDI, we follow the extant literature (Kolstad & Wiig, 2011; Shan et al., 2018) and include the GDP of each host country as a measure of the size of its market. The data is obtained from the World Bank (2020) World Development Indicators and is measured in constant 2005 US\$ to control for inflation. In addition to the classic market-seeking variable, we also employ an industry-specific variable (Infrastructure) to proxy market-seeking in a particular sector. We include the number of internet users per 100 people as our infrastructure variable, following Wood and Harrison (2015).

Finally, we obtained data on institutions from the Worldwide Governance Indicators (World Bank, 2020). There are six such indicators – Rule of Law, Control of Corruption, Voice and Accountability, Government effectiveness, Political stability, and Regulatory Quality (Kaufmann et al., 2010). We use these indicators in two ways. To begin with, we include the average of the six indicators (WGI) in our models. We then included each of the indicators separately in our model to consider whether they might have differential effects on FDI. These results are provided in Appendix 1. All six indicators range from -2.5 (weak governance) to $+2.5$ (strong governance).

5.2.3. Control variables

In addition to the above variables, we include a control variable for inflation (e.g. Kolstad & Wiig, 2011) which captures the stability of the economy. We also include period-dummies for pre- (2002–2008) and post-financial crisis (2009–2012) to control for unobserved effects or endogeneity issues (Lahiri, Pahnke, Howard, & Boeker, 2019).

All of our variables are summarized in Table 2 and the descriptive statistics, as well as the pairwise correlation included in Table 3.

5.3. Model

To analyze the determinants of Chinese FDI projects in African host countries, we define our baseline model as:

$$FDI_{it} = \beta_0 + \beta_1 Y_{it-1} + \beta_2 X_{it} + \beta_3 Z_{it} + \beta_i + \beta_t + \varepsilon_{it}$$

Our dependant variable, FDI_{it} , is the count of Chinese FDI projects in an African host country (i) in a given year (t), $\beta_1 Y_{it-1}$ is the one year lagged dependent variable, $\beta_2 X_{it}$ is a vector of independent variables, $\beta_3 Z_{it}$ is inflation, β_i and β_t are the year dummies, and ε_{it} is the remaining country-year heterogeneity.

We include the one-year lagged dependent variable as an explanatory variable (Mistura & Roulet, 2019), to capture the path dependence (Amighini, Mcmillan, & Sanfilippo, 2017) and trend of FDI (see Figure 1). However, including the lagged dependent variable in an ordinary least squares regression will lead to biased results, including wrongly signed coefficients (Driffield, Pereira, & Temouri, 2019). To correct this bias, we estimate our model using the system GMM estimator, which is appropriate for dynamic panel data with a relatively small T and large N (Roodman, 2009). The advantage of the system GMM estimator is that we can use instruments from within our model to control for potential endogeneity (Arellano & Bover, 1995; Blundell & Bond, 1998; Roodman, 2009), whereas the classic instrumental variable approach would require the selection of suitable external instruments (Amighini et al., 2017). As highlighted by Amighini et al. (2017), using model internal instruments has the additional advantage of not facing the risk of including external instruments that might not be theoretically profound.

Compared to its one-step system GMM alternative, the two-step system GMM is asymptotically more efficient (Windmeijer, 2005). However, due to a downward bias in the standard errors of the two-step GMM estimator, one needs to include a correction. We do this by employing the Windmeijer (2005) corrections. Including both the Windmeijer corrected cluster-robust standard-errors and using the *collapse* function in Stata 14's *xtabond2* code, we also control for the small-sample characteristics of our dataset (Roodman, 2009). Comparing the difference and system GMM estimators, the findings of Blundell and Bond's (1998) performance tests show that within a finite sample, characterized by a relatively short T and a high persistence in the dependent variable, the system GMM is more efficient than the difference GMM. As highlighted by Windmeijer (2005), the two-step system GMM shows smaller corrected standard errors than the two-step difference GMM, which leads to more precision in its estimations. The downward bias is less prone in the two-step system GMM than in the two-step difference

GMM because of more “informative” instruments. Hence, we employ a two-step system GMM in our analysis.

We use the standard (first-difference) deviations instead of orthogonal deviations, as our data is highly balanced, showing no gaps (Arellano & Bover, 1995; Roodman, 2009). The lagged dependent variable is defined as an endogenous regressor due to its potential for reverse causality, and its lagged levels are set as instruments (Amighini et al., 2017). Furthermore, *Inflation* and *Other Resources* are added as exogenous variables, and all other independent variables are predetermined. With these instruments in place, we can control for endogeneity issues in our dynamic panel data, i.e. simultaneity, unobserved heterogeneity, omitted variables, and measurement error (Ajide & Raheem, 2016).

To test the validity of our system GMM, we perform several robustness tests. Firstly, we perform the serial-correlation test of Arellano and Bond (1991), revealing that our estimations do not have autocorrelation issues (second-order). Secondly, we test for the exogeneity of our instrumental variables by conducting the Hansen (1982) J-test. Following Roodman (2009), we show that none of our Hansen test results are either below the threshold of 0.1 or very high. Hence, overidentification does not seem to be a problem in our estimations. Thirdly, we calculate the ratio of the number of countries in our models to the number of instruments. Across our models, the ratio is not smaller than 1.0, revealing no type I error (Roodman, 2009).

6. Results and discussion

Following on from the tests above, we estimate our models using the System GMM method. The results are presented in Tables 4 and 5. We start with our baseline regression in model 1, where we include all variables except institutions. The institutional variable is added in model 2. The following columns of Table 4 present the results for variants of this model, including the interaction terms of institutions with GDP (model 3), with infrastructure (model 4), with Oil and gas (model 5), as well as with other resources (model 6).

In further extensions of our estimation, we divide our sample into large and small markets and resource-rich and poor countries. This allows us to consider whether the impact of institutions varies across these samples. Table 5 presents these results. To divide our sample by market size, we follow the country classification of the World Bank (2020) by income levels. In model 7, we classify countries as having larger markets if, for most of our observation period, they had a Gross National Income per capita above the World Bank’s low-income threshold level (e.g. for 2012 set at US\$ 1.035). Countries with GNI below this threshold were considered as being those with small markets. To classify host countries into resource-rich and resource-poor, we follow the approach of the International Monetary Fund (Lundgren et al., 2013) and classify countries as resource-rich economies if their natural resource export share was at least 25% (model 9). Countries that had resource exports below this threshold were classified as resource-poor countries (model 10). We will discuss our results in what follows.

Our results in both Table 4 and Table 5 indicate that the lagged dependent variable (*L. FDI*) has a positive and highly significant impact on current FDI. This is unsurprising and reflects the trend seen in Figure 1 above. The positive and significant coefficient reflects FDI path dependence in Africa and confirms a similar pattern found in the non-

Chinese-African FDI context (Busse, Nunnenkamp, & Spatareanu, 2011). This reflects the fact that the internationalization experience of firms matters for future investments abroad (Dunning & Lundan, 2008, p. 668) because it enables firms and countries to collect information and build experience regarding working conditions in the host country as well as investment opportunities. In what follows, we will discuss our results on the basis of the hypotheses set up in Table 1 above.

Hypothesis 1. Host Countries with Larger Natural Resource Reserves Attract FDI

Our results indicate that the coefficient of the oil and gas variable is not significant in Table 4, leading us to conclude that Chinese FDI is not attracted into Africa for oil and gas. In Table 5, we find that oil and gas reserves result in significantly reduced FDI both in Models 8 and 10, i.e. in the low-income countries sub-sample and also in the resource-poor sub-sample. Thus, to the extent that *Oil and Gas* is significant, it reduces FDI flows rather than increases it. Our results, therefore, lead us to conclude that oil and gas is certainly not a major attraction for Chinese firms investing in Africa.

Turning to the second natural resource variable (*Other resources*), we find that African host countries with high levels of Aluminum, Bauxite, Copper, Gold, and Diamond attract Chinese FDI (model 1; $b = 2.966, p = 0.01$ in Table 4). This variable is significant and positive in four of the six models in Table 4. However, our sub-sample results of Table 5 indicate that the coefficient of *Other Resources* is insignificant in 3 out of four sub-

Table 2. Description of Variables.

Variables	Descriptions
FDI (dependent variable)	Number of annually approved Chinese FDI projects
Inflation	Consumer prices in annual %
GDP	Host country GDP in constant 2005 US\$
Infrastructure	Internet users per 100 people
Oil and gas	Proved reserves of crude oil and natural gas, measured in billion barrels
Other resources	Production of Aluminum, Bauxite, Copper, Gold, and Diamond, measured in metric tons
WGI	Average of the six Worldwide Governance Indicators (each ranging from -2.5 (weak) to 2.5 (strong))

Source: Authors and highlighted sources.

Table 3. Correlation Matrix.

No	Variable	1	2	3	4	5	6	7
1	FDI	1						
2	Inflation	0.12	1					
3	GDP	0.51	-0.02	1				
4	Infrastructure	0.41	-0.10	0.45	1			
5	Oil and gas	0.37	-0.01	0.49	0.21	1		
6	Other resources	0.04	0.23	0.08	-0.06	-0.09	1	
7	WGI	-0.03	-0.20	0.11	0.18	-0.18	0.14	1
	Mean	4.15	8.12	24.88	5.85	6.73	0.29	-0.64
	S.D.	7.03	9.38	47.83	8.63	21.10	0.82	0.58
	Min	0.00	-9.80	0.50	0.03	0.00	0.00	-1.77
	Max	47.00	108.89	307.65	55.42	112.04	5.00	0.91

Note: N = 430. Correlations with an absolute value of equal or larger 0.08 are significant at 0.10 level.

Table 4. System GMM Results, Full Models.

Variables	Model 1 Basic	Model 2 Institutions	Model 3 GDP	Model 4 Infrastructure	Model 5 Oil and gas	Model 6 Other resources
LFDI	0.776*** (0.078)	0.770*** (0.120)	0.742*** (0.092)	0.762*** (0.103)	0.792*** (0.092)	0.760*** (0.096)
Inflation	-0.037 (0.051)	-0.049 (0.033)	-0.045* (0.024)	-0.038 (0.028)	-0.039 (0.033)	-0.044 (0.032)
GDP	0.052 (0.034)	0.047* (0.024)	0.052** (0.022)	0.041 (0.029)	0.054** (0.024)	0.056** (0.023)
Infrastructure	-0.010 (0.054)	0.025 (0.047)	0.012 (0.077)	0.054 (0.112)	0.024 (0.073)	0.007 (0.073)
Oil and gas	-0.012 (0.047)	-0.031 (0.032)	-0.055 (0.054)	0.001 (0.036)	0.139 (0.108)	-0.031 (0.023)
Other resources	2.966*** (1.082)	2.749* (1.417)	1.825* (0.906)	2.540** (1.021)	1.179 (1.044)	0.809 (1.288)
WGI		-3.493** (1.601)	-2.957* (1.567)	-2.951* (1.725)	-4.747** (1.884)	-3.637* (2.117)
WGI*GDP			-0.023 (0.043)			
WGI*Infrastructure				0.070 (0.131)		
WGI*Oil and gas					0.177* (0.095)	
WGI*Other resources						-0.730 (1.093)
Constant	1.368*** (0.405)	-0.756 (0.967)	-0.527 (1.376)	-0.693 (1.238)	-1.704 (1.468)	-0.887 (1.661)
Net effect	na	na	na	na	-4.86	na
Observations	430	430	430	430	430	430
Group count (g)	43	43	43	43	43	43
Instrument count (i)	20	23	36	31	35	36
Ratio (g/i)	2.15	1.87	1.19	1.39	1.23	1.19
Year fixed-effects	YES	YES	YES	YES	YES	YES
AR(2) test, p-value	0.21	0.23	0.263	0.23	0.24	0.267
Hansen test, p-value	0.13	0.19	0.18	0.14	0.28	0.13

Note: Robust standard errors in parentheses; estimates of year dummies have been omitted for brevity; AR(2) – Arellano Bond test on second-order; *, **, *** mean significant at, respectively, 10%, 5%, 1% level.

samples, leading us to conclude that there is no significant difference in the impact of these resources on FDI across the different samples.

Our results to these variables, therefore, do not allow us to either fully accept or reject Hypothesis 1. Whether resources attract or repel Chinese FDI in Africa depends on the resources we are considering: *Oil and Gas* has no impact, whereas *Other Resources* can have a significant attractive impact. These findings confirm prior studies related to Chinese resource-seeking FDI (Cheung et al., 2012; Cheung & Qian, 2009).

Hypothesis 2. Host Countries with larger Domestic Markets Attract FDI

We find strong support for the market-seeking FDI hypothesis in Table 4, where the coefficient of *GDP* is positive and significant in four out of the six models. This confirms earlier findings (Kolstad & Wiig, 2011; Shan et al., 2018). Turning to our sub-sample analysis in Table 5, we find that the *GDP* coefficient is positive and significant in low-income countries, as well as in resource-rich and resource-poor countries. The *GDP* coefficient is insignificant in high-income countries (model 7, $b = 0.060$) but is larger and significant in the low-income sub-sample (model 8, $b = 0.473$, $p = 0.01$). This demonstrates that for Chinese FDI in Africa, an increase in *GDP* in low-income countries exerts

Table 5. System GMM Results, Sub-models.

Variables	Model 7	Model 8	Model 9	Model 10
	Higher-income	Low-income	Resource-rich	Resource-poor
LFDI	0.647** (0.230)	0.599*** (0.132)	0.798*** (0.107)	0.715*** (0.201)
Inflation	-0.023 (0.029)	0.000 (0.045)	-0.003 (0.030)	-0.081 (0.079)
GDP	0.060 (0.043)	0.473*** (0.073)	0.032** (0.013)	0.126** (0.052)
Infrastructure	-0.015 (0.122)	-0.173 (0.130)	0.242** (0.090)	-0.059 (0.110)
Oil and gas	-0.071 (0.080)	-0.432*** (0.087)	-0.025 (0.032)	-0.141** (0.064)
Other resources	0.602 (1.830)	4.043* (2.057)	0.135 (0.918)	40.629 (64.076)
WGI	-7.221 (9.011)	3.227** (1.306)	-5.779** (2.687)	-4.055** (1.756)
Constant	-3.488 (7.417)	1.797 (1.226)	-3.057 (2.368)	-1.283 (1.836)
Observations	160	270	190	240
Group count (g)	16	27	19	24
Instrument count (i)	16	22	19	17
Ratio (g/i)	1.00	1.23	1.00	1.41
Year fixed-effects	YES	YES	YES	YES
AR(2) test, p-value	0.40	0.42	0.69	0.19
Hansen test, p-value	0.20	0.29	0.37	0.41

Note: Robust standard errors in parentheses; estimates of year dummies have been omitted for brevity; AR(2) – Arellano Bond test on second-order; *, **, *** mean significant at, respectively, 10%, 5%, 1% level.

a larger marginal attraction than in high-income countries. This might reflect the fact that low-income markets are less crowded with foreign investors or that the products of Chinese firms might be more competitive in low-income host countries. The latter might reflect the fact that a majority of Chinese companies investing in Africa are not from the high-technology sector but from sectors of lower technological advancement (Bureau van Dijk, 2020; Eurostat, 2020). Some evidence to confirm this possibility is available from a sub-sample of 40 companies for which firm-level data is available between 2002–2012. Data from these companies indicates that only eight out of the 40 Chinese mother companies operate in high-technology manufacturing (Bureau van Dijk, 2020). Our results, therefore, confirm Hypothesis 2 that Chinese FDI is market-seeking. However, we qualify this with our sub-sample results, which indicate that it is attracted into low-income markets more than high-income African markets. In concluding this, we provide more detailed findings than previous research on Chinese market-seeking FDI in Africa (e.g. Mourao, 2018; Sanfilippo, 2010).

Hypothesis 3. Host Countries with Better ICT Infrastructure Attract FDI

The level of infrastructure in African countries has no significant impact on Chinese FDI (Table 4), except in resource-rich host countries (Table 5). Thus, our hypothesis can only be confirmed in model 9 ($b = 0.242$, $p = 0.05$) for resource-rich countries where better infrastructure attracts FDI. These results indicate that the infrastructure sector is not a significant market for FDI in Africa. Instead, it is seen as an input that helps to ease business for firms that are attracted into Africa for resources. Our empirical findings, therefore, reject the argument made by Tang and Pearce (2017) that infrastructure

market-seeking FDI by Chinese firms in Africa is related to resource-seeking projects, but reveal that it is the well-established ICT infrastructure in resource-rich countries that attracts Chinese FDI (Calderon & Serven, 2008; Sanfilippo, 2010). With resource-seeking FDI being capital intensive and extraction locations often far away from cities, good ICT coverage is an essential factor for communication in resource projects. In all other subsamples, however, this hypothesis is not supported. With our empirical results on the resource-infrastructure relationship of Chinese FDI in Africa, we contribute to the public debate on this topic (e.g. The New York Times, 2018).

Hypothesis 4. Host countries with Weak Institutional Environments Attract FDI

When interpreting the results of our hypotheses on institutions, one needs to bear in mind that the institutional index (*WGI*) goes from -2.5 (weak institutions) to $+2.5$ (good institutions). The coefficient of this institutional index is consistently negative and significant (Table 4), indicating that the better is the quality of institutions in a country, the lower is the FDI that is attracted into it. In model 2, where we add our institutional variable (*WGI*) to the basic regression, the coefficient is negative and significant ($b = -3.493$, $p = 0.05$). With our full-model results in Table 4, we further confirm the extant literature arguing that Chinese outward FDI is attracted by weak institutions (Buckley et al., 2007).

This finding is significantly strengthened when we consider each of the six components of the *WGI* index separately. The results are presented in Appendix 1 and indicate that when Control of Corruption (*CoC*), Voice and Accountability (*V&A*), Government Effectiveness (*GE*), Rule of Law (*RoL*) and Regulatory Quality (*RQ*) are high, Chinese FDI is low. These results are interesting because they clearly indicate that in countries where the quality of government (*CoC*, *V&A*, *GE*, *RoL* and *RQ*) is good, FDI is discouraged. The coefficients of Rule of Law and Government Effectiveness are particularly large. The table also confirms that the coefficients of all the six governance indicators are negative, and only *PS* is insignificant.

Turning to the relationship between institutional quality and other FDI determinants in Table 4, we find that the *GDP*, *Infrastructure*, and *Other Resources* interaction terms are insignificant. Only the interaction coefficient of *WGI* and *Oil and Gas* is significant and positive ($b = 0.177$, $p = 0.1$). Our results indicate that while the interaction effect is positive so that countries with larger oil and gas reserves and better quality institutions are likely to attract more FDI, the negative level effect of institutions is much larger, yielding a large negative net effect of institutions: $-4.86 = ([0.177 * -0.64] - 4.747)$.¹

Hypothesis 5: Host Countries with Larger Domestic Markets and a Weaker Institutional Environment Attract FDI

The results for this hypothesis are presented in Appendix 2, with interactions between the six institutional indicators and *GDP*. These results confirm the sign of the interaction between the aggregated institutional index (*WGI*) and *GDP*. In particular, the interactions of *GDP* and *Control of Corruption* ($b = -0.063$, $p = 0.1$), *GDP* and *Government Effectiveness* ($b = -0.082$, $p = 0.1$), and *GDP* and *Regulatory Quality* ($b = -0.082$, $p = 0.1$) are significant.

¹In calculating the interaction net effects, we follow the approach of Tchamyou and Asongu (2017).

Thus, in countries with high GDP and better quality institutions in the forms of control of corruption, government efficiency and regulatory quality, there is a dampening effect on Chinese FDI. For all three interaction terms, the net effect of a larger GDP is also negative. Therefore, hypothesis 5 can be confirmed for these three institutional indices. Our findings add to the literature by revealing that with larger market size, higher quality African institutions deter FDI. Market size seems to have higher importance than independent and well-established host country policies for Chinese FDI in Africa.

This finding supports our claim that one should consider the market size of the host country when studying the role of institutions on inward FDI. It also confirms the argument of Buckley et al. (2007) and Cuervo-Cazurra and Genc (2008) that FDI from developing countries is attracted by weak host country institutions in the context of market-seeking.

Hypothesis 6: Resource-Rich Host Countries with a Weaker Institutional Environment Attract FDI

Our results in Table 5 confirm that better institutions in resource-rich countries are not attractive to Chinese FDI. With a focus on resources, our study shows that weaker institutions attract FDI, confirming hypothesis 6. The coefficient of the institutional index is negative and significant in both model 9 ($b = -5.779$, $p = 0.05$) with a focus on resource-rich countries, but also model 10 ($b = -4.055$, $p = 0.05$), for the resource-poor countries. Thus the findings of our study are in line with what has been found by Kolstad and Wiig (2011, 2012). However, our results indicate that the coefficient is larger in the resource-rich countries than in resource-poor ones.

With even larger differences in the sizes of their coefficients, the six sub-indices of our institutional quality variable (*WGI*) highlight that especially in the resource-seeking context, weak host country institutions attract Chinese FDI. However, while in the resource-rich sub-sample all indicators are significant (and negative), no institutional sub-indicator is significant in the resource-poor sub-sample. Thus, the individual levels of quality of the institutional sub-indices are only of importance for Chinese FDI in resource-rich countries.² Our findings, that the different indicators of institutional quality seem to play a role for Chinese resource-seeking FDI, thus contradict the argument of Ajide and Raheem (2016) on global FDI in the African ECOWAS region, that the quality of institutions does not seem to matter.

7. Conclusion

The inflow of Chinese investment into Africa has given rise to a large literature. The motivation for this investment as well as the factors that influence it have been studied, though few researchers have considered the interaction of the role of institutions and the motivation for the investment. Our analysis in this paper aimed to consider this in more detail. In particular, we were concerned with whether the role of these institutions depends upon the type of FDI (market-seeking vs resource-seeking) and the type of country being

²The results of institutional sub-indices for the resource-rich and resource-poor are not included in the paper for brevity. They have been reviewed and are available upon request to the authors.

considered (resource-rich and poor; higher- and low-income). Employing a System GMM covering the period of China's FDI surge in Africa (2002–2012), we find that it is not larger resource reserves but larger markets and weaker institutions, particularly in higher-income and resource-rich countries that are attractive for Chinese FDI projects.

For African host countries, our institutional results reveal that Chinese investors might not be interested in supporting the creation of more stable institutions, which is also in line with the Chinese policy of political noninterference (Zheng, 2016). In addition, firms facing stronger competition at home might search for new markets with similar institutional settings.

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Appendices

Appendix 1. System GMM Results of Institutional Sub-indicators, Full Models.

Variables	CoC	V&A	GE	RoL	PS	RQ
L.FDI	0.776*** (0.089)	0.797*** (0.114)	0.738*** (0.122)	0.758*** (0.127)	0.752*** (0.097)	0.773*** (0.102)
Inflation	-0.028 (0.029)	-0.040 (0.027)	-0.016 (0.035)	-0.023 (0.038)	-0.032 (0.036)	-0.023 (0.026)
GDP	0.034 (0.024)	0.048* (0.028)	0.063** (0.027)	0.062** (0.027)	0.037 (0.029)	0.047** (0.022)
Infrastructure	0.024 (0.065)	-0.000 (0.059)	0.067 (0.075)	0.063 (0.104)	-0.003 (0.060)	0.035 (0.067)
Oil and gas	-0.000	-0.025	-0.036	-0.051*	0.000	-0.018

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(Continued).

Variables	CoC	V&A	GE	RoL	PS	RQ
	(0.026)	(0.035)	(0.024)	(0.030)	(0.030)	(0.023)
Other resources	3.005** (1.290)	1.583 (1.295)	0.976 (1.103)	0.390 (1.210)	2.437** (0.973)	1.510 (1.100)
CoC	-2.389* (1.272)					
V&A		-2.943** (1.428)				
GE			-4.785** (1.790)			
RoL				-6.314** (2.676)		
PS					-1.320 (0.944)	
RQ						-2.674** (1.151)
Constant	-0.330 (1.025)	-0.627 (1.450)	-2.838 (1.762)	-3.371 (2.467)	0.805 (0.724)	-0.818 (1.050)
Observations	430	430	430	430	430	430
Group count (g)	43	43	43	43	43	43
Instrument count (i)	31	31	31	31	31	31
Ratio (g/i)	1.39	1.39	1.39	1.39	1.39	1.39
Year FE	YES	YES	YES	YES	YES	YES
AR(2) test, p-value	0.214	0.248	0.253	0.250	0.243	0.244
Hansen test, p-value	0.134	0.127	0.141	0.153	0.157	0.236

Note: Robust standard errors in parentheses; estimates of year dummies have been omitted for brevity; AR(2) – Arellano Bond test on second-order; *, **, *** mean significant at, respectively, 10%, 5%, 1% level; FE = Fixed effects.

Appendix 2. System GMM Results of Institutional Sub-indicators, GDP Interactions.

Variables	CoC	V&A	GE	RoL	PS	RQ
LFDI	0.750*** (0.076)	0.772*** (0.087)	0.711*** (0.109)	0.749*** (0.100)	0.758*** (0.096)	0.754*** (0.064)
Inflation	-0.049 (0.042)	-0.039 (0.028)	-0.037 (0.029)	-0.041 (0.033)	-0.032 (0.037)	-0.044* (0.026)
GDP	0.041** (0.018)	0.051 (0.034)	0.071** (0.027)	0.039 (0.025)	0.036 (0.027)	0.054*** (0.017)
Infrastructure	-0.050 (0.073)	-0.023 (0.090)	-0.039 (0.078)	0.041 (0.068)	0.006 (0.093)	-0.047 (0.076)
Oil and gas	-0.055 (0.039)	-0.041 (0.068)	-0.112* (0.061)	-0.034 (0.087)	0.005 (0.096)	-0.081* (0.042)
Other resources	3.427** (1.458)	2.484** (1.141)	2.151* (1.094)	2.881* (1.435)	2.541** (1.238)	3.967** (1.690)
CoC	0.540 (2.099)					
V&A		-1.430 (1.456)				

(Continued)

(Continued).

Variables	CoC	V&A	GE	RoL	PS	RQ
GE			-0.381 (1.650)			
RoL				-2.111 (1.761)		
PS					-1.214 (1.403)	
RQ						1.982 (3.553)
CoC*GDP	-0.063* (0.037)					
V&A*GDP		-0.024 (0.043)				
GE*GDP			-0.082* (0.047)			
RoL*GDP				-0.029 (0.070)		
PS*GDP					-0.000 (0.053)	
RQ*GDP						-0.082* (0.047)
Constant	1.783 (1.723)	0.349 (1.178)	0.943 (1.456)	-0.375 (1.374)	0.639 (0.909)	2.318 (2.345)
Net effects	-1.53	na	-1.97	na	na	-1.99
Observations	430	430	430	430	430	430
Group count (g)	43	43	43	43	43	43
Instrument count (i)	35	35	35	35	35	35
Ratio (g/i)	1.23	1.23	1.23	1.23	1.23	1.23
Year FE	YES	YES	YES	YES	YES	YES
AR(2) test, p-value	0.236	0.238	0.248	0.212	0.228	0.185
Hansen test, p-value	0.119	0.287	0.162	0.203	0.300	0.136

Note: Robust standard errors in parentheses; estimates of year dummies have been omitted for brevity; AR(2) – Arellano Bond test on second-order; *, **, *** mean significant at, respectively, 10%, 5%, 1% level; FE = Fixed effects.