

China's Investments in Africa

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This Version: January 2011

1. Introduction

China's fast-growing economic ties with Africa have attracted considerable attention. China's trade (exports plus imports) with Africa increased steadily, albeit at a slow pace, in the 1990s, but surged from \$9.5 billion in 2000, to \$36.3 billion in 2005, and to \$79.8 billion in 2009. Likewise, China has become one of the major capital providers for countries in Africa (UNCTAD, 2007). According to the 2009 *China Commerce Yearbook*, China's Outward Direct Investment (ODI) in Africa relative to its total ODI increased from 2.6% in 2003 to 9.8% in 2008. In fact, Africa has become the third largest recipient of China's ODI in recent years (Besada *et al.*, 2008). In addition to trade and ODI, contracted projects are another important channel through which China interacts with Africa. These contracted projects include building of highways and roads, bridges, schools, shopping centers, housing and office buildings, water conservancy, dams, and power plants. The dollar value of China's contracted projects dwarfs its ODI in Africa.

A very common view is that China's interest in Africa is mainly driven by its concern to achieve more security of supply for natural resources, rather than relying on global markets.¹ Likewise, worries have been raised that Chinese investments could crowd out African manufacturing industry, causing unemployment. The number of high-quality jobs created by Chinese investments is perceived to be quite limited, since Chinese firms tend to bring along their own workers. Some other concerns include the possible negative impacts of China's ODI on the environment, governance, and political reforms in Africa. Some observers criticize China's policy as it tolerates, and passively exacerbates, authoritarian regimes and human right violations. For instance, Brookes (2007, p. 5) argues that "Chinese policies are troubling, especially when they support authoritarian African regimes, and exacerbate conflicts and human rights abuses in countries such as Sudan and Zimbabwe."²

Yet, the benefits of China's ODI may be enormous (UNCTAD, 2010a). Chinese capital offers a valuable source of financing for African countries. Arguably, China has played a positive role in improving infrastructures, increasing productivity, boosting exports, and raising the living standards of millions of Africans. Sometimes, China's ODI is credited for diversifying economic activity and creating jobs in manufacturing, mining, processing trade, and construction.

¹ Indeed, oil and gas accounted for over 60 percent of Africa's exports to China in 2006, followed by non-petroleum minerals and metals that take up 13 percent, while Africa's imports from China comprised mainly manufactured products and machinery and transport equipment, which together accounted for about three-fourths of total imports (Wang and Bio-Tchan é 2008).

² For an alternative view, we refer to Brautigam (2009) who takes issue with the image of China propping up dictatorial regimes.

Although China's economic relations with Africa have attracted some attention in the academic literature (see, for instance, Besada *et al.*, 2008, Morck *et al.*, 2008, Broadman, 2007 and Wang, 2007), formal econometric evidence of the driving factors of China's ODI in Africa is scarce.³ In previous work, (Cheung *et al.*, 2011), we have examined to what extent China's ODI is driven by standard economic determinants of foreign direct investment. We concluded that there is evidence in support of the market-seeking motive, the risk-avoiding motive, and the resources-seeking motive. The economic links with China that are captured by trade relations and contracted projects affect China's investment decision. Once an investment decision is made, China tends to invest more in oil-producing African countries. The effects of natural resources on China's investment decision are especially visible after the adoption of the "Going Global" policy in 2002.

This paper extends our previous work by examining to what extent also political considerations and host-country characteristics affect China's ODI in Africa. For instance, does China invest more in countries that are political allies? Do autocratic and corrupt regimes receive more Chinese ODI? Most importantly, what happens with the economic drivers of China's ODI in Africa once political factors are included in the analysis?

We use two sets of China's ODI data. The first one contains data on China's ODI approved by Chinese authorities. The sample period is from 1991 to 2005. The end of the sample period is dictated by the availability of the officially approved ODI data. The sample starts in 1991 because host-country specific ODI data are available only after 1991. The second dataset comprises ODI data (2003 – 2007) compiled by the Ministry of Commerce of China using the OECD-IMF standard. The second dataset only contains observations after 2002, when the "Going Global" policy was announced, allowing us to test whether this policy change had any implications for the importance of economic vs. political determinants of Chinese ODI in Africa.

Since the ODI data are "censored" at zero and below, we estimate Tobit models. In addition, we use the Heckman (1979) method that allows us to separate the investment decision process into two stages. First, a decision is taken whether to invest in a host country. If this is the case, the second decision is how much to invest in the country concerned.

Our main findings are that in the Tobit models for the first dataset political variables seem to dominate economic determinants of China's ODI in Africa. The likelihood that a country receives ODI from China increases if the country concerned is a political ally of

³ Some previous studies (e.g. Buckley *et al.*, 2007, Cheung and Qian, 2009, and Ramasamy *et al.*, 2010) have analyzed China's ODI strategy.

China, has diplomatic relations with China, is corrupt, democratic, and politically stable. In contrast, for the second dataset most political variables turn out to be insignificant. According to our estimates for the more recent period, China's ODI in Africa is mainly driven by economic ties (trade and projects) and the drive for natural resources. The Heckman models suggest that the decision to invest in a country is driven by different factors than the decision how much to invest in a country.

The remainder of the paper is structured as follows. Section 2 describes the data used in this paper, while section 3 presents the hypotheses tested. Section 4 contains the estimation results and the final section concludes.

2. China's ODI in Africa

The ties between China and Africa can be traced back to the Bandung Conference in Indonesia – the first large-scale Asian–African Conference held in 1955. On May 30, 1956, China established its first formal diplomatic relationship in Africa, with Egypt. Ever since, China has been cultivating and maintaining ties by spreading revolutionary ideology and offering economic and military support to its “Third World” African friends. However, China changed course in the 1980s. As pointed out by Cheung and Qian (2009), its policy has been transformed from a purely political devise to a more market-oriented strategy. Before 1985, only state-owned and local-government-owned enterprises were allowed to invest overseas, but after 1985 private enterprises were permitted to apply for ODI projects. However, the state is still heavily involved in the FDI activity.

One Chinese policy action that has attracted some attention is the establishment of special economic zones in Africa. For China, special economic zones play a crucial role in its recent astonishing economic performance. Conceived to be an effective policy to promote the manufacturing sector and employment in Africa, China has assisted some African countries in developing their own special economic zones and encouraged Chinese companies to invest in them. The first special economic zone established under this initiative is in the Chambishi copper belt region in Zambia. Despite its potential benefits to the African economies, China's involvement in these African special economic zones is not without critics.⁴

In the beginning of the 1990s Chinese ODI surged, especially in Hong Kong. After the 1997 Asian financial crisis, China adjusted its ODI strategy. In 1999, a directive was issued to

⁴ See, for example, UNCTAD (2010b) for a detailed discussion on China's role in Africa's development and related issues.

encourage direct investment abroad that promotes China's exports via "processing trade" investment, while in 2002, the Chinese authorities pushed the "Going Global" strategy to sustain the economic reform process and to promote global industry champions in the wake of the WTO accession. This policy represents China's concerted efforts to encourage investments in overseas markets to support economic development and sustain economic reform in China.

Despite all these changes, the absolute amount of China's ODI is quite small and it accounted for only 1.2% of the world's total FDI in 2009. Still, China's ODI as a share of FDI from developing countries has increased steadily since the 1990s and reached the 9% level in 2003 and 17% in 2009. Indeed, the 2010 United Nations survey reported that China is ranked as the second most promising global investor (UNCTAD, 2010b).

We use data on approved ODI as annually published by the Ministry of Commerce and the former Ministry of Foreign Trade and Economic Co-operation in the "*Almanac of China's Foreign Economic Relations and Trade*." Country-specific approved ODI data are available since 1991, offering a reasonably long time series to investigate the linkages between Chinese ODI in Africa and the characteristics of its host countries. Chinese ODI is still to a great extent determined by the government and using ODI projects approved by the authorities thus allows examining China's policies.⁵ This data set is available for the period 1991-2005. The top three receivers in Africa of ODI from China are South Africa, Sudan and Algeria.

We have a second dataset on China's ODI from the China Commerce Year Book that runs from 2003-2007 in which ODI is measured differently, so that both datasets cannot be merged. This dataset reports the data according to the IMF-OECD standard, thereby mitigating one of the drawbacks of the other dataset that we use. The top three receivers in Africa of ODI from China are now Nigeria, South Africa and Sudan.

In the remainder of this paper, we will investigate the driving forces of Chinese ODI in Africa by testing various hypotheses, building upon our previous work (Cheung *et al.*, 2010).

3. Hypotheses and data

Table 1 shows the hypotheses to be tested. We distinguish between three groups of

⁵ This data do not cover ODI that does not go through the formal approval process, thereby underestimating China's total ODI. However, as we are interested in the Chinese authorities' policies, this is not a serious drawback. In addition, we use a second dataset that covers all Chinese ODI. Unfortunately, this dataset is available for a short period only.

hypotheses. The first set of hypotheses refers to ‘standard’ economic determinants of ODI on which we focused in our previous work. The second group of hypotheses focuses on political ties between the host country and China, while the third subset of hypotheses refers to political and institutional host country characteristics. Data availability primarily determined the list of hypotheses tested. The Appendix offers summary statistics of the data used and provides detailed information on their sources.

The first hypothesis is that Chinese ODI in Africa is determined by the drive for new markets. Numerous studies (surveyed by Chakrabarti, 2001) show that FDI and market size are associated positively. In our previous work, we employed various proxies to test the importance of the market-seeking motive and it turned out that the host-country’s gross domestic product, measured in current US dollars in logs (*GDP*) outperforms other indicators. *GDP* represents the market size and has been used in previous research (Frankel and Wei, 1996; Kravis and Lipsey, 1982; Wheeler and Mody, 1992). Data were drawn from the *World Development Indicators* database of the World Bank. According to our first hypothesis, *GDP* is expected to have a positive impact on Chinese ODI in Africa.

The second hypothesis is that China will invest in African countries with which it has close economic ties. We use two proxies to test this hypothesis, namely *EX* and *Proj*. The first variable, *EX*, is the ratio of the host country’s total exports to China and total exports of the host country.⁶ Although it is more common to use total trade, a case can be made that exports to China may be more relevant. China’s recent investment in Africa is generally perceived to follow the state-driven strategy of giving infrastructure and taking natural resources (cf. Foster *et al.*, 2008). If true, exports of African countries to China should increase ODI.

The second element, *Proj*, is the amount of China’s contracted projects in a host country normalized by the host-country’s population. Contracted projects are an important channel through which China interacts with Africa. Conceivably, contracted projects require endorsements by local authorities. Thus, the amount of contracted projects is indicative of the existing economic ties between China and the host country. To facilitate comparison across countries of different size, we normalize the data by the host-country’s population. We expect *Proj* to have a positive impact on China’s ODI.

The incentive to invest could be adversely affected by the presence of risk factors (Hypothesis 3). Traditionally, many African countries are considered to be very risky (Asiedu, 2002). This explains why Africa receives little capital from Western investors. We include

⁶ Here we slightly deviate from our previous work in which we used total trade of the host country with China.

RISK to assess the effect of a host country's risk characteristics on China's ODI. This variable is the sum of the socioeconomic conditions index and the investment profile index as provided by the *International Country Risk Guide* (ICRG) divided by two. The socioeconomic conditions index is an assessment of the socioeconomic pressures at work in society that could constrain government action or fuel social dissatisfaction. The rating assigned is the sum of three subcomponents, each with a maximum score of four points (very low risk) and a minimum score of 0 points (very high risk). The subcomponents are: unemployment, consumer confidence and poverty. The investment profile index is an assessment of factors affecting the risk to investment that are not covered by other political, economic and financial risk components. The rating assigned is the sum of three subcomponents, each with a maximum score of four points (very low risk) and a minimum score of 0 points (very high risk). The subcomponents are: contract viability/expropriation, profits repatriation and payment delays. Our *RISK* index runs from zero (high risk) to 12 (low risk). According to our third hypothesis, *RISK* is expected to have a positive impact on Chinese ODI in Africa.

China seriously lacks natural resources to support its high rates of economic growth. Growing at double digits requires access to natural resources. However, the evidence in support of natural resources as a pull factor (Hypothesis 4) is mixed. Whereas Ramasamy *et al.* (2010) report that China's ODI is attracted to countries with abundant natural resources, Cheung and Qian (2009) found otherwise. The different focus between these two studies could explain these diverging results. The study of Ramasamy *et al.* (2010) refers to the number of international location decisions made by private and non-private Chinese firms during the period 2006–2008, while Cheung and Qian (2009) use similar data as the present study, but focus on Chinese ODI in all countries.

Two endowment-related variables, *Engy* and *Min*, are used to examine whether China's drive for natural resources impacts its ODI in Africa. *Engy* is a host country's energy output that includes crude oil, natural gas, and coal output. *Min* is the mineral output that includes bauxite, copper, iron, and gold. Both *Engy* and *Min* are normalized by the host country's gross national income. The data on *Engy* and *Min* were also retrieved from the World Bank.

The next set of hypotheses refers to China's political ties with the host country. According to Besada *et al.* (2008, p. 15), "A key element in understanding what is behind the growth in China's involvement in Africa is the central Chinese precept that business should not be mixed with politics. China's growing presence in Africa thus largely reflects

commercial rather than other political considerations.” In fact, these authors claim that the Chinese position is not to interfere in other countries' internal affairs and respecting their right to choose the road of development that best suits them. In contrast, it can be hypothesized that China has a preference for countries that are political allies (Hypothesis 5). We test this hypothesis using data on voting behavior in the UN General Assembly. Unfortunately, data on voting in line with China are not available and therefore we follow Barro and Lee (2005) and use a variable reflecting the extent to which a country voted in line with the USA, discarding those votes where more than 80 percent of the countries agreed (*UN Voting*). The data has been provided by Axel Dreher (see Dreher and Sturm, 2010). The expected sign of this proxy is negative.

[Insert Table 1 here]

Under hypothesis 6 China is expected to invest in those countries with which it has diplomatic relations. In the course of time, China has established diplomatic ties with many African countries. In 2010, China has a formal diplomatic relationship with 49 of the 54 countries on the African continent. Our variable *Diplomatic* is a dummy indicating whether country *i* and China have a diplomatic relationship in year *t*. If so, the dummy is one and it is zero otherwise. The data come from: the Ministry of Foreign Affairs of the People's Republic of China (<http://www.fmprc.gov.cn/eng/>). The expected coefficient is positive.

The final set of hypotheses refers to host country characteristics. The view outlined concerning China's non-interference policy above also implies that China should not have a preference for democratic versus autocratic states. At the same time, China supports African leaders, like Mugabe in Zimbabwe and Bashir in Sudan (Brookes, 2007). A possible reason is that making a deal with an autocrat is easier than with a democratic country. Still, most previous evidence reports that democracy enhances FDI (see Adam and Filippaios, 2007 and Busse and Hefeker, 2007 and references cited therein). Under Hypothesis 7 China is therefore assumed to invest in non-autocratic states (hypothesis 7). We use the sum of the Political Rights and Civil Liberties indicators of the Freedom House to proxy *Autocracy*. The Freedom House indicators have a value between 1 and 7 (where 7=autocracy and 1=democracy), so our indicator ranges between 2 and 14. According to hypothesis seven, *Autocracy* is expected to have a negative impact on Chinese ODI in Africa.

Next, we test whether China invests in countries with low corruption and good governance (Hypothesis 8). A poor institutional environment is often argued to deter foreign

investment (Globerman and Shapiro, 2002). On the other hand, corruption may be seen as facilitating transactions and speeding up procedures that would otherwise occur with more difficulty, if at all (Cuervo-Cazurra, 2006). Therefore, the expected sign of corruption is ambiguous. To capture corruption, we include a variable *Corruption* provided by the International Country Risk Guide (ICRG). The ICRG data is based on perceived corruption by a panel of experts. The level of corruption is expressed on a scale between zero and six, where a higher score means less corruption. Although there are many proxies available for measuring corruption, this index is the only one that is available for a long period of time for many countries and that has been constructed in a consistent way (see Seldadyo and De Haan, 2011). To capture governance we include the *Law and Order* index of ICRG. This indicator assesses (on a 6 point scale) the strength and impartiality of the legal system (the law component) as well as popular observance of the law (the order component). The expected sign of *Law and Order* is positive.

Finally, Hypothesis 9 states that China prefers to invest in countries that are politically stable (Schneider and Frey, 1985). There is some evidence in support of this hypothesis. For instance, Ramasamy *et al.* (2010) conclude that Chinese investments are attracted to countries that are politically unstable. For testing Hypothesis 9 we use the variable *ExecChn*, which is defined as the number of times in a year that effective control of the executive power changes hands (source: Databanks International). The expected sign is negative.

4. Censored Regression Results

The Chinese ODI data we are dealing with are left-censored, since either positive or zero ODI flows from China are observed. Using OLS would lead to biased estimates for coefficients and that is why we estimate Tobit models. We estimate various panel models that are specified as follows:

$$ODI_{i,t}^* = \alpha + \beta_1 GDP_{i,t-1} + \beta_2 ECI_{i,t-1} + \beta_3 RISK_{i,t-1} + \beta_4 NTR_{i,t-1} + \beta_5 POL_{i,t-1} + \beta_6 ICC_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where $ODI_{i,t} = ODI_{i,t}^*$ if $ODI_{i,t}^* > 0$ and $ODI_{i,t} = 0$ if $ODI_{i,t}^* \leq 0$. While $ODI_{i,t}^*$ being the latent variable, the observed dependent variable, $ODI_{i,t}$, is the host-country i 's amount of ODI from China in year t normalized by the host-country's population to facilitate comparison across countries of different size. The variable is expressed in logarithmic form. *GDP* is our proxy for market-seeking. *ECI* is a vector comprising two variables *EX* and *Proj* that measure

China's economic interactions with the host countries. *RISK* is the economic condition risk index, while the vector *NTR* includes the variables *Engy* and *Min*. The vectors *POL* and *ICC* contain our proxies for the political relationship between the host country and China (*UN Voting* and *Diplomatic*) and individual country characteristics (*Autocracy*, *Corruption*, *Law and Order*, *ExecChn*), respectively. To facilitate interpretation and avoid endogeneity issues, lagged variables are used in the regression, except for *Diplomatic*.

[Insert Table 2 here]

The maximum likelihood estimates obtained from the panel data censored regression with the random effect specification are presented in Table 2.⁷ As explained before, the data refer to officially approved ODI for the period 1991-2005. Because data on some explanatory variables is not available, the regressions are based on data for 31 African countries.

Column (1) shows the results if we use *GDP* as proxy for market size. In addition, we include the variables *EX*, *Proj*, *RISK*, *Engy* and *Min*. We take this model, which is very similar to the model used in our previous work, as our base model. In line with our previous findings, we find that *GDP* is only significant at the 20% level of significance, while the variables *Engy* and *Min* are not significant. Of the two variables that measure China's economic interactions with the host countries (exports and contracted projects), the contracted projects *Proj* is statistically significant at the 1 percent level, while *EX* is significant at 5 percent. Finally, *RISK* comes out significantly at the 10 percent level with the expected sign.

Column (2) shows the results when we add all the variables in the vectors *POL* and *ICC* simultaneously to the base model and follow the general to specific procedure. The main conclusion that follows from this regression is that inclusion of the political variables causes most of the economic determinants to become insignificant. Most coefficients of the variables in the vectors *POL* and *ICC* are in line with the hypotheses spelled out in Table 1. In line with Hypothesis 7, the coefficient of *Autocracy* is significant, albeit only at the ten percent level, with a negative sign. So, our findings suggest that autocratic regimes do not receive more Chinese ODI (recall that a higher number for the variable *Autocracy* implies a more authoritarian regime). Our results also suggest that political allies of the US, politically unstable regimes, and countries without diplomatic ties with China receive less ODI from China.

⁷ The fixed effect specification would generate biased estimates (Greene, 2004a, 2004b).

As an alternative approach, we add the variables in the vectors *POL* and *ICC* to the base model one by one; only those variables that turn out to be significant at the 10% level are shown. The results are presented in columns (3)-(5) of Table 2. It turns out that now also corruption is significant: more corrupt countries in Africa receive more ODI from China in the period under consideration (recall that a higher number of *Corruption* implies less corruption). Although corruption is often perceived to deter FDI because it represents an extra tax and increases investment costs (Bardhan, 1997; Abed and Davoodi, 2000 and Wei, 2000), empirical evidence on the deterrent effect of corruption is very mixed. For instance, some studies found no significant corruption effect (Wheeler and Mody, 1992) and some found that corruption could, in fact, positively affect investment and economic growth (Swaleheen and Stansel, 2007). Cuervo-Cazurra (2006) argues that investors who have been exposed to bribery at home will not be deterred by corruption abroad, but instead seek countries where corruption is prevalent. The similarities in the conditions of the institutional environment induce these investors to focus their FDI there. Our result that for the period under consideration China has a preference for investing in countries that are corrupt are in line with the findings of Swaleheen and Stansel (2007) and Cuervo-Cazurra (2006).

Overall, our results suggest that in the period under consideration, political factors played a key role in China's ODI decisions. Inclusion of political factors makes some previously significant economic determinants of ODI become insignificant, although exports and contracted projects remain significant in all specifications.

[Insert Table 3 here]

Table 3 presents the estimation results for ODI data in IMF-OECD format, following the same set-up as Table 2. As said, the sample period is 2003-2007. We start with the baseline model in column (1), including *GDP*, *EX*, *Proj*, *RISK*, *Engy* and *Min*. Column (2) shows the results when we add all the variables in the vectors *POL* and *ICC* simultaneously and follow the general to specific procedure. In stark contrast to the results as reported in Table 2, it turns out that none of the variables in the vectors *POL* and *ICC* are significant, while various traditional economic determinants of ODI turn out to be significant. The coefficients of *GDP* and *Proj* are significant, while there is also strong evidence for the resource-seeking motive as *Min* turns out to be significant. Our findings for the resource-seeking motive are broadly in line with the results of Buckley *et al.* (2007) who also find that their proxy for this motive is only significant in the latter part of their sample period.

Likewise, when we add the variables in the vectors *POL* and *ICC* one by one to the base model, only *Law and Order* turns out to be significant at the 10% level as shown in column (3). However, the coefficient has the wrong sign, so our results do not confirm Hypothesis 8.⁸

5. Results for Heckman models

So far we have found support for many of our hypotheses, although our results also suggest that during the first period political factors played a more important role than during the second. However, there is a potential problem with our estimates. In a Tobit regression, the occurrence of Chinese FDI and the amount of Chinese FDI are assumed to be determined by the same mechanism and the same set of explanatory variables. However, it might not be true that the occurrence of Chinese ODI and the amount of Chinese ODI are driven by the same variables. That is why we have applied a Heckman two-step estimator, which assumes two mechanisms: one for the occurrence of Chinese ODI and one for the amount of Chinese ODI. Compared with the censored model used in the previous subsection, the two-step procedure offers a framework to sequentially analyze the decision making process. The first decision is to make an investment or not. If the first decision is positive, then the amount of the investments has to be determined. The decision to invest or not is studied using the regression specification:

$$D_{i,t} = \alpha + \beta_1 GDP_{i,t-1} + \beta_2 ECI_{i,t-1} + \beta_3 RISK_{i,t-1} + \beta_4 NTR_{i,t-1} + \beta_5 POL_{i,t-1} + \beta_6 ICC_{i,t-1} + \mu_{i,t} \quad (2)$$

where $D_{i,t} = 1$ if $ODI_{i,t} > 0$ and is zero otherwise.

In essence, we postulate that the likelihood of China to invest in an African country is determined by the variables used in the censored regression. The technical issue of zero-censored data – selection bias problem is controlled for using the inverse Mills ratio (also known as the hazard rate). The ratio that contains information about the unobserved factors that determine China's ODI in an African country is retrieved from equation (2) and will be included in the second stage of the Heckman regression. The significance of the inverse Mills ratio reflects the importance of selection bias.

We adopted the Wooldridge (1995) procedure that extends the Heckman procedure to panel data. Specifically, the panel data Probit regression with random effects is used to estimate (2) with both zero and positive ODI observations. In the second stage of the

⁸ So our results are not in line with the findings of previous studies like Busse and Hefeker (2007).

Heckman procedure, we assess the determinants of the amount of China's ODI. The assessment using only positive ODI data is based on the following regression:

$$ODI_{i,t} = \alpha + \beta_1 MKT_{i,t-1} + \beta_2 ECI_{i,t-1} + \beta_3 RISK_{i,t-1} + \beta_4 NTR_{i,t-1} + \beta_5 POL_{i,t-1} + \beta_6 ICC_{i,t-1} + \rho Mills + v_{i,t} \quad (3)$$

Table 4 presents the results for the officially approved ODI data for the period 1991-2005. We start with a general-to-specific approach in the first stage and report all remaining significant variables in column (1). In the second stage, we again employ the general-to-specific approach including the estimated reverse Mills ratio based on the results of column (1). As to the estimator used: the Hausman test did not reject the null hypothesis, suggesting that the use of a random-effects estimator is not inappropriate, while the Lagrange-multiplier test (LM test, which compares the OLS estimator with the random effects estimator) shows the existence of random effects, which makes pooled OLS estimates less efficient and thus inappropriate. We use a random effects estimator⁹ with year-fixed effects. The F-statistic indicates that the year-fixed effects are jointly significant.

The results for the first-stage regression are broadly in line with the findings as reported in Table 3, suggesting that the decision to invest is primarily driven by political factors and host-country characteristics, although also *GDP* and *EX* come out highly significant. Table 4 also suggests that the factors determining the decision to invest are not the same as the factors determining the amount to be invested. For instance *GDP* and *Law and Order* are significant in the first stage regression, but not in the second. Likewise, *Proj* is significant in the second stage, but not in the first. Now the coefficient of *Law and Order* has the expected sign, while the results for *Corruption* are in line with our previous findings.

[Insert Table 4 here]

Table 5 presents the estimation results for ODI data in IMF-OECD format, following the same set-up as Table 4. It is quite remarkable that in the first stage regression only *GDP* and *Law and Order* turn out to be significant, the latter again with the wrong sign. In the second stage regression, only economic determinants of ODI (*EX*, *Proj*, *Min*) turn out to be significant, in line with the results reported in Table 3. None of the political variables that turned out to be significant in the regressions for the period 1991-2005 have a significant coefficient.

⁹ To be more precise: our random effects estimator is sometimes referred to as GLS random effects estimator (see, for instance, Cameron and Trivedi, 2005).

[Insert Table 5 here]

5. Conclusions

Extending Cheung *et al.* (2011), we have examined to what extent political considerations and host-country characteristics affect China's ODI in Africa. We come up with nine hypotheses on factors that may drive China's ODI that are tested using two sets of China's ODI data. The first one contains data on China's ODI approved by Chinese authorities. The sample period is from 1991 to 2005. The end of the sample period is dictated by the availability of the officially approved ODI data. The sample starts in 1991 because host-country specific ODI data are available only after 1991. The second dataset comprises ODI data (2003 – 2007) compiled by the Ministry of Commerce of China using the OECD-IMF standard. The second dataset only contains observations after 2002, when the “Going Global” policy was announced, allowing us to test whether this policy change had any implications for the importance of economic vs. political determinants of Chinese ODI in Africa.

Since the ODI data are “censored” at zero and below, we estimate Tobit models. In addition, we use the Heckman (1979) method that allows us to separate the investment decision process into two stages. First, a decision is taken whether to invest in a host country. If this is the case, the second decision is how much to invest in the country concerned.

[Insert Table 6 here]

Table 6 summarizes our results. Our main findings are that in the models for the first dataset political variables seem to dominate economic determinants of China's ODI in Africa. The likelihood that a country receives ODI from China increases if the country concerned is a political ally of China, has diplomatic relations with China, is corrupt, democratic, and politically stable. In contrast, for the second dataset most political variables turn out to be insignificant. According to our estimates for the more recent period, China's ODI in Africa is mainly driven by economic ties (trade and projects) and the drive for natural resources. The Heckman models suggest that the decision to invest in a country is to some extent driven by different factors than the decision how much to invest in a country.

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Table 1. Hypotheses

Hypothesis:	Proxies:	Expected sign:
<i>Standard economic determinants</i>		
1. China invests in African countries with large market potential	<i>GDP</i>	+
2. China invests in African countries with which it has strong economic ties	<i>EX, Proj</i>	+
3. China invests in African countries with low risk	<i>RISK</i>	+
4. China invests in African countries with large amounts of natural resources	<i>Engy, Min</i>	+
<i>Political ties with China</i>		
5. China invests in African countries that are close political allies	<i>UN Voting</i>	-
6. China invests in African countries with which it has long standing diplomatic relations	<i>Diplomatic</i>	+
<i>Host country characteristics</i>		
7. China invests in African countries that are authoritarian	<i>Autocracy</i>	-
8. China invests in African countries with low levels of corruption and a good bureaucracy	<i>Corruption, Law and Order</i>	+/- +
9. China invests in African countries that are politically stable	<i>ExecChn</i>	-

Table 2. Chinese ODI in Africa, 1991-2005 (Tobit estimates with random effects)

	(1)	(2)	(3)	(4)	(5)
GDP_{it-1}	0.140		0.139	0.126	0.126
	1.346		1.380	1.291	1.223
EX_{it-1}	2.588**	2.333**	1.947*	2.271**	2.691**
	2.251	2.084	1.681	1.982	2.344
Proj_{it-1}	0.018***	0.014**	0.016***	0.017***	0.017***
	3.155	2.555	2.760	2.973	3.047
RISK_{it-1}	0.131*		0.120	0.150**	0.114
	1.742		1.629	2.024	1.523
Engy_{it-1}	0.003		0.002	0.002	0.002
	0.320		0.203	0.170	0.197
Min_{it-1}	-0.140		-0.132	-0.085	-0.141
	-1.323		-1.262	-0.788	-1.339
UN Voting_{it-1}		-3.802***	-3.764***		
		-2.765	-2.723		
Diplomatic_{it}		0.703**			
		2.040			
Autocracy_{it-1}		-0.060*			
		-1.685			
Corruption_{it-1}				-0.204**	
				-2.081	
ExecChn_{it-1}		-0.624**			-0.590**
		-2.338			-2.169
Constant	-4.516*	-0.211	-3.967*	-3.762*	-4.045*
	-1.949	-0.425	-1.777	-1.734	-1.760
Observations	434	433	433	434	434
Number of id	31	31	31	31	31
LR-test	24.09	16.45	24.29	18.48	24.72
Pseudo R-squared	0.03	0.02	0.03	0.02	0.03

Notes: t-statistics are reported below coefficient "*", "**", "***" denote significant levels at the 10%, 5%, 1% level, respectively. Pseudo R-squared gives the McFadden's R-squared.

Table 3. Chinese ODI in Africa, 2003-2007 (Tobit estimates with random effects)

	(1)	(2)	(3)
GDP_{it-1}	0.298**	0.356***	0.287**
	2.135	2.875	2.195
EX_{it-1}	2.483	3.007**	2.378
	1.456	2.147	1.477
Proj_{it-1}	0.008*	0.009**	0.007
	1.669	2.159	1.544
RISK_{it-1}	-0.022		0.085
	-0.164		0.613
Engy_{it-1}	0.017		0.014
	1.173		1.024
Min_{it-1}	0.518***	0.519***	0.544***
	5.869	6.078	6.276
Law and Order_{it-1}		-0.292*	-0.313*
		-1.871	-1.885
Constant	-6.794**	-7.251**	-6.121**
	-2.202	-2.523	-2.109
Observations	123	123	123
Number of id	31	31	31
LR-test	2.53	1.87	1.15
Pseudo R-squared	0.01	0.00	0.00

Notes: t-statistics are reported below coefficient "*", "**", "***" denote significant levels at the 10%, 5%, 1% level, respectively. Pseudo R-squared gives the McFadden's R-squared.

Table 4. Chinese ODI in Africa, 1991-2005 (Heckman two stage estimates)

	(1)	(2)
	1st stage	2nd stage
GDP_{it-1}	0.346***	
	3.708	
EX_{it-1}	3.692**	5.204***
	2.473	2.618
Proj_{it-1}		0.024**
		2.486
UN Voting_{it-1}	-2.877**	-5.447*
	-2.112	-1.885
Autocracy_{it-1}	-0.112***	-0.269***
	-3.101	-3.402
Corruption_{it-1}	-0.266***	-0.353*
	-2.861	-1.915
Law and Order_{it-1}	0.140*	
	1.749	
ExecChn_{it-1}	-0.501**	-1.213**
	-2.129	-2.033
Mills		1.942**
		2.191
Constant	-6.308***	-0.477
	-3.020	-0.304
Year-fixed effects	No	Yes
Observations	433	205
Number of id	31	29
Pseudo R-square	0.05	
Hausman test		chi2(20)=3.65
LM test		chi2(1) = 17.57
R-squared		0.29

Notes: We report the estimation results from the random-effect Probit panel regressions for the first stage regression. For the second stage, we use Random-effect estimator and include year-fixed effects, which are jointly significant at least 10 percent. The Breusch and Pagan Lagrange-multiplier test for random effects (short for LM test) is performed here and the result suggests random effects estimator is more appropriate than pooled OLS. The t-statistics (robust in 2nd stage) are reported in second rows. Pseudo R-squared gives McFadden's R-squared. "*", "**", "***" denote significant levels at the 1%, 5%, 10% levels, respectively.

Table 5. Chinese ODI in Africa, 2003-2007 (Heckman two stage estimates)

	(1)	(2)
	1st stage	2nd stage
GDP_{it-1}	0.767**	
	2.280	
EX_{it-1}		4.259**
		2.524
Proj_{it-1}		0.011***
		3.265
Min_{it-1}		0.167***
		3.207
Law and Order_{it-1}	-0.823*	
	-1.917	
Mills		-0.567
		-0.513
Constant	-12.880*	-1.373***
	-1.920	-3.009
Year-fixed effects	No	Yes
Observations	123	104
Number of id	31	30
Pseudo R-squared	0.07	
Hausman test		chi2(7)=13.61
LM test		chi2(1) = 27.23
R-squared		0.31

Notes: We report the estimation results from the random-effect Probit panel regressions for the first stage regression. For the second stage, we use Random-effect estimator and include year-fixed effects, which are jointly significant at least 10 percent. The Breusch and Pagan Lagrange-multiplier test for random effects (short for LM test) is performed here and the result suggests random effects estimator is more appropriate than pooled OLS. The t-statistics (robust in 2nd stage) are reported in second rows. Pseudo R-squared gives McFadden's R-squared. "*", "**", "***" denote significant levels at the 1%, 5%, 10% levels, respectively.

Table 6. Summary of findings

Hypothesis:	Expected sign:	First data set (1991-2005)			Second data set (2003-2007)		
		Tobit	Heckman		Tobit	Heckman	
			1st stage	2nd stage		1st stage	2nd stage
1. China invests in African countries with large market potential	+		+		+	+	
2. China invests in African countries with which it has strong economic ties	+	+	+	+	+		+
3. China invests in African countries with low risk	+	+					
4. China invests in African countries with large amounts of natural resources	+				+		+
5. China invests in African countries that are close political allies	-	-	-	-			
6. China invests in African countries with which it has long standing diplomatic relations	+	+					
7. China invests in African countries that are authoritarian	-	-	-	-			
8. China invests in African countries with low levels of corruption (first line) and a good bureaucracy (second line)	+/- +	-	- +	-		-	-
9. China invests in African countries that are politically stable	-	-	-	-			

Appendix: Sources and summary statistics

Chinese ODI in Africa, 1991-2005

Variable	Description	Obs.	Mean	S.D.	Min	Max
ODI_{it}	China's approved outward direct investment scaled by the host country's population (in logs). [Source: Editorial Broad of the Almanac of China's Foreign Economic Relations and Trade (1992-2006)]	434	0.254	0.912	0	11.088
GDP_{it-1}	Lagged value of the host-country's gross domestic product, measured in current US dollars in logs and represents the market size [Source: WDI]	434	22.569	1.411	18.700	26.099
EX_{it-1}	Lagged ratio of the host country's total exports to China and total exports of the host country [Source: IMF DOTS and WTO]	434	0.029	0.073	0	0.594
Proj_{it-1}	Amount of contracted projects China has in a host African country in the previous year in USD per capita. [Source: Editorial Broad of the Almanac of China's Foreign Economic Relations and Trade (1992-2008)]	434	5.518	14.963	0	157.86
RISK_{it-1}	Lagged value of the sum of the socioeconomic condition index and the investment profile index divided by two as provided by the International Country Risk Guide (ICRG).	434	5.360	1.515	0.500	8.729
Engy_{it-1}	Lagged value of a host country's energy output (includes crude oil, natural gas, and coal output) normalized by the host country's gross national income [Source: WDI]	434	6.154	13.784	0	81.309
Min_{it-1}	Lagged value of a host country's mineral output (includes bauxite, copper, iron, and gold) normalized by the host country's gross national income [Source: WDI]	434	0.340	1.040	0	8.986
UN Voting_{it-1}	Lagged value of Inlineblhetusa (voting inline with USA, votes where more than 80 percent of the countries agreed discarded, definition according to Barro and Lee), as provided by Dreher and Sturm (2010)	433	0.115	0.058	0	0.271
Diplomatic_{it}	Dummy indicating whether country i and China have a diplomatic relationship in year t. Information is obtained from the Ministry of Foreign Affairs of the People's Republic of China (www.fmprc.gov.cn/eng/)	434	0.882	0.322	0	1
Autocracy_{it-1}	Lagged value of the sum of the Political Rights and Civil Liberties indicators provided by the Freedom House (2010)	434	9.355	2.950	3	14
Corruption_{it-1}	Lagged value of the corruption index provided by the International Country Risk Guide (ICRG).	434	2.562	1.001	0	5
Law and Order_{it-1}	Lagged value of the law and order index provided by the International Country Risk Guide (ICRG).	434	3.175	1.219	0.083	6
ExecChn_{it-1}	Number of times in the previous year that effective control of the executive power changes hands, as provided by Databanks (2010).	434	0.111	0.335	0	2

Chinese ODI in Africa, 2003-2007

Variable	Description	Obs	Mean	S.D.	Min	Max
ODI_{it}	China's outward direct investment in the IMF-OECD standard scaled by the host country's population (in logs). [Source: Statistical Bulletin of China's Outward Foreign Direct Investment and China Commerce Yearbook, the Ministry of Commerce, China (2005 – 2009)]	123	0.894	1.818	-2.025	9.691
GDP_{it-1}	Lagged value of the host-country's gross domestic product, measured in current US dollars in logs and represents the market size [Source: WDI]	123	23.012	1.471	19.721	26.275
EX_{it-1}	Lagged ratio of the host country's total exports to China and total exports of the host country [Source: IMF DOTS and WTO]	123	0.073	0.123	0	0.567
Proj_{it-1}	Amount of contracted projects China has in a host African country in the previous year in USD per capita. [Source: Editorial Broad of the Almanac of China's Foreign Economic Relations and Trade (1992-2008)]	123	18.126	37.520	0	241.33
RISK_{it-1}	Lagged value of the sum of the socioeconomic condition index and the investment profile index divided by two, as provided by the International Country Risk Guide (ICRG).	123	5.663	1.448	1.083	8.750
Engy_{it-1}	Lagged value of a host country's energy output (includes crude oil, natural gas, and coal output) normalized by the host country's gross national income [Source: WDI]	123	8.516	16.107	0	77.671
Min_{it-1}	Lagged value of a host country's mineral output (includes bauxite, copper, iron, and gold) normalized by the host country's gross national income [Source: WDI]	123	0.604	1.811	0	15.056
UN Voting_{it-1}	Lagged value of Inlineblhetusa (voting inline with USA, votes where more than 80 percent of the countries agreed discarded, definition according to Barro and Lee), as provided by Dreher and Sturm (2010)	123	0.050	0.037	0	0.140
Diplomatic_{it}	Dummy indicating whether country i and China have a diplomatic relationship in year t. Information is obtained from the Ministry of Foreign Affairs of the People's Republic of China (www.fmprc.gov.cn/eng/)	123	0.935	0.248	0	1
Autocracy_{it-1}	Lagged value of the sum of the Political Rights and Civil Liberties indicators provided by the Freedom House (2010)	123	8.496	3.023	3	14
Corruption_{it-1}	Lagged value of the corruption index provided by the International Country Risk Guide (ICRG).	123	1.987	0.763	0	4
Law and Order_{it-1}	Lagged value of the law and order index provided by the International Country Risk Guide (ICRG).	123	3.190	1.117	0.5	6
ExecChn_{it-1}	Number of times in the previous year that effective control of the executive power changes hands, as provided by Databanks (2010).	123	0.057	0.295	0	2