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Chinese FDI and Debt-Trap Diplomacy in Sub-Saharan Africa

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ABSTRACT

This empirical study seeks to initiate a new field of study. Through panel data analysis the relationship between Chinese FDI, non-Chinese FDI, and government debt in Sub-Saharan Africa is investigated. The model is expanded to include resource endowment and political stability variables. This is contextualized with the narrative of debt-trap diplomacy. This controversial notion is relatively well-trodden ground in the literature, however, not in the context of FDI and its effect on government debt. The panel consists of 46 countries, over the period 2003-2019. Granger Causality testing is employed. The result shows positive effects on government debt from Chinese FDI and a negative effect on non-Chinese FDI. Where a negative effect is expected. The positive effect is increased both in the case of natural resources and political stability. The conclusions drawn from the study are; that the effects of Chinese FDI are different from non-Chinese FDI and that there seems to be a link between higher effects on government debt and resource endowment and political stability. This does support the nation of debt-trap diplomacy, however, this study alone is certainly not able to confirm or deny its existence.

Keywords: Foreign direct investment, China, Sub-Saharan Africa, debt-trap diplomacy

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1. Introduction

1.1 Introducing the study

China has risen to become one of the largest international players in recent decades. With its economic rise, an increase in Foreign Direct Investment (FDI) has followed. FDI is an investment by the resistant enterprise in an economy into another enterprise in another economy with the intention of establishing a lasting relationship (UNCTAD I, 2020). FDI is generally seen as a positive for the receiving countries, since it besides bringing finance, often brings technology, employment, and catalyzes development (OECD, 2002). Although somewhat ambiguous, FDI is expected to negatively affect government debt in the receiving country (Swamy, 2015). This paper seeks to investigate whether there is a difference in the effect on government debt caused by Chinese FDI, and non-Chinese FDI in Sub-Saharan Africa (SSA).

This line of questioning stems from the narrative of ulterior motives behind Chinese investment in Africa and other parts of the world. Questions regarding so-called "debt-trap diplomacy", a term coined by Indian scholar Brahma Chellaney in 2017, came to fruition in the media in the late 2010s. In a much-debated article, Chellaney claimed that Chinese FDI is predatory and aimed to use debt as diplomatic leverage. This notion was exemplified by the Chinese-built and financed port of Hambantota in Sri Lanka, which was leased to a Chinese state-owned company for 99 years when loan payments were not met (Abi-Habib, 2018; Chellaney, 2017). Discussion encompassing debt-trap diplomacy has since then expanded and in light of China's rapid expansion over the last decade in SSA the fear of debt-trap diplomacy has risen. However, questions regarding the reality of such a thing as debt-trap diplomacy have also been raised. In addition to investigating the effect on government debt, this paper looks to further the understanding of this narrative and investigate if there is empirical evidence in support of debt-trap diplomacy.

This will be done through regression analysis of panel data. The model in this study will use macroeconomic control variables, Chinese FDI and non-Chinese FDI, to investigate if there is a significant effect on government debt that varies between the two. Furthermore, the model will be expanded to include a resource dummy variable and political stability measurement. To

further the understanding on the subject of where China invests, and what conclusions can be drawn in the context of debt-trap diplomacy.

1.2 Purpose

The purpose of this study is to expand upon the already existing field of study, which revolves around economic growth and FDI. Firstly, by expanding the model used from a pure growth model to one in which government debt is the dependent variable. Secondly, by problematizing the intent and effect of FDI in SSA in the context of debt-trap diplomacy.

1.3 Research Question

This study will try to contribute to this field of study by answering the following questions: Is the effect on government debt in SSA significantly different between Chinese FDI and non-Chinese FDI, and does the empirical evidence support the narrative of debt-trap diplomacy?

1.4 Disposition

The first part of the paper (1.), presented above, lays out the ground for the rest of the study and introduces the study. The second part (2.) attempts to summarize existing literature through a brief literature review and presents the notion of debt-trap diplomacy, its origin, and criticism of it. Part three (3.) presents the theory of the models, tests used in the study, and the baseline estimation. The fourth section (4.) presents the variables and the dataset and its limitations. Part five (5.) presents the results of the baseline estimation and the expanded model. Part six (6.) discusses the results generally and in the context of debt-trap diplomacy. Part seven (7.) Summarizes and draws conclusions. Finally, part eight (8.) presents the references.

2. Chinese FDI in Sub-Saharan

2.1 Background

Involvement in SSA dates back to colonial times, however, mainly from The Western world. This extended period of influence of The West has meant that it for a long time has been the dominant power in Africa. This can be seen in all aspects of life in Africa, to mention but a few: politics, religion, language, and technology are all greatly influenced by western presence in the region (Nnajiofor, 2020). This has meant that African countries mainly have looked to the West when it comes to developmental problems and investment in the region (Nnajiofor, 2020). Nonetheless, there has been an investment gap needing to be filled. This gap was in 2004 estimated to be an annual 64 billion US$ in order to meet the Millenium Development Goals (Asiedu, 2004). Due to the failure of adequate investment from traditional investors in the region, and the subsequent investment gap, China has been able to establish itself in Africa as an alternative (Kragelund & van Dijk, 2009).

Chinese investment in Africa started to rapidly increase in 1998 when the "go global" strategy was initiated by the Chinese Communist Party (CCP). Since this strategy was initiated FDI has increased. "Go global" in combination with the CCP actively subsidizing entrepreneurship in Africa, meant that by the end of 2006 China had invested more than ten billion US$ in SSA (Kragelund & van Dijk, 2009). Chinese FDI in SSA has since 2006 continuously increased and reached a peak of 46 billion US$ in 2019.

Figure 1: Chinese FDI in SSA by official Chinese data
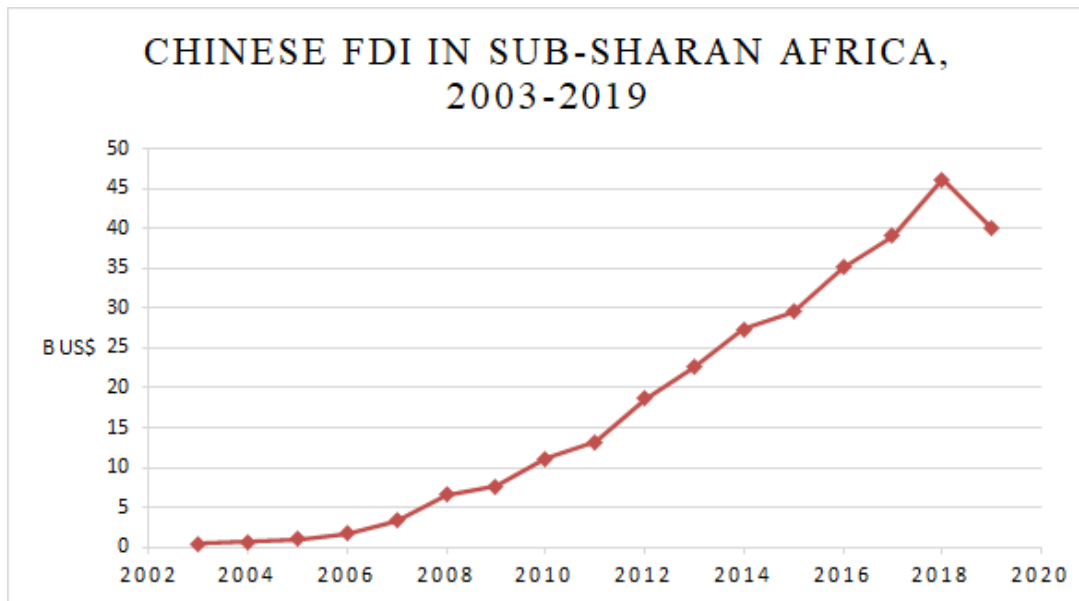
Source: China Africa Research Initiative, 2020

Furthermore. Establishing in Africa came relatively easy for China. This in part because of their willingness to accept projects which western investors rejected. A clear example of this is the Tanzanian railway project Tanzam which was carried out between 1970-1975. The project had been rejected by American companies and was thus carried out by the Chinese government, at a substantially lower price than proposed by the American companies (Nnajiofor, 2020). The importance of infrastructure projects should not be understated, as the severe lack of infrastructure in Africa, particularly in SSA has hindered economic development for decades, through FDI this problem can be solved and encourage growth (Amponsah & Sarpong, 2019). The efficacy and at the relatively low price at which these projects have been carried out has also been of importance, as pointed out by Ye (2010) and Foster et al. (2009). Moreover, China's willingness to invest in politically insatiable countries differs from that of other investors (Kipeja, 2015). These countries, which often are resource-rich, have made large-scale investments in resource extraction available to China (Kragelund & van Djik, 2009).

Chinese establishment in SSA is also a result of the failed practice by the West. In particular the failure of aid money. Moyo (2009) estimates that up to 85% of aid money has ended up in unproductive endeavors. This is a result of corruption, bribery, dictatorship, bad governance, and

theft by corrupt officials (Nnajiofor, 2020). Because of these failures, governments and corporations in SSA have turned to China, as an alternate source of investment in the region.

2.2 Literature

There is plenty of previous research on the topic of Chinese FDI's effect on economic growth in SSA. Another common subject matter is to investigate trade relations and the effects of trade between China and countries in SSA. However, the subject matter of this paper, FDIs effect on government debt is not an explored field of study. Due to this lack of previous research, this section will mainly cover the subjects mentioned above, in addition to this previous research relevant to the model of this study, and other relevant material will be reviewed.

In a paper by Adekunle and Gitau (2013) the determinants of trade flow between China and 46 countries in SSA are investigated. The authors investigate what effect GDP, FDI, distance, inflation, exchange rate, and GDP per capita have on the trade flow between China and SSA, using the gravity model. Furthermore, the authors take special action to account for the fact that 85% of exports from SSA come from 5 oil-rich countries. The result of the study is that GDP for China, FDI, and exchange rate are significant determinants of exports to China. This result held when special considerations were applied to the oil-rich counties, which the authors say is in line with the gravity model. Adekunle and Gita (2013) also find that the determinants of the trade flow between the oil-rich countries are different from the other countries. Lastly, the authors propose policy changes to improve the trade relations between China and SSA. Somewhat similarly Nuetah and Xin conducted a study on the Chinese investment pattern in SSA. This study seeks to investigate the relationship between Chinese FDI and resource seeking. A line of question that naturally follows from Adekunle and Gitau (2013). The null hypothesis of the study is that Chinese FDI in SSA is compatible with resource seeking. This is done through analysis of total investment data, divided into FDI and infrastructure investment. Nuetah and Xin`s study conclude that since less than 30 percent of Chinese investment in the region goes towards natural resource extraction, the null hypothesis is rejected. Similarly, Shan Et al (2017) find no significant effect of natural resources as a driving factor in attracting Chinese FDI in SSA. When analyzing a panel data regression on 22 countries for the period 2008-2014 (Shan et al, 2014).

Vighneswara Swamy (2015) examines the macroeconomic determinants of government debt. The objective of the article is to expand the field of government debt studies and through thorough data analysis. The data consists of 252 countries worldwide, over the period 1980-2009. Granger causality testing is employed to test for causality. The study results are that macroeconomic determinants that positively affect government debt are: Gross fixed capital formation, final consumption expenditure, and trade openness. On the contrary, a negative effect is observed by real GDP growth, FDI, government expenditure, inflation, and population growth. This article is relative to this study since knowing the expected value of the coefficient in this study`s model is vital in order to identify the relevance of the control variables.

A study was concocted by Doku, Akuma, and Owusu-Afriyie (2017) on the effect of Chinese FDI on economic growth in Africa. The study found that Chinese FDI has a significant effect on economic growth in the African countries examined. The researchers use a panel data model with fixed effects on 20 countries in Africa during the period 2003-2012 in the study. The model is complemented with a Granger causality test in order to see if a causal relationship exists between Chinese FDI and economic growth, which the authors find does exist. Furthermore, Akuma and Owusu-Afriyie conclude that free visas should be given to Chinese investors, low tariffs imposed on input and intermediate goods from China and that business grants should be made less bureaucratic, in order to stimulate Chinese FDI in Africa. There is quite an extensive amount of similar research on this topic (see Miao et al, 2020; Anning & Wiafe, 2021; Busse et al, 2014, among others).

Recently a first-of-its-kind study was published by the German Kiel Institute for the World Economy (IfW). The study, authored by Gelpern et al (2021), analyses 100 Chinese loans in 24 different countries. 47% of which in countries in SSA (Gelpern, 2021). This study is the first to through a systematic method review the legal terms of Chinese foreign lending (Pladson, 2021). The authors arrive at three main conclusions. Firstly, Chinese contracts contain what the authors describe as "unusual confidentiality clauses" (Gelpern et al, 2021, p.22). These forbid borrowers from revealing the terms or existence of the issued credit. Secondly, Chinese lenders use collateral arrangements (which are substantially more covered by security arrangements than other creditors), promise to keep the debt out of collective restructuring, and use

lender-controlled revenue accounts as a way to obtain an advantage over other creditors, the author claims. Thirdly, Gelpern et al found that Chinese creditors include "cancellation, acceleration, and stabilization clauses" in their contracts (Gelpern et al, 2021, p. 37). This potentially allows for the lender to influence domestic and foreign policies in the receiving country (Gelpern et al, 2021). These terms did not hold in court, nonetheless, the combination of confidentiality and policy influence could limit the sovereign debtor`s debt renegotiation and crisis management, the authors claim. This paper is of interest to this study since it highlights the notion of debt-trap diplomacy. Which will be discussed in the following section, and later in the discussion.

2.3 Debt-Trap Diplomacy

This section seeks to introduce the notion of debt-trap diplomacy, discuss "examples", and research on the topic. The concept of debt-trap diplomacy has been rigorously discussed in connection to China-Africa relations in the last couple of years. However, there is no consensus on the existence of a Chinese debt-trap (Hence *"examples"* above). In light of the lack of consensus on the topic. This section will present the original article, which sparked the discussion around it, and criticism of the narrative.

2.3.1 Introduction to the narrative

The term debt-trap diplomacy was coined by Indian scholar Brahma Chellaney in 2017. In an article titled *China's debt-trap diplomacy*, Chellaney discusses how China uses debt as diplomatic leverage in developing countries across the world (Chellaney, 2017). This is done through projects where the Chinese government directly or indirectly takes a controlling stake. This can be done through state-owned or private companies given the influence the CCP has on private enterprises (Chellaney, 2017). Sri Lanka is the main example that is discussed in the article. Two main projects were completed by China in Sri Lanka; Mattala Rajapaksa International Airport, and Magampura Mahinda Rajapaksa Port. Both of these projects were complete failures from a monetary perspective, which was known before they were initiated. The Mattala Rajapaksa International Airport was dubbed the world's emptiest, and the port was likewise a complete fiscal bust, drawing 34 ships in 2012 (Abi-Habib, 2018; Chellaney, 2017). Moreover, Gwadar port in Pakistan is lifted as another example that succumbed to the same fate

as Magampura Mahinda Rajapaksa Port in Sri Lanka. Chellaney continues by further discussing the ramifications of the so-called debt-trap. By rescheduling payments or canceling debt in exchange for renewed contracts or being awarded new projects China is trapping countries in interminable debt. Furthermore, Chellaney (2017) claims that the objective of these investments never was as simple as to build infrastructure, but rather to gain "commercial penetration and strategic leverage", as put by Chellaney (2017), since that is more valuable than the financial gain of the projects. Chellaney (2017) also claims that one of China's motives for debt-trap diplomacy is to access natural resources. This claim will be investigated through the inclusion of a natural resources dummy variable in the model of the study.

Moreover, the absence of violence as a requirement for investment is not as important for Chinese investors as others (Kipeja, 2015). This means that less stable countries, which generally are not subject to as much investment, and frequently are denied credit from common financiers are more likely to receive this investment and credit from China (Kipeja, 2015). In light of this notion, a variable that accounts for the political stability and absence of violence will be added to the model of this study.

Seeing the increase of investment in SSA by China in the last decade, questions concerning debt-trap diplomacy in SSA have arisen. However, as discussed above there is no consensus regarding the aforementioned topic. Therefore, the next section will present criticism of the narrative of debt-trap diplomacy - in SSA, and other parts of the world. When it comes to a topic of this sort, that is in many ways politicized, it is important to keep the discussion unbiased. The starting point of this study is that there is no debt-trap. This notion will at a later stage be discussed concerning the results of the study (see 7.).

2.3.2 Criticism

Just as the notion of debt-trap diplomacy has gained a larger role in the discord surrounding China-Africa relations (Shaomin & Jiang, 2020), it has attracted a fair amount of criticism. Mainly, from scholars denying its existence. Singh (2020) seeks to investigate the claim of debt-trap diplomacy by comparing Chinese loans and investments in Africa to American loans and investments in Latin America and the Caribbean. Singh concludes that Chinese finance is

not predatory and not resource seeking, rather, these claims are unfounded, and a result of US anxiety for the rise of China as a global force. This vision of debt-trap diplomacy being a result of US anxiety, and the willingness to spread an unfounded idea is shared by Brautigam (2020), who calls debt-trap diplomacy a meme spread by Brahma Chellaney in his 2017 article.

Moreover, the claim that Chinese investment is less sensitive to political stability and the absence of violence is refuted by Namit (2016). Through regression analysis, Namit arrives at the conclusion that there is no significant difference in the destination of FDI between China and Western investors. However, Namit also finds that Chinese FDI is concentrated in countries rich in natural resources (Namit, 2016).

3. Methodological Approach

3.1 Panel Data Model

Estimating a regression using panel data means that a dataset with several individuals (in this case countries) is observed over a period of time. Using and analyzing a panel data dataset is common among researchers because it has the benefit of combining a large amount of data from many individuals and observing them over time. In *Econometric Analysis of Panel Data* Baltagi (2021) discusses the benefits and limitations of panel data analysis. These are summarised below.

Firstly, Panel data allows controlling for individual heterogeneity. Unlike other forms of data, such as time-series and cross-section data, these data forms assume the data to be heterogeneous, at the risk of obtaining biased results (Baltagi, 2021). Secondly, Panel data provides more useful data, less collinearity, and more efficiency than other data forms. Multicollinearity, for instance, is less of a problem for panel data, compared to time-series studies. This is because the cross-section in the panel data adds more information to the explanatory variable. Thirdly, Panel data is more suited to analysis, what Baltagi (2021) calls, "dynamics of adjustment" (Baltagi, 2021, p.8). By this, the ability to capture the myriad of changes that take place in a cross-section that appears to be stable is meant. Here, the ability to capture individual differences allows for a more specific data analysis (Baltagi, 2021). Fourthly, when it comes to macro-panel analysis,

which is the case in this study, panel data can avoid the problem of nonstandard distribution, often present in unit root tests when it comes to time-series analysis (Baltagi, 2021).

Likewise, Baltagi (2021) discusses the limitations of panel data analyses, which are summarised below. Firstly, Limitations surrounding data availability and panel design are often present. This leads to unbalanced panels. Management of large datasets may also be problematic for large panels (Baltagi, 2021). Secondly, when it comes to short periods, asymptotical arguments around the individually recorded data arise, limiting the width of the conclusions which can be drawn from it. However, this problem is more common in micro-panel rather than macro-panels, Baltagi claims, and can be remedied by extending the period (Baltagi, 2021). Thirdly, Macro-panels with long periods are faced with the problem of cross-section dependence. This means that inference might be misleading. However, this can be avoided by unit root testing (Baltagi, 2021).

3.2 Different types of panel data model

This section will introduce the different types of panel data models that will be considered for this study. There are three types of panel data models in question: pooled OLS, random-effects model, and fixed effects model. The error component model is also of importance and will subsequently be discussed.

3.2.1 Panel data models

Pooled OLS is perhaps the most simple way of analyzing panel data. The starting point for these estimators is a balanced and stationary panel. This form of panel data model "ignores" the panel structure of the data, and runs a regression based on every row as a separate observation. Results from these types of regressions will be unbiased and consistent, given that the explanatory variables are exogenous. The OLS estimates will be efficient if the error terms are homoscedastic and not autocorrelated. (Jochumzen I, 2017)

The error component model (ECM) is the basis for the later random and fixed effects models. This model highlights the limitations of the Pooled Regression Model (PRM). The PRM does not account for any heterogeneity for the individual error terms (Jochumzen II, 2017). This does not

make sense, since it is very likely that an individual processes some characteristic which will uniquely affect them. Hence, the error component model, which accounts for the individual-specific effects (Jochumzen II, 2017). There are three different variations of the ECM; the one-way ECM with individual-specific effects, the one-way ECM with time-specific effects, and the two-way ECM with individual and time-specific effects (Jochumzen II, 2017).

The random-effects regression model is applicable for any of the three error component models (Jochumzen III, 2017). If the individual-specific effect has a conditional expectation of zero upon the explanatory variable, the explanatory variable is exogenous, then it is called a random individual-specific effect (Jochumzen III, 2017; Bjorn, 2016). Likewise, if the individual-specific effect is not exogenous, that is if the conditional expectation upon the explanatory variable is different from zero, then the individual-specific effect is fixed (Jochumzen III, 2017). The fixed-effects model is only applicable if there is some individual-specific variation over time, that is it not being constant, for all the explanatory variables (Jochumzen III, 2017). It is of importance to know if random- or fixed-effects should be used in a regression model, to ensure that the estimates are useful for inference. What should be used can be found through a Hausman test.

3.2.2 The Hausman Test

In order to determine if fixed effects or random effects should be applied to the model, the Hausman test will be performed. The Hausman test uses the null hypothesis (H_0) that the individual-specific effects are random (Jochumzen IV, 2017).

The point of the Hausman test is to figure out if the model should be estimated using fixed or random specific effects. Both the random effects estimator and the fixed effect estimator of $\boldsymbol{\beta}$ will converge to different values if the individual-specific effects are fixed (Jochumzen IV, 2017). On the other hand, if the individual-specific effects are random then this will not be the case. The random-effects estimators and the fixed effects estimators will converge to the same value (Jochumzen IV, 2017). So, The Hausman test uses both the random effects estimator and the fixed effects estimator and then compares the difference between the two estimators. If the difference is not significantly different from zero it is evidence in favor of the random effects

estimator. If H_0 is rejected it is evidence in favor of fixed individual effects (Jochumzen IV, 2017).

3.2.3 Granger Causality Test

It is generally known that correlation does not necessarily imply causation. In order to investigate if there exists a causal relationship between two variables, the Granger causality test can be used. This test, as described by EViews (2020), uses the lagged values of *x*, the past values, in order to explain *y*, by seeing to what degree current values of y can be explained using past values of *y*. To this, the above-mentioned lagged values of *x* are added in order to see if it improves the explanation or not. If it does improve the explanation, *y* is said to be Granger Caused by *x* and vice versa. The null hypothesis (H_0) of the test is that *x* does not Granger Cause *y*. If rejected it implies that *x* does Granger Cause *y*. (EViews, 2020)

3.3 Hausman Test result

In order to determine if random or fixed individual-specific effects should be used in the model, a Hausman test is performed. In the test, the null hypothesis is that random effects should be used.

Table 1: Results of the Hausman Test

Variable	Fixed	Random	Difference	P-value
cpi	-0.26871	-0.25047	0.000062	0.0206
trade	0.504621	0.428366	0.001062	0.0193
ge	-1.15615	-0.76746	0.012355	0.0005
ggdp	-1.88575	-1.86123	0.001176	0.4746
cfdi	0.008735	0.008469	0.000001	0.7362
fdi	0.000076	-0.00014	0	0.1764

As the table demonstrates the difference between the fixed and random effects estimators is not different from zero. The null hypothesis is rejected at the five percent significance level.

Subsequently, fixed effects are used in the model. This is to be expected since the model cross-country panel data, which is expected to vary over time across countries.

3.4 Granger Causality Test result

The Granger causality test is used to determine if government debt is Granger Caused by Chinese FDI and non-Chinese FDI, and vice versa. The use of this test is common practice in the literature (see Swamy, 2015, Doku et al, 2017, among others) The table below shows the result of the test.

Table 2: Results of Granger Causality Test

Null hypothesis	Obs.	F-Statistic	P-value
cfdi does not cause *gd*	628	7.01653	0.0010
gd does not cause *cfdi*	628	1.10919	0.3305
fdi does not cause *gd*	676	3.42404	0.0332
gd does not cause *fdi*	676	1.13804	0.3211

At the 5 percent level, the null hypothesis is rejected in both tests where FDI is the first term, and not rejected when government debt is the first term. From the results of the test, it is concluded that Chinese FDI does Granger Cause Government debt and that non-Chinese FDI does Granger Cause Government debt. It is also concluded that government debt does not Granger Cause Chinese FDI or non-Chinese FDI. The Granger causality runs one-way. These results infer that there is a causal link between Chinese FDI, non-Chinese FDI, and government debt. However, these test results should not be interpreted as conclusive evidence of the existence of such a relationship.

3.5. Baseline Model

The baseline model is on the following form:

$$GD_{i,t} = \beta_1 + \beta_2 cpi_{i,t} + \beta_3 trade_{i,t} + \beta_4 ge_{i,t} + \beta_5 ggdp_{i,t} + \beta_6 cfdi_{i,t} + \beta_7 fdi_{i,t} + \epsilon_{it}$$
$$i = [1, 47] \ t = [2003, 2019]$$

Where the subscript *i* indicates which of the 46 countries is in question, i thereby, ranges from 1 to 46, starts with Angola, and ends with Zimbabwe. The subscript *t* indicates at what time is being considered and since the data spans over the period 2003-2019, the range of t is 2003-2019. This regression model includes the macroeconomic control variables and the variables of interest for this study: Chinese and non-Chinese FDI. In the model fixed effects are used. The dataset and variables will be described in the following section.

4. Variables and dataset

4.1 Variables

In this section, all variables will be described in the order that they appear in the regressions, starting with the dependent variable and ending with the last additional variable. Their data sources are also stated.

4.1.1 Dependent variable

The explanatory variable in the regression is the logarithm of general government gross debt as a percentage of GDP. The description of this variable is found in the table below.

Table 3: Dependent variable, control variables, and descriptions

Variables	Description and Source
GD Government Debt	Logarithm of General Government Gross Debt as a Percentage of GDP. This measurement consists of all liabilities that require payments of interests and/or principal by the debtor to the creditor at a or many dates in the future, reported on annual basis (IMF, 2021). Data source: International Monetary Fund I (IMF), 2021.

4.2.2 Explanatory variables

There are also four macroeconomic control variables included in the model. These are the Consumer Price Index (CPI), Government expenditure as a percentage of GDP, Trade openness indicator as trade over GDP, and Real GDP growth rate. The data for the control variables have been collected from the IMF, The World Bank, and UNCTADSTAT. In order to answer the research question at hand, two explanatory variables are being used. These are Chinese FDI and non-Chinese FDI (from economies other than China). The stock of FDI is used rather than the flow. This makes the effect on those countries who have received the largest amount of FDI in the period observable. The reasoning behind the setup of the explanatory variables is to be able to isolate the effect of Chinese FDI and compare it to FDI from a large number of other economies. The explanatory variables and descriptions of the variables are shown in the table below.

Table 4: Explanatory variables and descriptions

Variables	Description and Source
cpi Consumer Price Index	Consumer Price Index with the base tear 2010 is an inflationary indicator. It measures weighted average of the prices paid by consumers for a basket of consumer goods and services. The CPI indices are measured by taking the price changes for each good and service during a month, reported on annual basis (UNCTAD II, 2021). Data Source: United Nations Conference on Trade and Development STAT I (UNCTADSTAT), 2021.
trade Trade openness	Trade openness is measured by a proxy of the sum of exports and imports of goods and services as a percentage of GDP on annual basis (World Bank, 2021). Data Source: World Bank I, 2021.
ge Government Expenditure	Government Expenditure as a percentage of GDP on all sectors. Reported on annul basis (IMF, 2021). Data source: International Monetary Fund II (IMF), 2021.
ggdp Growth GDP	Real GDP growth rate. Reported on annual basis as a percentage (IMF, 2021). Data source: International Monetary Fund III (IMF), 2021.
cfdi Chinese Foreign Direct Investment	Logarithm of the stock of Chinese foreign direct investment the 46 countries in SSA in millions of US$. A foreign direct investment is defined by UNCTAD as an investment made by a resident enterprise with the intent of establishing a long-lasting interest in an enterprise that is resident in another economy. This means a long-term relationship between the investor and the enterprise being invested in. The ownership of 10% or more of the voting power in the enterprise is required for such a relationship to be evident. (UNCTAD I, 2021) Data Source: China Africa Research Initiative (CARI), 2020.
fdi Total Foreign Direct Investment	Logarithm of the stock of Foreign Direct Investment in the 46 countries in SSA from 420 economies in millions of US$. However, Chinese FDI is subtracted from every observation, so that the total of observed economies is 419. The same definition of FDI as above is applied (UNCTAD I, 2021). Data Source: 2020, United Nations Conference on Trade and Development STAT II (UNCTADSTAT), 2021.

4.1.3 Additional variables

There are two interaction variables in the model. These are a natural resource endowment dummy variable and a variable that measures political stability and the absence of violence. The reasoning for including these variables is to allow for further discussion of the results. There is a notion that China is on a resource quest in SSA, which has been described as a form of colonialism. Access to natural resources is also a goal of debt-trap diplomacy, according to Chellaney (2017), in order to investigate this claim the resource variable has been included. The second variable is a measure of political stability. This is included to see if there is a difference in the effect of FDI depending on the political situation in the country. Political stability is generally seen as a positive for a country, therefore, the expectation upon this variable is a negative effect on government debt, likewise, a negative effect on government debt is expected of the interaction between FDI and political stability. The additional variables are described in the table below.

Table 5: Interaction variables and descriptions

Variables	Description and Source
polstab Political Stability and Absence of Violence	Political Stability and Absence of Violence/Terrorism estimates the precepted likelihood of political instability and/or politically motivated violence, which includes terrorism. The estimates range from -2.5 to 2.5 (World Bank III, 2020). Data source: World Bank IV, 2021.
top9res Dummy variable for most resources endowed countries	This dummy variable is set to 1 if the country is one of the top nine most natural resources rich in SSA, and to 0 if it is not. Data Source: World Bank III, 2018.

4.2 Dataset and limitations

The data set consists of 46 countries in SSA over the period 2003-2019. All the variables except Chinese FDI are collected from large international organizations such as the IMF, World Bank, and UNCTAD. This in order to ensure the reliability of the data. However, The Chinese FDI data is collected from the China Statistical Yearbook (YCS) compiled by The China Africa Research Initiative (CARI). Estimates of Chinese FDI are famously imprecise. This stems from the

complex nature of how they are administered by the Chinese government. In *The New Presence of China* Kragelund and van Dijk (2009), discusses how the Chinese system of directing FDI is constructed in a way that makes tracking FDI flows a tall task. This is done through an elaborate system of different banks and other institutes, who each control some part of the process (Kragelund & van Dijk, 2009).

Because of data unavailability and the absence of Chinese investment, some counties were not included in the dataset. These are South Sudan, Sudan, Eswatini, and Somalia. Data selection has not been performed after any other preference than data availability. Data from the CSY tend to underestimate the size of FDI. Since it does not include agreements struck in offshore financial centers, commonly used such include The British Virgin Island, Cayman Island, and Hong Kong (CARI, 2020; Kimpeja, 2015). As discussed above it is known that estimates of Chinese FDI vary greatly among different sources (Kimpeja, 2015), thus the dataset used is not necessarily the most accurate.

5. Results

This section will present the results of the baseline regression, and thereafter the expanded model, that is the baseline model with the additional variables added in separate regressions (see 5.2.1 and 5.2.2).

5.1 Baseline Estimation

This section will present the results of the baseline regression see (3.5). The following table shows the acquired results from the baseline fixed effects regression model. These will then be discussed for the model to thereafter be expanded.

Table 6: Results of the baseline model

Fixed effects	Obs.: 699			
Variable	Coefficient	Std. Error	t-Statistic	P-value
cpi	-0.001435	0.000563	-2.546609	0.0111
trade	0.005292	0.000814	6.501976	0.0000
ge	-0.005776	0.003189	-1.811208	0.0706
ggdp	-0.024772	0.003440	-7.200530	0.0000
cfdi	0.038249	0.022472	1.746569	0.0812
fdi	-0.074725	0.034183	-2.186016	0.0292
Adjusted R^2	0.684290			

All the variables show a significant effect on government debt, at the ten percent level, and the results seem robust with a relatively high adjusted R^2. Firstly, the coefficients of the control variables all show the expected values. That is to say all except trade show a negative effect on government debt, as previously discussed these are the same as results acquired by Swamy (2015). However, there is a significant difference between Chinese FDI and non-Chinese FDI. Chinese FDI shows a positive effect on the dependent variable, be it at a lower significance level than non-Chinese, whereas non-Chinese FDI shows a negative effect. The effect of Chinese FDI on government debt should be interpreted as; if the stock of Chinese FDI increases by 1% the expected government debt, conditional on all other variables, increases by 0.038249%. Subsequently the interpretation of the non-Chinese FDI is; if the stock of non-Chinese FDI increases by 1% the expected government debt, conditional on all other variables decreases by (approximately) 0.074725A difference in significance level is hardly unexpected, given the difference in the size of FDI. In the dataset, the average Chinese FDI stock across the 46 countries is 6.46 billion US$, and non-Chinese FDI is 139.70 billion US$. Given this, the difference in significance between the two is hardly surprising. Nonetheless, the difference in effect between the two is noteworthy. None of the standard errors are particularly high.

5.2 Expanded Model

The baseline model will be expanded using the two additional variables described in the section above (4.2.3). Each expansion and its regression results will be presented separately. A discussion of the full results then follows.

5.2.1 Natural resource endowment, Chinese and non-Chinese FDI

The objective of this expansion of the model is to investigate the claim that China is resource-seeking. When it comes to investing outside of China. This is done through the addition of a dummy variable, which is set to "1" for the top nine resource-rich countries, and "0" otherwise. The top 9 most resource-rich countries are Angola, Botswana, the Republic of Congo, Equatorial Guinea, Gabon, Nigeria, South Africa, Tanzania, and Zambia (World Bank II, 2018). Originally the top ten resource-rich countries were gonna be used. Though due to data unavailability the tenth country, Sudan, could not be included, and thus, the nine remaining are used in the regression. The table below shows the results of said regression.

Table 7: Results of the regression with an added dummy variable for the nine most resource-rich countries

Fixed effects	Obs.: 699			
Variable	Coefficient	Std. Error	t-Statistic	P-value
cpi	-0.001440	0.000555	-2.595916	0.0097
trade	0.005459	0.000793	6.881214	0.0000
ge	-0.004992	0.003109	-1.605660	0.0000
ggdp	-0.020616	0.003423	-6.023132	0.0000
cfdi	0.036148	0.022512	1.605729	0.1088
fdi	-0.060073	0.034929	-1.719849	0.0860
cfdi*top9res	0.106067	0.030730	3.451547	0.0006
fdi*top9res	0.127708	0.076488	1.669647	0.0955
Adjusted R^2	0.700431			

As the table illustrates, all variables in the regression except Chinese FDI (*cfdi*) show a significant effect on the dependent variable, at the ten percent level. The results seem robust given the adjusted R^2-value. None of the standard errors are particularly high but the interaction between non-Chinese FDI (*fdi*) and resource endowment is the highest. The interaction between Chinese FDI (*cfdi*) and the top nine resource-rich countries in SSA (*top9res*) results in an increased positive effect on government debt. Such is also the case for non-Chinese FDI and resource endowment. The effect of Chinese FDI and resource endowment on government debt should be interpreted as; if the stock of Chinese FDI increases by 1% and the country is one of the nine resource-rich countries in SSA the expected government debt, conditional on all other variables increases with 0.106067%. Subsequently, the interpretation of non-Chinese FDI and resource endowment on government debt is; if the stock of non-Chinese FDI increases by 1%

and the country is one of the nine resource-rich countries in SSA the expected government debt, conditional on all other variables increases with 0.127708%.

The positive effect is higher for non-Chinese than Chinese FDI. From these results, it is concluded that the effect on government debt increases for both Chinese and non-Chinese FDI, compared to without the interaction. Potential explanations for this result will be discussed in the section below (6.).

5.2.2 Political stability, Chinese, and non-Chinese FDI

The model is expanded by interacting the Chinese FDI variable with political stability (*cfdi*polstab*) and by interacting non-Chinese FDI with political stability (*fdi*polstab*), the political stability variable is also added separately to see its effect alone on government debt. The results of this regression are shown in the table below.

Table 8: Results of regression with the interaction between Chinese FDI and Political Stability indicator

Fixed effects	Obs.: 699			
Variable	Coefficient	Std. Error	t-Statistic	P-value
cpi	-0.000608	0.000538	-1.129439	0.2591
trade	0.004612	0.000778	5.929813	0.0000
ge	-0.005251	0.003047	-1.723489	0.0853
ggdp	-0.020594	0.003275	-6.288182	0.0000
cfdi	0.073531	0.022037	3.336770	0.0009
fdi	-0.043047	0.038312	-1.123598	0.2616
cfdi*polstab	0.055593	0.012639	4.398597	0.0000
fdi*polstab	0.043256	0.028359	1.525288	0.1277
polstab	-0.818862	0.187205	-4.374144	0.0000
Adjusted R^2	0.749922			

The regression results show a significant effect from all variables except Consumer Price Index (*cpi*), non-Chinese FDI (*fdi*), and the interaction between non-Chinese FDI and political stability (*fdi*polstab*). As can be seen from the coefficient of the political stability variable the expected effect on government debt is negative. Yet, the effect of the interaction between Chinese FDI and political stability is positive, which calls for deeper analysis. The interpretation of the Chinese FDI and political stability is; if the stock of Chinese FDI increases by 1% the expected government debt increases by 0.055593%, given that political stability increases 1 unit. The standard errors are generally small, but are the largest for political stability, indicating that this variable spreads the most around its mean more than the other variables. The adjusted R^2 value gives the impression of these estimates being robust.

6. Discussion

The following discussion seeks to generalize the results obtained in the model, and the subsequent expansion of the model, and to contextualize these with the notion of debt-trap diplomacy. To push the discussion on Debt-Trap Diplomacy towards empirics rather than speculation.

The positive effect on government debt increases when the FDI variables are interacted with the resource endowment variable (see table 7). This effect is significant for Chinese FDI and non-Chinese FDI at the ten percent level. One explanation for this could be that this is because China is investing with the intent to, as put by Chellaney in his 2017 article: "facilitate access to natural resources" (Chellaney, 2017, n.p.). On the other hand, it could also be argued that this is because these resource endowed countries are among the largest economies in the whole of Africa. This is true for Nigeria, South Africa, Angola, Tanzania, and Zambia. These countries are all among the nine resource-rich and rank among the 20 largest economies in Africa (Statista, 2020). As discussed above, the results in this study point to an effect contrary to what is expected for Chinese FDI according to Swamy (2015). This certainly is curious. However, there are many factors that affect government debt that are not accounted for in this study. It is of importance to note that an increase in government debt, as a consequence of Chinese FDI, is not necessarily a sign of predatory behavior. It can certainly be the case that the FDI is aimed at a sector where the recipient country's government takes debt upon itself to complete the project. This is normal for infrastructure projects, which are commonly financed by China in SSA. In many nations in SSA, there is still a need for infrastructure which the government might be willing to fund by debt. For example in Nigeria, SSA`s largest economy 50% of FDI went into railroad projects between 2010-2017 (Butcher et al, 2019). yet, the exasperated effect by the inclusion of the natural resource variable can be seen as evidence pointing towards resource seeking. An idea pushed by Brahma Chellaney as a goal of debt-trap diplomacy (Chellaney, 2017). However, the idea of resource seeking has been refuted by other researchers (see Singh, 2020, among others). Nevertheless, these results indicate that Chinese FDI in resource endowed countries leads to higher government debt, however, this effect is not unique for the Chinese FDI as the positive effect is also present for non-Chinese FDI. Which might point towards a more general trend in these resource-rich countries. It is hard to know what factor is driving. The case might be that the

truth lies somewhere in the middle. Reasonably this is a subject that requires more research to be conducted.

When it comes to analyzing the model with interaction between FDI and political stability things get even more interesting. The effect of high political stability is negative, which intuitively makes sense and was expected. The notion of a lack of sensitivity for political stability does not gain any traction from these results, since higher political stability results in higher government debt. Although the effect from political stability is expected to be negative, the effect of the interaction between Chinese FDI and political stability is positive and significant (see table 6). One interpretation is that when a country is politically stable it is easier to enter contracts and complete investments. If we then factor in the finding of Gelpern et al (2021); that is to say Chinese loan agreements contain special arrangements regarding acceleration, cancellation, and stabilization (among others) which might compromise the receiving countries' domestic and foreign policy according to Gelpern et al (2021). That might point towards why these Chinese investments seem to have a higher positive effect. The result contextualized with Gelpern et al (2021) gives merit to the notion of debt-trap diplomacy. This if anything raises more questions than they bring answers to. The reason why the effect is higher when a county is more politically stable cannot be concluded by this study. Rather it is a question to be investigated by further research.

7. Conclusions

This study has shown that there is a difference in the effect on government debt between Chinese FDI and non-Chinese FDI effect. The positive effect from Chinese FDI is significant when political stability is added to the model, and when natural resource endowment is added. There seems to be a difference in the FDI affecting government debt depending on where it originates. These results do to certain extent merit the claims of debt-trap diplomacy.

Although this study concludes that there is a significant positive effect on government debt from Chinese FDI, contrary to non-Chinese FDI. It is important to note that this study alone does not supply sufficient grounds to make claims regarding the existence of debt-trap diplomacy. There are numerous limitations to this study, for example, data availability and underestimation of Chinese FDI due to a significant amount of FDI being channeled through external destinations, thereby not appearing in official data. Rather, this study should be seen as an introduction to a new field of study, where the focus is FDI and its effect on government debt. There is certainly a need for more research in order to answer these questions and the results of this study.

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