

# **Deciphering Chinese Financing To African Countries**

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## **Abstract**

The paper considers what attracts Chinese aid and Chinese investment to African countries and what kinds of Chinese financing projects are more likely to have unrevealed financing amount. The main database used is AidData: China's Official Finance to Africa 2000-2012. It contains 2356 Chinese financing projects to 50 African countries. The results suggest that Chinese aid supports less developed economies, while Chinese investment favors countries with resource abundance and political conditions conducive to profit-making. The findings show that projects with unrevealed funding amounts tend to fall under investment and the government sector among other categories, raising questions on financing secrecy.

*JEL Classification:* F13; F54; N47; N57; O24; R11; R15

*Keywords:* China, Africa, Development Finance, Foreign Aid, Non-DAC Donors, Emerging Donors, Tracking Underreported Financial Flows

# 1. Introduction

Between 2000 and 2013, China has invested approximately US\$50 billion into the African region for development and commercial purposes (Dreher and Fuchs, 2015). The behemoth amount of financing makes China one of Africa's most significant international partners in foreign aid, investment and trade. In 2017, McKinsey's evaluation of Africa's economic financing relationship with the rest of the world finds that no other country matches the depth and breadth of African engagement that China has achieved (Jayaram, Kassiri and Sun, 2017).

The paper seeks to answer the questions: What political, economic and social characteristics of African countries attract Chinese financing? Do the African traits that attract Chinese aid and Chinese investment differ, and why might that be the case? Are there consistent patterns in the projects which are disclosed but do not have a revealed funding amount? What do these patterns (if any) suggest about financing transparency?

Before launching into the investigation, it is important to establish the distinction between the two main types of Chinese financing to Africa. The first is Chinese Official Development Aid (ODA) which best mirrors foreign aid; the second is Other Official Flows (OOF) which resembles foreign investment. Chinese ODA is primarily state-sponsored support meant for infrastructure-building and state development, often in the form of grants or debt relief. Chinese OOF<sup>1</sup>, on the other hand, are typically projects pursued by government authorities and corporate players to promote business

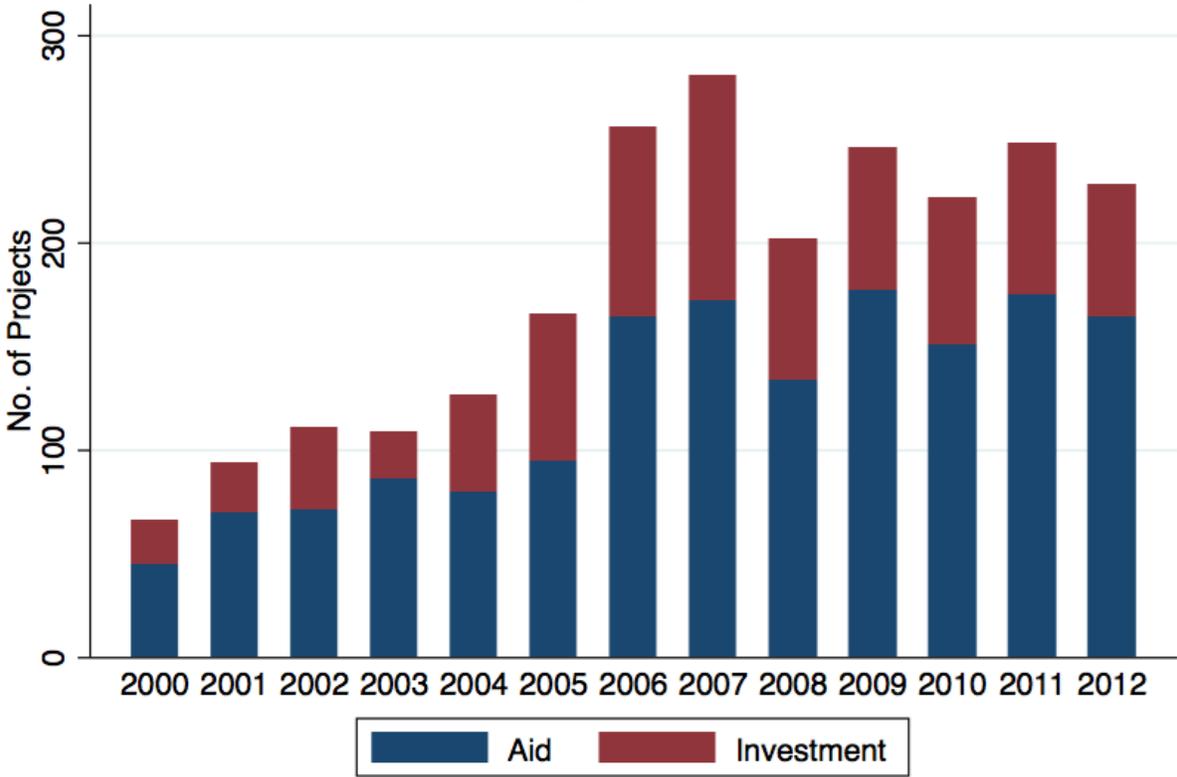
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<sup>1</sup> The MOFCOM approval process was mandatory for every investment project proposed before September 2016, but the approval process was known to be perfunctory (Strange et al, 2013). The requirement to file for MOFCOM approval has been removed since September 2016.

partnerships and pursue financial gains. ODA and OOF will henceforth be referred to as Chinese aid and Chinese investment respectively. Since Chinese aid and investment are pursued with dissimilar interests to advance different goals, the paper will consider them as separate financing streams in its analysis.

The crux of the paper’s analysis relies on AidData: China’s official finance to Africa database (version 1.2), which exclusively records Chinese funding projects in the African continent. The database is the most comprehensive and rigorously cross-checked database available on Chinese financing to Africa (Strange et al, 2013).

Graph 1.  
**No. of Chinese Projects in African Countries**

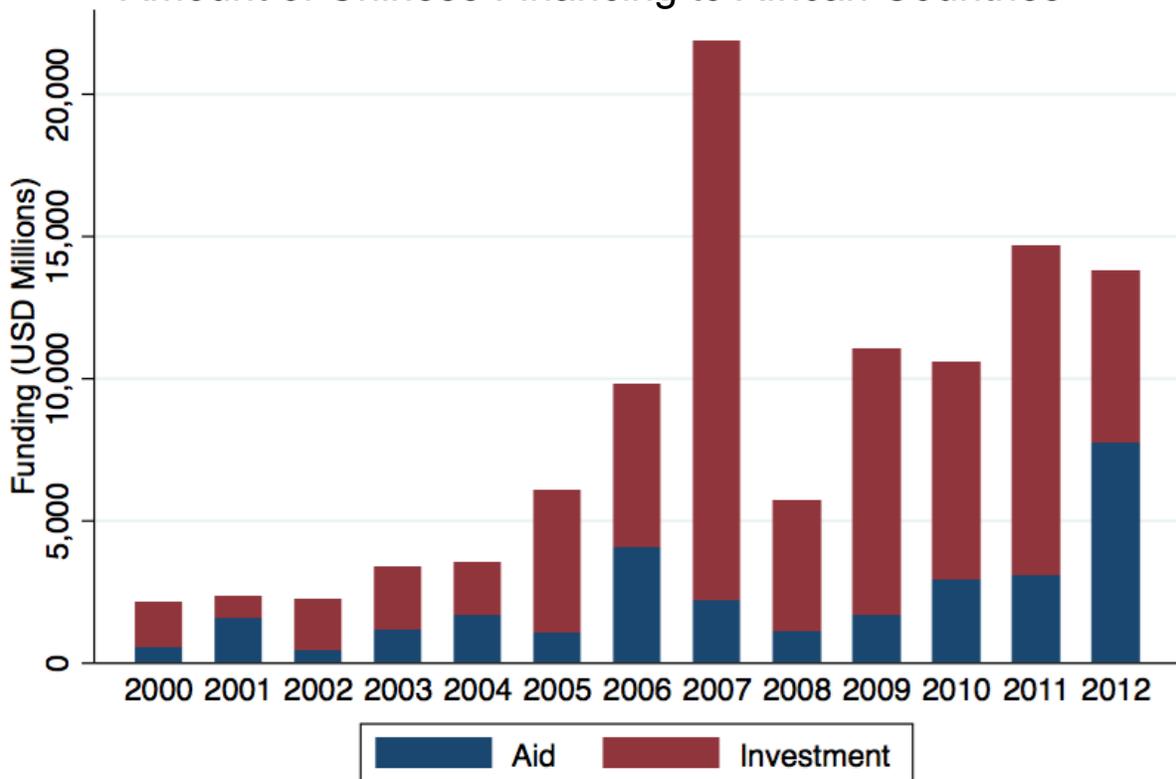


Source: AidData China’s Official Finance to Africa (version 1.2)

Graph 1 shows all the documented Chinese projects in the African continent. There is a general upward trend in the number of African projects documented from

2000 and 2012. Both a greater Chinese financing interest in Africa and a higher rate of project disclosure<sup>2</sup> from China could contribute to this observation. The number of aid projects consistently make up about 70% of all documented projects, suggesting that either China engages in more aid than investment in Africa or investment projects are less likely documented than aid projects.

Graph 2.  
Amount of Chinese Financing to African Countries



Source: AidData China's Official Finance to Africa (version 1.2)

Note: True total financing amount not captured; 42% of projects lack revealed funding amount

The financial amounts represented in Graph 2<sup>3</sup> are a function of both the

<sup>2</sup> China has been making modest efforts to increase foreign financing transparency. The Chinese State Council released the inaugural "White Paper on China's Foreign Aid" in April 2011 (PRC, 2011) and established the China-Development Assistance Committee Study Group to increase information sharing on Chinese foreign financing (Strange et al, 2013).

<sup>3</sup> The sharp financing spike in 2007 is the result of over US\$8 billion of Chinese investment into the Democratic Republic of Congo (DRC) for a copper and cobalt mining project (Bräutigam, 2015). The significant decline in 2008 is most likely the result of the global financial crisis which dampened China's spirits in pursuing African funding as well as other foreign financing projects generally.

financial value per project and the number of projects documented. The funding amount aggregated does not reflect the full extent of financing received by each African country because not all of the documented Chinese projects not have a revealed financial amount and undocumented Chinese projects exist.

Graph 2 provides an interesting contrast to Graph 1. While the number of aid projects comprises about 70% of documented projects every year, they generally compose of less than 30% of the financing amount yearly. Given that the rate of financing amount reveal for aid and investment projects are both around 40%, China is expending significantly more financing dollar in every investment project than every aid project.

Most contemporary research relies on AidData's compilation of Chinese projects into Africa because of its comprehensive nature. However, the the data is incomplete because the Chinese state fails to report every foreign financing activity and does not inconsistently reveal the financing amount at the project level. There could be several reasons for China's seeming reluctance to share about its foreign financing projects. The Chinese bureaucratic system poses a tremendous challenge to project transparency<sup>4</sup>. Furthermore, there is weak internal support for the state's foreign financing program<sup>5</sup> (Cheng and Smyth, 2014). Hence, competing political imperatives are at play as China considers information-sharing about African financing.

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<sup>4</sup> Instead of having a central foreign financing agency which documents all the foreign funding endeavors, China has a multi-tiered system that requires the collaboration from 23 different government bodies to track foreign financing. The administrative infrastructure contributes directly to gaps in data collection and the lack of records on the projects' financial value (Huang 2007, Hu and Huang 2012).

<sup>5</sup> The Chinese public has questioned the need for Chinese overseas spending to develop African public infrastructure like healthcare and education when the Chinese domestic infrastructure is in dire need of rejuvenation (Dreher et al., 2015).

Little empirical research has been conducted on whether the completely undisclosed projects and projects disclosed without financing amounts are completely random or share similar characteristics. Given that it is not possible to draw conclusions on undocumented Chinese projects, this paper will seek to examine if the projects that have unrevealed funding amounts share non-random similarities and contribute to the academic discourse on the perceived secrecy of Chinese financing.

Two distinct hypotheses are made from the outset:

Hypothesis 1: Chinese aid and investment would favor African recipients with different characteristics. Specifically, African countries with greater development needs would attract Chinese aid, while African countries showing greater capacity for higher returns would bring in Chinese investment.

Hypothesis 2: Chinese financing projects to Africa with unrevealed funding amount are expected to exhibit non-random patterns and be associated with project categories such as industry sectors or forms of financing.

In order to test the hypotheses, two datasets and three regressions are used. The first dataset combines data from AidData, Worldwide Governance Indicators, the World Bank, IMF Historical Public Debt Database and CEPII GeoDist Database. Using this dataset, Regression 1 considers the probability of receiving financing on the African recipient's political, economic and social traits while Regression 2 explores the amount of financing on the African recipient's political, economic and social characteristics. The second dataset uses data from the AidData database alone. Regression 3 assesses the relationship between documented project characteristics and the likelihood of a

documented project having a revealed funding amount.

## 2. Literature Review

Recipient characteristics that attract Chinese foreign aid are heterogeneous and complex. While there have been accusations that the Chinese administration provides disproportionately high aid to dictatorial and politically volatile African regimes, Berger, Bräutigam, and Baumgartner, (2011) found no evidence to back up these claims. In addition, Dreher et al (2015) discovered no evidence that China's aid to Africa is influenced by domestic political institutions in the recipient countries. Nonetheless, China's indiscriminate generosity draws criticism for potentially perpetuating autocratic systems and delaying governmental reform (Kurlantzick, 2006).

Dreher et al (2015) found that Chinese aid is strongly correlated with African states with relatively low levels of per-capita income across all industry sectors. This finding suggests that, at the very least, Chinese aid is going towards African countries with larger development needs. Dreher and Fuchs (2012) has also disproven the myth that Chinese aid is motivated by the desire to secure access to natural resources; the researchers found no statistical significance between resource endowment and Chinese aid. This implies that Chinese aid is not directly concerned with resource gain.

With regards to Chinese investment, research findings have been highly consistent. Much like its western counterparts, Chinese investment to foreign economies tends to be positively correlated with larger markets and significant natural resource abundance (Cheung and Qian 2009, Cheung et al 2012). Controlling for these factors, Chinese investment does not shy away from countries with poor governance in

terms of property rights and rule of law (Chen et al, 2015). To the extent that corruption might expedite the deal-making process and make higher margins possible, China could have stronger incentives to seek profits in such environments (Dreher et al, 2015).

China has also adopted investment strategies that embolden it to enter business contracts with poorly-run institutions. Chinese investment to Africa often utilizes financial instruments such as commodity-backed loans to guarantee some financial compensation in the case of default (Brautigam, 2011). Such instruments allow China to reduce the risks of financial misappropriation and loan repayment delinquency and engage African counterparts with greater financial reassurance.

This paper aims to not only investigate if the AidData database supports the findings from previous research, but also explore the issue of inconsistent financing amount reveal. Potentially purposeful financing secrecy is a topic that previous empirical research has not considered. The paper hopes to discover non-random patterns in projects with unrevealed financing amount and contribute fresh insight to the discussion of Chinese financing to Africa.

### **3. Data**

In order to answer the research questions, two datasets are created. The first dataset tests for the African characteristics that attract Chinese financing. It is compiled using data from AidData: China's Official Finance to Africa, Worldwide Governance Indicators, the World Bank, IMF Historical Public Debt Database and CEPII GeoDist Database. The summary statistics can be found in Table A1 in the Appendix.

The second dataset tests for the project characteristics that correlate with

whether the financing amount of a project is revealed. Created using data from AidData: China's Official Finance to Africa alone, the second dataset has summary statistics in Table A2 in the Appendix.

### **3.1 AidData: China's Official Finance to Africa**

Started by Austin Strange and co-authors, the AidData: China's Official Finance to Africa database records 2,356 projects in 50 African recipient countries<sup>6</sup> between 2000 and 2012 and focuses exclusively on Chinese financing in Africa. The database is primarily built on information provided by MOFCOM and other official sources such as news releases and agency statements.

As discussed in the introduction, official sources fail to report every Chinese finance activity to Africa, and do not consistently reveal financial amounts at the project level (Strange et al., 2013). To obtain more project-level information, the researchers at AidData developed an open-source data collection technique – AidData's Tracking Underreported Financial Flows (TUFF) methodology – to collect data from policy-makers, development practitioners, journalists, and other local stakeholders in Africa. The collaborators are able to vet and enhance the database subject to the discretion of AidData researchers and add more project granularity. In spite of these efforts, 42% of the documented projects are unable to be traced to be a financing amount.

For Regression 1, the dependent variables are the aggregated number of funding projects per country per year. The year data is identified using the project

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<sup>6</sup> Interestingly, Chinese financing extends to 50 out of 54 total African countries in the continent. The four countries excluded are Sao Tome and Principe, Gambia, Western Sahara and Swaziland – these countries are relatively smaller and more under-developed than their neighbors in the African continent.

announcement date, which is a fair gauge of project commencement (Dreher et al, 2015).

For Regression 2, the focus shifts from the number of projects to the financial amount of the projects. The dependent variables are generated from aggregating the amount of funding (in USD 2011 terms) per project per year. It should be noted that the financing amount in the dataset is skewed downwards compared to the actual financing amount because of 1) undocumented and completely undisclosed projects and 2) documented projects with unrevealed financing amount.

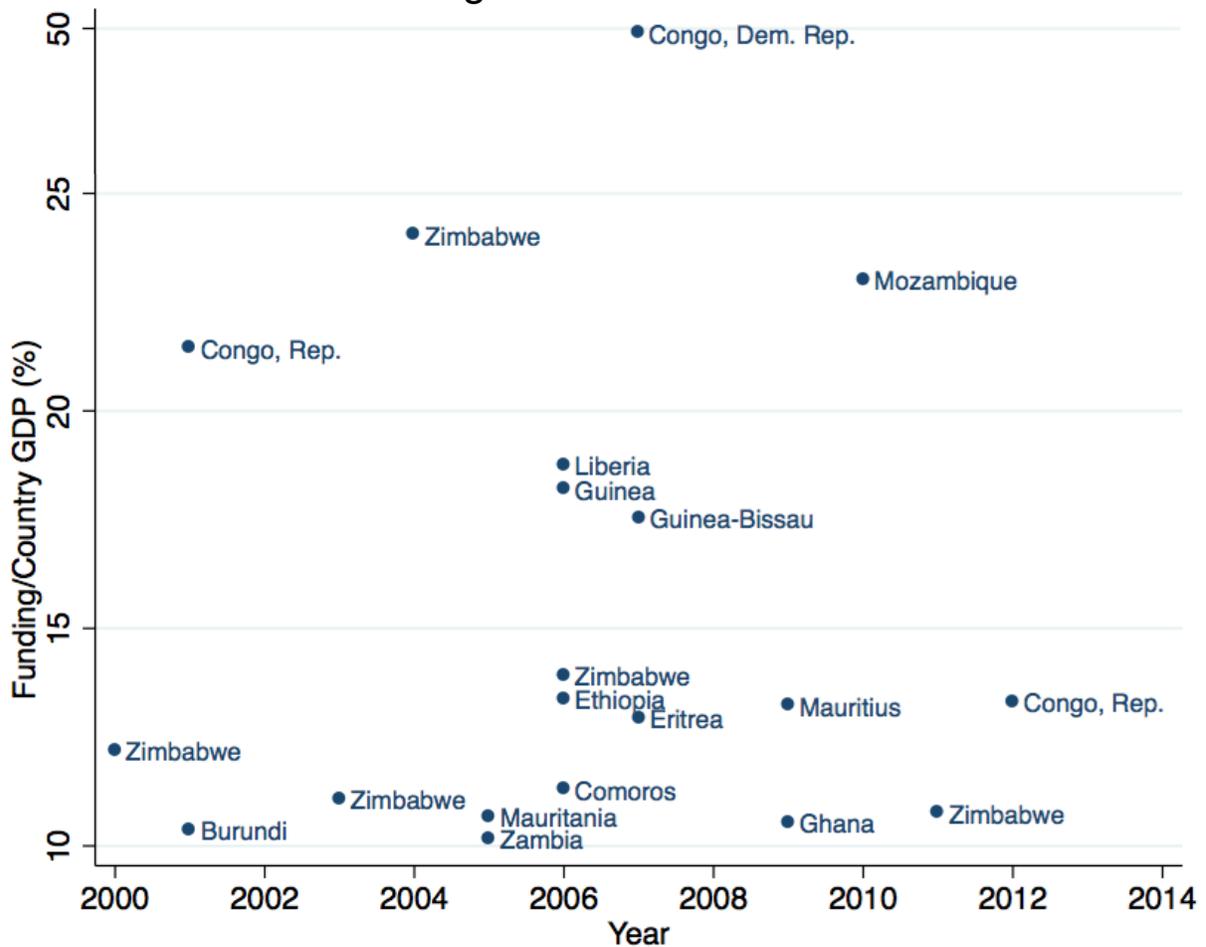
Given the varying GDP sizes of African countries, the same amount of Chinese funding might constitute a drastically different percentage of the recipient country's GDP. Graph 3 highlights the countries with a Funding-to-GDP ratio of more than 10% in every year between from 2000 to 2012. The median Funding-to-GDP ratio for all African recipients every year is below 5%.

With reference to Graph 3, the Democratic Republic of Congo (DRC) appears as a tremendous outlier at 50% Funding-to-GDP ratio in 2007, but hovers below 10% Funding-to-GDP ratio for the rest of years between 2000 and 2012. It is highly unusual for China to embark on such an isolated colossal project<sup>7</sup> (Graph A1 in the Appendix). Regression 2 is run both with and without the DRC to test for results distortion.

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<sup>7</sup> In 2007, China invested over US\$8 billion into the DRC for a copper and cobalt mining project (Bräutigam, 2015). The DRC is home to large amounts of untapped mineral ores and 60% of the world's cobalt (The Economist, 2017).

Graph 3.  
Chinese Financing Amount to African GDP Ratio



Source: AidData China's Official Finance to Africa (version 1.2)

The recurring countries in Graph 3 suggest that China rewards its close political allies, such as Zimbabwe and the Republic of Congo, with more generous and consistent Chinese financing. The political relationship between Zimbabwe and China was first established in 1980<sup>8</sup> and Zimbabwe remains China's closest allies in Africa to this day<sup>9</sup>. The Republic of Congo and China also share an established history of

<sup>8</sup> On the day of Zimbabwe's independence on 18 April 1980, Zimbabwean President Robert Mugabe and Chinese President Deng Xiaoping formally established diplomatic relations on the grounds of political ideology alignment (Gao, 2017).

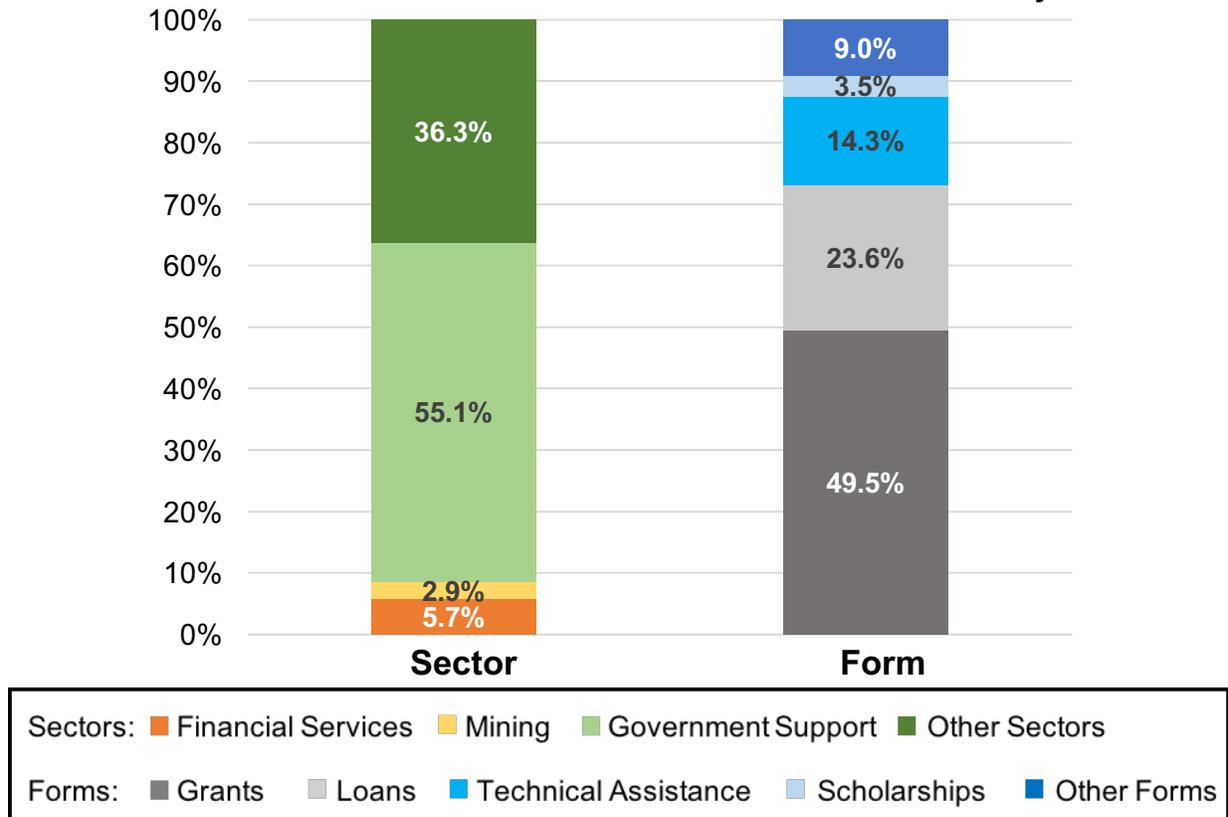
<sup>9</sup> The strong bilateral relationship today is exemplified by Zimbabwe's recent initiative to adopt the Chinese yuan as its primary international currency in late 2015 (Ramani, 2016).

political alliance since the 1960s (Li, 2012).

Regression 3 investigates the funding secrecy of Chinese projects by using the following variables from the AidData database: financial value per project, type of funding, form of funding, industry sector of funding, year of funding and recipient country of funding. The categories within form and sector of funding are coded into dummy variables as shown in Graph 4.

Graph 4.

### Breakdown of Sector and Form of 2356 Total Projects



Source: AidData China's Official Finance to Africa (version 1.2)

Note: 100% corresponds to 2356 total projects from 2000 to 2012

It is possible that the financing amount of some AidData projects were provided by collaborators with exclusive knowledge instead of Chinese official sources. This

would skew the overall financing amount reveal rate upwards in the dataset. To the extent that the collaborators' input was non-random and concentrated on specific categories of financing, the results of Regression 3 might be biased. Future research could work with AidData researchers to disentangle the officially revealed funding information from those that are privately sourced in order to examine the data with fresh eyes.

### **3.2 Worldwide Governance Indicators (WGI)**

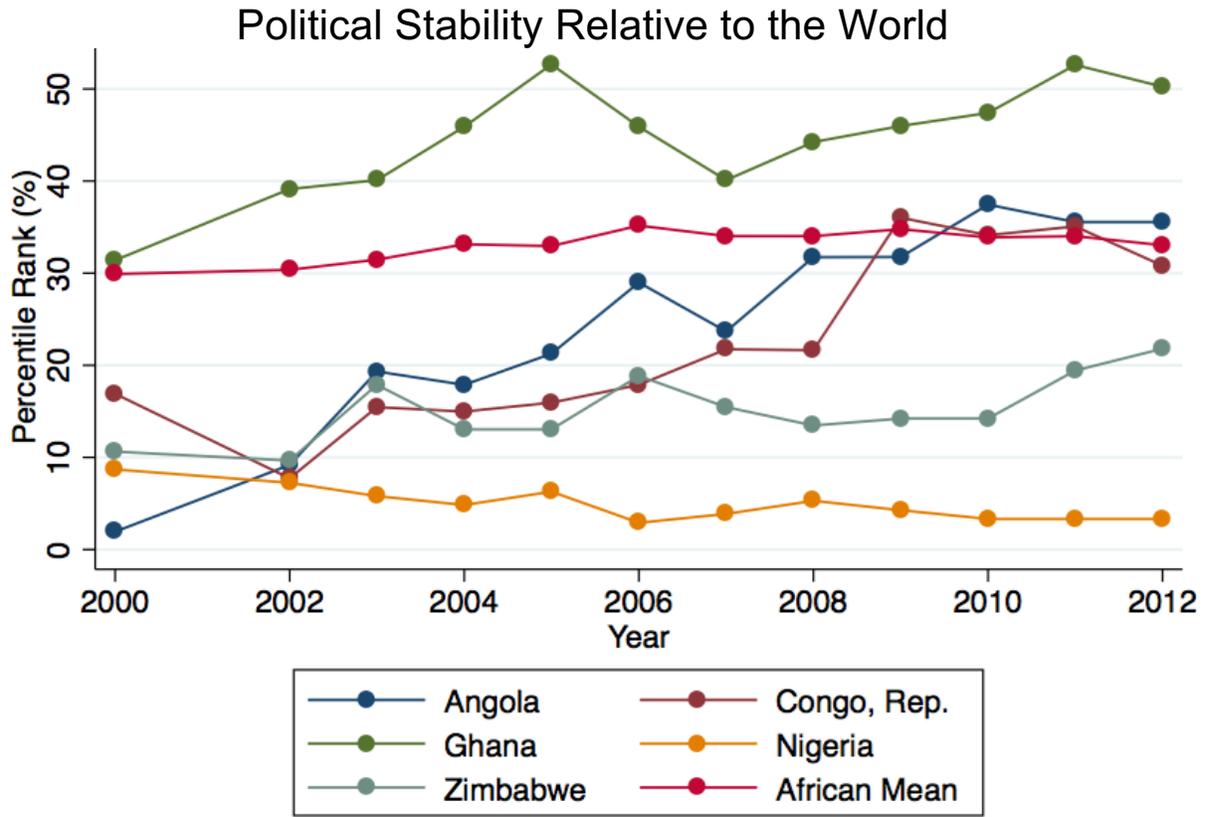
The political characteristics of African recipient countries are assessed by WGI variables, which are expressed in worldwide percentile rank terms. The variables used are: 1) Political Stability and Absence of Violence/Terrorism, which represents the likelihood of political unrest with higher percentiles corresponding with more political stability, 2) Political Freedom, which expresses the extent to which a country's citizens are able to participate in selecting their government with higher percentiles corresponding with more political freedom, and 3) the Control of Corruption index, which captures the extent to which public power is exercised for private gain with higher percentiles corresponding with less tolerance for corruption.

One might expect political indicators of African countries to be largely similar and constant over time. However, Graphs 5 and 6 demonstrate that there are meaningful fluctuations both across countries and time<sup>10</sup>.

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<sup>10</sup> The sample of five African countries represented in Graphs 5 and 6 receive higher than average absolute Chinese funding and/or have a Funding-to-GDP ratio above 10%.

Graph 5.

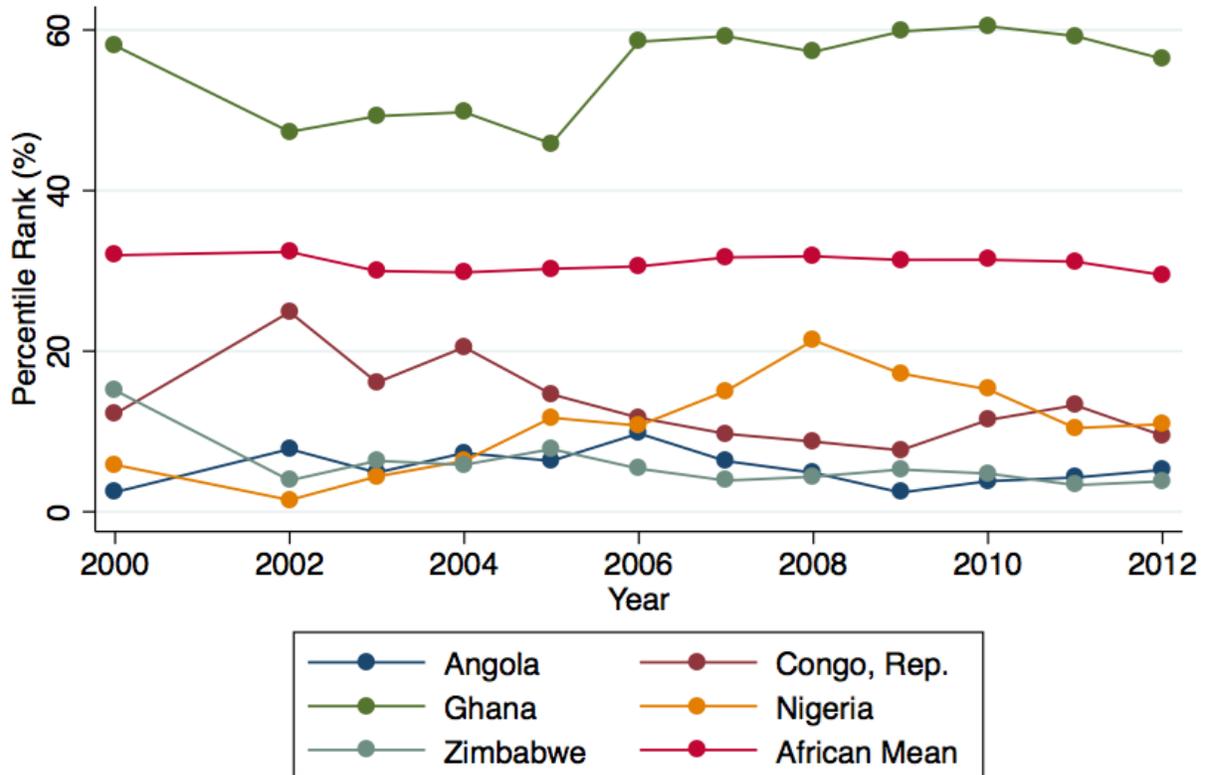


Source: Worldwide Governance Indicators

Note: 100% = Perfect stability; 0% = Complete chaos; 50% = Average country in the world

Graph 6.

### Corruption Control Relative to the World



Source: Worldwide Governance Indicators

Note: 100% = No corruption, 0% = Complete corruption; 50% = Average country in the world

### 3.3 Other Databases Used

The World Bank provides the data for three explanatory variables: 1) Population size, which approximates the size of the economy and the funding need potential, 2) Real GDP per capita which indicates the level of economic development, and 3) Resource endowment which aggregates the oil, natural gas and coal resources that the African recipient has to offer and expresses it as a percentage over the recipient's GDP.

The IMF Historical Public Debt Database 2013 provides the data for the Debt-to-GDP ratio which assesses the financial health and creditworthiness of the country.

The CEPII GeoDist Database 2011 provides data on the official national language of the African countries of interest. China may favor African recipients with English as the official language because the Chinese are the most comfortable with using English as a foreign language of instruction (Dreher, et al., 2015).

## 4. Empirical Strategy

Three sets of regressions are run to address the hypotheses. Regression 1 is a panel Logit regression exploring how the African recipient's political, economic and social characteristics influence the likelihood of receiving Chinese aid, investment or both types of financing projects. Regression 2 is a panel Ordinary Least Squares (OLS) regression investigating how the African recipient's political, economic and social characteristics affect the amount of three-year moving average of Chinese total funding, Chinese aid, and Chinese investment. Regression 3 is a Logit regression which considers how the project characteristics affect whether the project's financing amount is publicly disclosed.

The discussion about Chinese political allies in Data 3.1 suggests that a quantitative measure of political alliance could improve the explanatory power of Regression 1 and 2. As proxies for political alliance, previous research by Dreher et al (2015) used UN voting patterns, the recognition of Taiwan and bilateral trade as explanatory variables. While the variables displayed a strong correlation to the amount of Chinese financing, the results might not be reliable. To the extent that African recipients started demonstrating consistent allegiance to China as a result of receiving Chinese financing, the proxies for political alliance are likely endogenous. Bilateral trade

is a flawed indicator because economic partnership does not equate to political alliance<sup>11</sup>. In this paper, the country fixed effects would absorb the effects of political alliance. Future research could create a non-endogenous measure of political alliance from examining the history of cooperation between China and the African recipients.

#### 4.1 Logit Panel Model on Likelihood of Receiving Financing Project

$$1) \quad \text{logit} \left( \frac{X_i}{1 - X_i} \right) = \beta_1 \text{political}_{it-1} + \beta_2 \text{economic}_{it-1} + \beta_3 \text{social}_{it-1} + \beta_4 \text{moving ave}_{it-1} + \alpha_t + \mu_i + \varepsilon_i$$

In Regression 1,  $X_i$  denotes the likelihood of an African country  $i$  to receive a Chinese funding project in terms of 1) aid, 2) investment or 3) both aid and investment, where the outcome is expressed in log-odds, or classically known as the logit function. The expression  $\text{political}_{it-1}$  denotes the lagged political variables 1) the worldwide percentile rank of political stability of country  $i$  in year  $t-1$ , 2) the worldwide percentile rank of political freedom, and 3) the worldwide percentile rank of corruption control. The expression  $\text{economic}_{it-1}$  captures the lagged economic variables 1) real GDP per capita for the level of development, 2) Debt-to-GDP ratio, and 3) amount of natural resources available. The expression  $\text{social}_{it-1}$  represents the lagged variable population size and a dummy variable that is (1) for when the country's official language is English. The expression  $\text{moving ave}_{it-1}$  refers to the three-year moving average (years:  $t-3$ ,  $t-2$ ,  $t-1$ ) that captures the effect of previous financing on the current year. For example, large funding amounts in year  $t-1$  might reduce the likelihood of receiving a financing project

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<sup>11</sup> Trade is primarily motivated by economic gain. For instance, China is the largest trade partner to the US in 2016 because of the sheer size of the Chinese economy (Census, 2017). China is generally not perceived as a political ally to the US.

in year  $t$ .  $\alpha_t$  is a set of year dummy variables ( $t = 2000, \dots, 2012$ );  $\mu_i$  is a set of country dummy variables ( $i = 50$  African recipients);  $\varepsilon_{it}$  is a stochastic error term.

By using the number of projects as the dependent variable, Regression 1 avoids the measurement error of incomplete project financing amount in the dataset.

Regression 1 also provides the opportunity to explore if African countries that receive both Chinese aid and investment share any traits that differ from those that receive only aid or investment.

## 4.2 OLS Panel Model on Amount of Funding

$$2) \quad \ln(Y_{it}) = \beta_1 \text{political}_{it-1} + \beta_2 \text{economic}_{it-1} + \beta_3 \text{social}_{it-1} + \alpha_t + \mu_i + \varepsilon_{it}$$

In Regression 2,  $Y_{it}$  denotes the three-year moving average of the aggregate amount of 1) Chinese aid, 2) investment or 3) both aid and investment promised to African country  $i$  in year  $t$ . The expression  $\text{political}_{it-1}$  denotes the lagged political variables 1) the worldwide percentile rank of political stability of country  $i$  in year  $t-1$ , 2) the worldwide percentile rank of political freedom, and 3) the worldwide percentile rank of corruption control. The expression  $\text{economic}_{it-1}$  captures the lagged economic variables 1) real GDP per capita for the level of development, 2) Debt-to-GDP ratio, and 3) amount of natural resources available. The expression  $\text{social}_{it-1}$  represents the lagged variable population size and a dummy variable that is (1) for when the country's official language is English.  $\alpha_t$  is a set of year dummy variables ( $t = 2000, \dots, 2012$ );  $\mu_i$  is a set of country dummy variables ( $i = 50$  African recipients);  $\varepsilon_{it}$  is a stochastic error term.

About 40% of the African countries experience funding amounts shifting from

zero to positive across one- to two-year periods. Hence, three-year moving averages of Chinese total financing, aid and investment (years included:  $t-1$ ,  $t$ ,  $t+1$ ) are created as the dependent variable,  $Y_{it}$ , to smooth the sporadic funding gaps across years. The moving average variables take funding dynamics into consideration and help alleviate some of the measurement error from funding projects without revealed financing amount.<sup>12</sup>  $Y_{it}$  and all explanatory variables (except dummies) are expressed in log terms to produce coefficients that can be easily interpreted in percentage terms. This expression captures the magnitude of the effects, which is more meaningful than the absolute financing amount difference between African recipients. The years with zero financial amount is coded as 1 to generate  $\log(1) = 0$ .

All explanatory variables are in one-year lagged terms because the decision of funding is likely made based on previous year's data. Two-year and three-year lags are less favorable given those models would require dropping more observations from the small 2000-2012 panel dataset of 650 total observations.

### 4.3 Logit Model on Project Secrecy

$$3) \quad \text{logit}\left(\frac{z}{1-z}\right) = \beta_1 \text{type} + \beta_2 \text{year} + \beta_3 \text{sector} + \beta_4 \text{form} + \beta_5 \text{country} + \beta_6 \text{interaction term} + \varepsilon$$

In Regression 3,  $Z$  denotes the probability that the dollar amount of funding promised for a particular project was revealed, where the outcome is log-odds, also known classically as the logit function. The dummy variable *type* denotes whether the project is coded as aid or investment. The variable *year* captures the extent to which the

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<sup>12</sup> Since the financing amount per country per year is aggregated, the projects without financing amount will be interpreted as if the project did not happen or that it was completely undisclosed.

rate of financing amount reveal increases or decreases in a linear progression from 2000 to 2012. The expression *sector* represents dummy variables for industry sectors: 1) Financial Services, 2) Government Support, 3) Mining Industry and 4) Other smaller sectors such as Women in Development. The expression *form* refers to dummy variables indicating different forms of funding packages: 1) Grants, 2) Loans, 3) Technical Assistance such as sending medical practitioners into the African country, 4) Scholarships, 5) Other smaller forms such as export credits. The expression *country* denotes a dummy variable for each of the 50 African recipient countries. The expression *interaction term* refers to dummies for 1) type and sector and 2) type and form.  $\varepsilon$  is a stochastic error term.

The interaction terms are included to account for potential collinearity between type and sector, and type and form. Given that *type* is a dummy variable, the interaction terms can be described as a set of 1) investment and industry sector dummy variables, and 2) investment and financing form dummy variables.

## **5. Results & Discussion**

### **5.1 Likelihood of Receiving Financing on Recipient Characteristics**

The Hausman test suggests that the fixed effects regression (shown in Table 1) is more suitable than the random effects regression. The dummy variable for “Official Lang: English” is automatically dropped with fixed effects; the variable shows no statistical significance in the random effects version nor Regression 2.

The results in Table 1 supports the hypothesis that Chinese aid and investment are attracted to African countries with different characteristics. While both aid and

investment favor larger populations, investment alone shows a preference for resource endowment in the recipient country.

Table 1 reports the odds ratio instead of the coefficients. The odds-ratio for each variable reports a multiplicative effect in the form of  $(\text{odds-ratio} - 1) * 100\%$  on the overall probability. With regards to Chinese investment, the population size and the level of resource endowment increase a country's probability of receiving investment projects by 27% and 6% respectively. This means that a larger population base or a larger level of resource endowment would generate a greater increase in the overall probability of receiving investment projects. These results corroborate past research findings. Interestingly, the relatively small odds-ratio on resource endowment implies that resource considerations are not the most pivotal factor in Chinese investment decisions.

For both Chinese aid and investment, the population size increases the probability of receiving both aid and investment by 11%. This could be explained by larger humanitarian need<sup>13</sup> for aid, and larger demand potential for investment projects in bigger markets.

It is worth noting that Chinese financing projects that are completely undisclosed and undocumented exist. To the extent that those undocumented projects are not randomly spread across country and time, the Table 1 results may not capture the true relationship between Chinese financing and recipient characteristics.

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<sup>13</sup> The paper considered including natural disaster as a measure for humanitarian need, but previous research showed that the correlation between financing and natural disaster was statistically insignificant largely because country and time fixed effects (which are required for this paper's empirical model) would absorb the variation (Chen et al 2015, Dreher et al 2015).

Table 1: Odds-Ratio Likelihood of Receiving Chinese Funding Project 2000-2012

	(1) Pr(Both)	(2) Pr(Aid)	(3) Pr(Investment)
L.Political Stability	1.003 (0.21)	0.982 (-0.94)	1.010 (0.62)
L.Political Freedom	0.999 (-0.03)	0.977 (-0.79)	1.005 (0.20)
L.Corruption Control	0.983 (-0.82)	0.987 (-0.63)	1.006 (0.36)
L.ln(Population)	1.107** (0.70)	0.817 (-1.05)	1.273** (1.70)
L.ln(GDP Per Capita)	0.574 (-0.76)	0.524 (-0.81)	0.684 (-0.52)
L.Debt/GDP	0.999 (-0.19)	0.995 (-0.76)	0.999 (-0.26)
L.Resource Endowment	1.027 (1.10)	0.978 (-0.97)	1.055* (2.10)
L.Total Moving Avg	0.989 (-0.35)		
L.AidMoving Avg		0.991 (-0.35)	
L.Investment Moving Avg			0.967 (-1.93)
Constant	0.559 (-1.11)	1.435 (0.82)	0.559 (-1.20)
Pseudo R2	0.113	0.122	0.105
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
N	415	373	437
t statistics in parentheses	* p<0.05,	** p<0.01,	*** p<0.001

Note 1: Dummy "Official Lang: English" is dropped in a Fixed Effects set up. It was not statistically significant in the Random Effects set up or in Regression 2.

Note 2: The Odds-Ratios and their t-stats are displayed instead of the coefficients and their t-stats.

## 5.2 Amount of Chinese Financing on Recipient Characteristics

The Hausman test suggests that Random effects are appropriate for this regression, whose results are presented in Table 2. For completeness, the fixed effects regression results are shown in Table A3 in the Appendix. The observations for the DRC are included in Table 2; the regression results with and without the DRC are qualitatively identical.

The results in Table 2 support the hypothesis that Chinese investment and aid favor countries with contrasting political, economic and social characteristics. Larger amounts of Chinese investment are correlated with countries with higher corruption, higher political stability, and a larger population size. For every percentage increase in corruption control percentile rank relative to the world, the amount of Chinese reduced by about 8%. For every percentage increase in political stability percentile rank relative to the world, the amount of Chinese investment increased by about 8%. For every percentage increase in population size, the amount of Chinese investment is likely to increase by about 1.6x.

From previous literature, China prefers working with corrupt regimes because it greases the wheels of commerce and raises the profits that could be gained (Dreher et al, 2015). Favoring political stability makes business sense because political volatility corresponds with an absence of legal enforcement to protect profits. The astonishingly large and significant coefficient on population size suggests that Chinese investment is keen to tap on larger African markets with greater economic potential.

The results for Chinese aid depict a different story. For every percentage

increase in GDP per Capita, the average aid is likely to decrease by about 1.2x. This large and significant coefficient suggests that Chinese aid allocations are concentrated in countries with greater development needs even when controlling for corruption and resource endowment. The fact that none of the other political or economic indicators are statistically significant implies that Chinese aid is less calculative and more benevolent than it might be given credit for.

Contrary to the results for investment projects in Regression 2, Regression 1 shows no statistical significance in the political indicators. This might imply that most African countries receive some investment projects regardless of the political condition of the country, but countries with political circumstances that are conducive to profit-making tend to receive significantly larger financing amounts. Another reason might be that projects with undisclosed financing amounts come from countries with specific political characteristics, and the omission of these projects in Regression 2 created biased results.

Table 2: Amount of Chinese Funding 3-Year Moving Average 2000-2012 (Random Effects)

	(1) ln(Total Moving Avg)	(2) ln(Aid Moving Avg)	(3) ln(Investment Moving Avg)
L.Political Stability	0.0243 (1.06)	-0.0172 (-0.64)	0.0789* (2.16)
L.Political Freedom	0.0349 (1.22)	0.0601 (1.77)	0.0262 (0.60)
L.Corruption Control	-0.0420 (-1.74)	-0.0387 (-1.37)	-0.0767* (-2.07)
L.ln(Population)	0.488 (1.29)	-0.641 (-1.41)	1.618** (2.97)
L.ln(GDP Per Capita)	-0.283 (-0.61)	-1.181* (-2.11)	-0.771 (-1.12)
L.Debt/GDP	0.00228 (0.40)	-0.00363 (-0.55)	-0.0137 (-1.52)
L.Resource Endowment	0.0157 (0.56)	0.0183 (0.56)	0.0137 (0.32)
Official Lang: English	1.539 (1.46)	1.495 (1.17)	1.998 (1.34)
Constant	8.652 (1.10)	32.20*** (3.41)	-11.32 (-0.99)
Adjusted R <sup>2</sup>	0.109	0.111	0.17
Country RE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
N	438	438	438
t statistics in parentheses	* p<0.05,	** p<0.01,	*** p<0.001

Note 1: Random effects selected based on the Hausman test.

Note 2: The observations for the DRC are included; the regression results with and without the DRC are qualitatively identical.

### 5.3 Funding Secrecy on Project Characteristics

The results in Table 3 supports the hypothesis that projects with and without revealed funding amounts display consistently different project characteristics. Controlling for project form, country, year and sector, investment-type projects decreases the probability of having an omitted financing amount by 93% compared to aid-type projects. This suggests that the financing amount for investment projects in Regression 2 is under-represented. In addition, the Sector results suggest that Government Support projects decreased the probability of financing amount reveal by 83%. The omitted Sector base is Financial Services, which has a 68% rate of revealed funding amount for its 134 projects. This result further supports the idea that Chinese and African stakeholders might be withholding the financing information for political reasons. Given that higher investment amount correlates with corrupt African regimes and greater political stability from Regression 2, the coefficients on these political variables might be larger and more significant with greater financing amount reveal.

In contrast, the Form sector results can be largely explained by non-political reasons. Relative to Grants, which has a 62% rate of revealed funding out of 1,167 projects, Loans increase the probability of financing amount reveal by about 10x and Scholarships decreases the probability of financing amount reveal by about 95%. Loans are expected to be repaid, so they require an explicit financing amount unlike Grants. Scholarships tend to be tuition sponsorship which might be student-dependent and harder to quantify at the time of project announcement. Within Technical Assistance projects, investment projects have a 7x higher probability of financing amount reveal than aid projects. Technical Assistance projects meant for development aid are often

one-off expertise exchange programs which are more challenging to quantify.

The time trend results demonstrate that the linear progression of time from 2000 to 2012 decreases the probability of financing amount reveal by 4%. This contradicts the recent Chinese commitment<sup>14</sup> shown towards improving transparency and implies that the Chinese efforts might be more nominal than real. Another explanation is that the rate of Chinese project disclosure has increased at a faster pace than the rate of reveal for the financing amount of the projects.

Interestingly, Mining projects, which tends to receive the most international scrutiny, produced no conclusive results. This is likely due to insufficient data points. Only 68 projects, 3% of all projects, fall under the Mining category. There might be unannounced mining projects that are omitted from the database completely.

The Country dummy variables are included to control for country-specific factors (Graph A2 in the Appendix). Almost all countries dummies are not statistically significant, suggesting that the explanatory variables in Table 3 captured most of the variation across projects.

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<sup>14</sup> The Chinese State Council released the inaugural “White Paper on China’s Foreign Aid” in April 2011 (PRC, 2011) and established the China-Development Assistance Committee Study Group to bring forth greater information sharing (Strange et al, 2013).

Table 3: Odds-Ratio Likelihood of Chinese Project Financing Amount Revealed 2000-2012

	Financial Amount of Project: (1) Revealed (0) Undisclosed
Type: (1) Investment (0) Aid	0.0689** (-3.08)
Time Trend	0.958* (-2.48)
Sector: Government Support	0.172* (-2.20)
Sector: Mining Industry	0.281 (-1.10)
Other Sectors	0.567 (-0.71)
Form: Loans	11.01*** (6.13)
Form: Technical Assistance	0.0516*** (-13.61)
Form: Scholarships	0.0356*** (-7.07)
Other Forms	0.683 (-0.46)
Investment & Govt Support	5.237 (1.90)
Investment & Mining	6.164 (1.46)
Investment & Other Sectors	1.903 (0.73)
Investment & Loans	0.865 (-0.32)
Investment & Technical Assistance	8.423*** (4.46)
Investment & Other Forms	2.097 (0.85)
Pseudo R2	0.329
N	2341
t statistics in parentheses	* p<0.05, ** p<0.01, *** p<0.001

Note 1: All scholarships fall under aid, so the interaction term is dropped.

Note 2: The Odds-Ratios and their t-stats are displayed instead of the coefficients and their t-stats.

## 6. Conclusions

The hypothesis that Chinese aid and Chinese investment serve different purposes and favor African recipients with dissimilar political, social and economic traits is well-supported by the results from Regression 1 and 2. For Chinese aid, the target recipients are African countries with lower GDP per capita and greater development need. For Chinese investment, greater resource abundance attracts more investment projects, and political conditions conducive to profit-making (specifically higher political stability and higher corruption) bring in larger amounts of Chinese investment. Notably, both Chinese aid and Chinese investment seem to favor a large population size. This could be explained by greater development need for aid, and larger demand potential in for investment projects. It is worth noting that if non-random projects are completely undisclosed and omitted from the dataset, the results would fail to capture the true correlations between African traits and Chinese financing.

The hypothesis that projects with unrevealed financing amount display specific patterns is also proven. The discovery that investment projects and Government Support projects tend to have a lower rate of financing amount reveal than other projects in their respective categories implies that the real coefficients for the political variables Regression 2 might be larger and more significant than what is shown in Table 2. There is likely a political-driven motivation to disclose African financing amounts selectively. To the extent that financing amount secrecy is deliberately pursued, it seems counter-intuitive that China disclosed the existence of these Government Support projects at all. A plausible explanation is that this observation reflects China's gradual transition towards greater transparency (Strange et al 2013, PRC 2011).

On the topic of financing transparency (or the lack thereof), the time trend results from Regression 3 demonstrate that the probability of financing amount reveal decreased slightly from 2000 to 2012. This could be interpreted in two different ways: 1) the Chinese efforts to improve transparency are more nominal than real, or 2) there has been improved project transparency, but the rate of Chinese project disclosure has increased at a faster pace than the rate of financing amount reveal of the projects.

It must be noted that the results in Table 3 might be skewed towards higher financing amount reveal because of private collaborators' contributions to the AidData database. If the collaborators' knowledge area is concentrated in specific project categories, the results from Regression 3 could be biased.

In future research, it would be interesting to compare and contrast Chinese financing to Africa against western funding patterns in Africa. The effects of Chinese financing on the political, economic and social fabric of African recipients are also worth exploring.

## Appendix

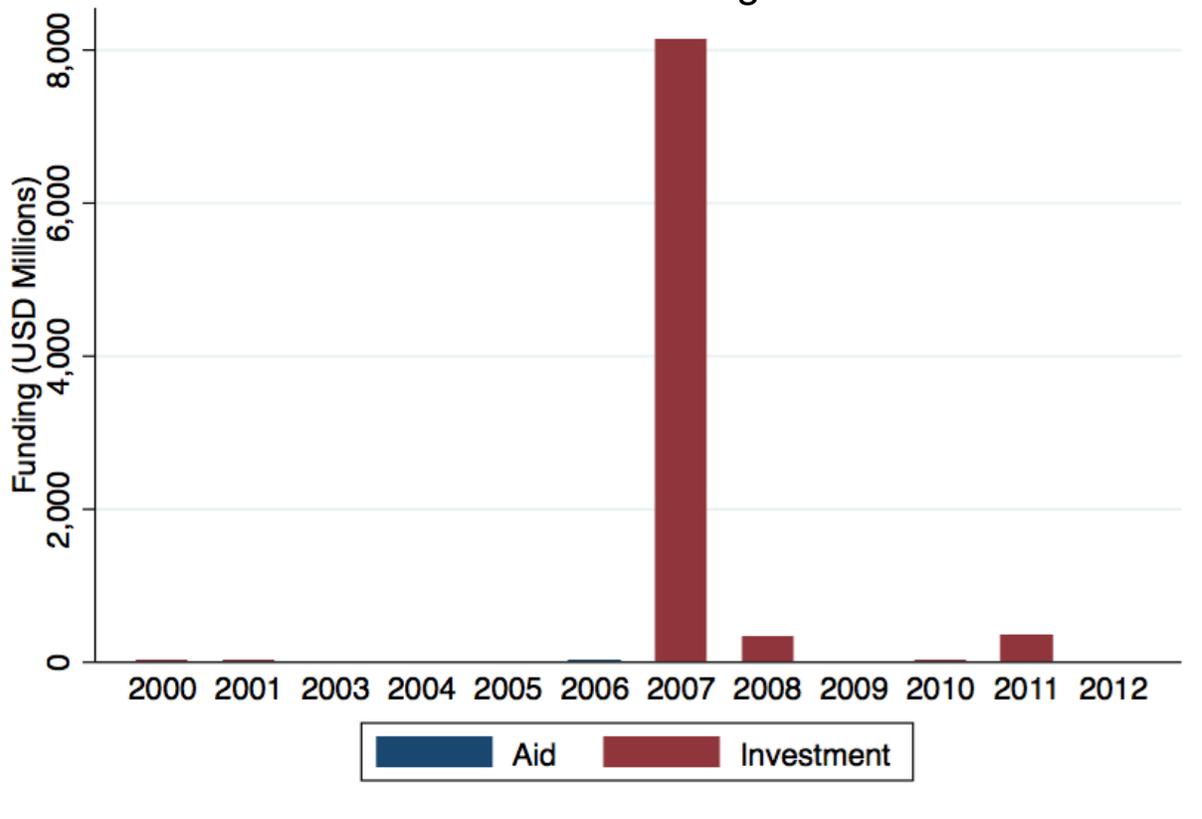
Table A1: Summary Statistics for Regression 2& 2 (Aggregated per Country per Year)

<b>Dependent Variables</b>	Obs.	Mean	SD	Min	Max
Total Funding (US\$m)	650	170.7004	524.4177	0	8138.523
Aid Funding (US\$m)	650	46.24828	165.6026	0	1670.088
Investment (US\$m)	650	124.4521	484.729	0	8138.523
Total Projects	650	3.739683	3.810142	0	35
Aid Projects	650	2.514286	2.466749	0	18
Investment Projects	650	1.225397	2.237842	0	30
<b>Explanatory Variables</b>	Obs.	Mean	SD	Min	Max
Year	650	2006.065	3.742153	2000	2012
Country	650	25.52063	14.71668	1	50
Political Stability % Rank	536	33.07234	22.35909	0	92.78846
Political Freedom % Rank	536	29.49708	19.46264	0	78.84615
Corruption Control % Rank	536	30.98166	21.77849	0	85.85366
Population Size (millions)	579	18.40063	25.3559	.081131	167.2973
GDP per Capita	565	1965.425	3109.989	111.3634	22742.38
Debt-to-GDP Ratio	650	69.80949	65.23393	0	523.38
Resource Endowment (% GDP)	554	15.78627	16.005	.0036994	89.00155
English Official Language	650	.3046252	NA	0	1

Table A2: Summary Statistics for Regression 3 (Disaggregated by Project)

<b>Dependent Variables</b>	Obs.	Mean	SD	Min	Max
Total Funding (US\$m)	2356	45.44102	238.9204	0	8138.523
Aid Funding (US\$m)	1584	18.32547	86.26783	0	1257.443
Investment (US\$m)	772	101.0771	393.0249	0	8138.523
<b>Explanatory Variables</b>	Obs.	Mean	SD	Min	Max
Year	2356	2007.215	3.319077	2000	2012
Country	2356	27.48939	15.25248	1	50
<b>Dummy Variables</b>	Obs.	Mean	SD	Min	Max
Type: (1) Investment (0) Aid	2356	.327674	.4694649	0	1
Sector: Financial/ Business Services	2356	.0568761	.2316548	0	1
Sector: Government Support	2356	.5509338	.4975046	0	1
Sector: Mining Industry	2356	.0288625	.1674555	0	1
Other Sectors	2356	.3633277	.4810602	0	1
Form: Grant	2356	.4953311	.5000843	0	1
Form: Loan	2356	.2359932	.4247081	0	1
Form: Technical Assistance	2356	.1434635	.3506193	0	1
Form: Scholarships	2356	.0348048	.1833239	0	1
Other Forms	2356	.0904075	.2868255	0	1

Graph A1.  
Amount of Chinese Financing to the DRC



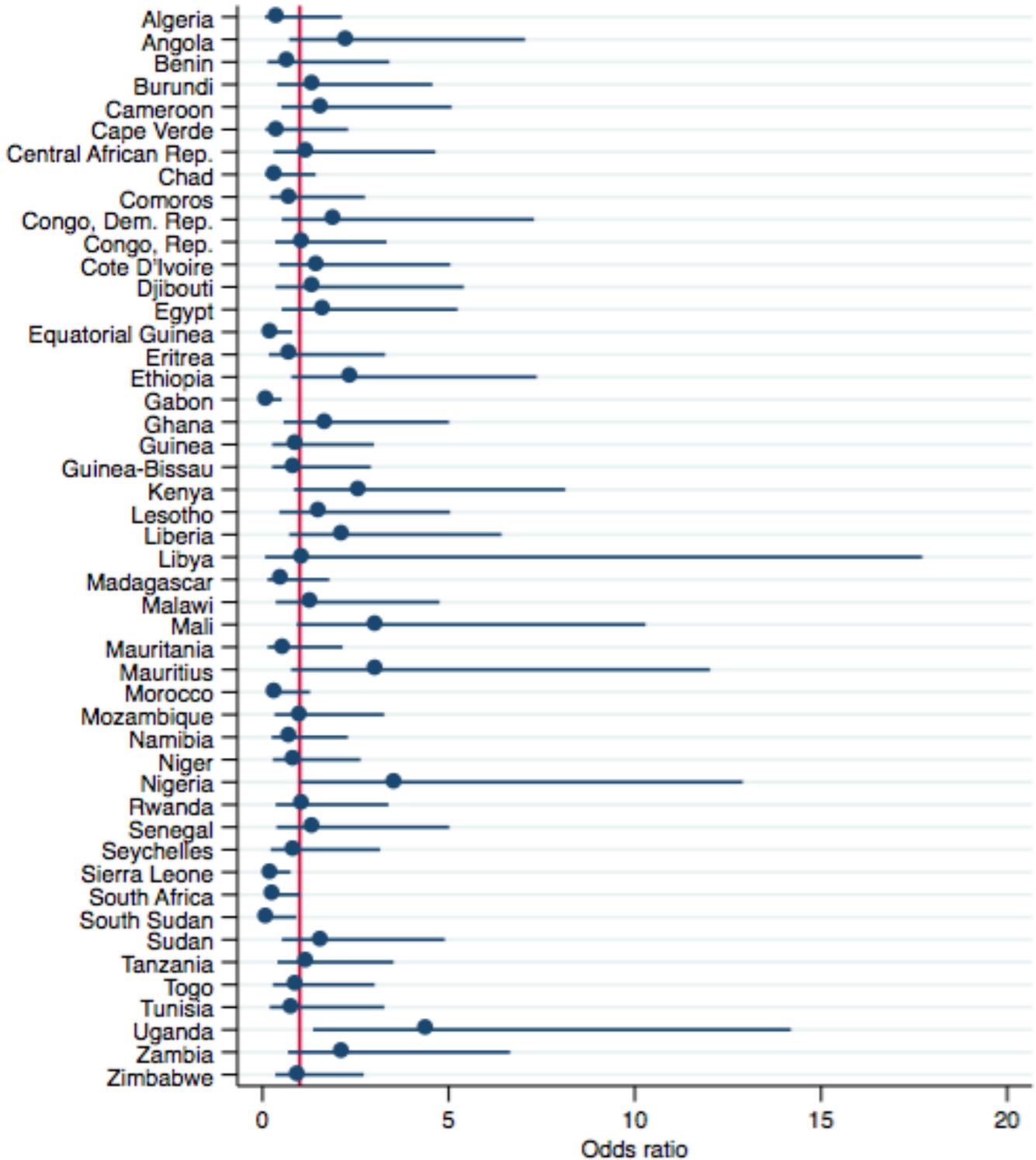
Source: AidData China's Official Finance to Africa (version 1.2)

Table A3: Amount of Chinese Funding 3-Year Moving Average 2000-2012 (Fixed Effects)

	(1) ln(Total Moving Avg)	(2) ln(Aid Moving Avg)	(3) ln(Investment Moving Avg)
L.Political Stability	0.0380 (1.46)	-0.0147 (-0.49)	0.110* (2.54)
L.Political Freedom	0.0654 (1.47)	0.0556 (1.09)	0.0946 (1.28)
L.Corruption Control	-0.0730* (-2.31)	-0.0650 (-1.80)	-0.0389 (-0.74)
L.ln(Population)	1.694 (0.21)	18.59* (2.06)	17.81 (1.36)
L.ln(GDP Per Capita)	0.490 (0.42)	-1.557 (-1.16)	-0.503 (-0.26)
L.Debt/GDP	0.00369 (0.55)	0.000860 (0.11)	-0.00733 (-0.66)
L.Resource Endowment	0.0612 (1.62)	0.0698 (1.61)	0.00878 (0.14)
Constant	-17.08 (-0.14)	-272.8 (-1.92)	-276.9 (-1.34)
Adjusted R2	-0.00551	-0.0381	-0.0313
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
N	438	438	438
t statistics in parentheses	* p<0.05,	** p<0.01,	*** p<0.001

Graph A2.

### Odds-Ratio of Funding Amount Reveal (Compared to Botswana)



Source: AidData China's Official Finance to Africa (version 1.2)

Note: Odds ratio estimates with 95% confidence interval.

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