GLOBAL ECONOMIC GOVERNANCE INITIATIVE

Banking on Energy:
The Determinants of Export Credit Agency Energy Financing from China and Japan

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ABSTRACT

In a very short period, Export-Import Bank of China (CHEXIM) and China Development Bank (CDB) have become some of the largest Export Credit Agencies in the world. This paper examines the extent to which CHEXIM and CDB behave similarly to Japan Bank for International Cooperation (JBIC), their Japanese counterpart in energy loans approval. Utilizing a new database on publicized overseas loans for energy from the two banks, this paper econometrically analyses the determinants of CHEXIM and JBIC's overseas energy loans in a comparative perspective. Like their Japanese counterparts, the Chinese banks exhibit a certain degree of concern for the recipient's domestic economy but exhibits risk seeking tendencies as well. Unlike current JBIC energy loans, Chinese energy loans have a significant correlation to China's growing energy dependence. Contrary to claims that China's ECA is a tool to gain geopolitical advantage; geopolitical concerns do not appear to be a determinant of CHEXIM's overseas finance.

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Key Words: export credit agency; energy finance; China; Japan; policy bank

Introduction

China has gradually become a global leader in outbound overseas investment in a manner that is triggering significant change in China and host countries alike. Similar to other successful paths to development, government-sponsored financial institutions have played a significant role in China's outbound investment. Some existed studies suggest that China financially supports overseas investment in key sectors such as energy in order to achieve political goals of the state (Kamiński, 2017). Analyzing the political and economic factors behind China's surge of overseas investment, especially the "strategic" investments in energy sector, will provide insight into the political economy of China's rise and to the broader literature in international political economy.

Export-Import Bank of China (CHEXIM), China's main export credit agency (ECA), acts as a provider of development finance to host governments by providing trade credits and concessional loans. China Development Bank (CDB) also acts as an ECA and provides developmental finance to overseas energy investments of China. Studying loans from these banks not only contributes to the understanding of these important actors in global capital flows, but also adds insight to the interaction of China's economic rise and international politics.

One puzzle often discussed in studies of China's economic takeoff is: as one of the strongest governmental financial agents, are CHEXIM and the overseas branch of CDB behaving similarly or differently compared to its developed country counterparts? This paper aims to study the determinants of energy investment – an area often considered to be "strategically essential" in government-led economic development (Gonzalez-Vicente, 2013) – from the two major ECAs. It discovers that only CHEXIM's energy loans are correlated with China's energy dependence, whereas both banks show a certain degree of market and politics-oriented behaviors.

Background

ECAs are defined as "governmental, quasi-governmental or private financial institutions specialized in issuing governmental export credit to exporters"[1]. These institutions exist in almost all major economies[2]; In addition, one country might have multiple ECAs at its disposal. For example, CDB is not officially classified as an export-import bank, but it functions like an ECA by granting loans to Chinese overseas investment. The only difference between CDB and CHXIM is that CHEXIM issues concessional loans.

CHEXIM and CDB were established in 1993 and quickly became important overseas capital provide because of their substantial support in China's overseas investments. As the largest non-Chinese policy bank, Japan Bank for International Cooperation (JBIC) was originally established as Japan Export Bank in 1950. The bank experienced a series of re-arrangement before becoming the nowadays JBIC.

ECAs of relatively late-developing countries in the global economy, such as Japan and China, are significantly larger as they have assumed a much more substantial role in supporting overseas investments and "strategically" strengthening certain industrial sectors. This paper argues that JBIC is comparable to Chinese banks in terms of energy loan, whereas other ECAs might not be comparable. The following table offers a brief comparison among JBIC, CHEXIM, CDB and two of their counterparts from major economies - Germany's KfW IPEX Bank and US Export-Import Bank. As can be seen from the table, the Chinese and Japanese banks have much larger total assets compared to the other two banks. In addition, the total amounts of energy loans from JBIC, CHEXIM and CDB in the included period are similar.

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1 Definition from ECA Watch, http://www.eca-watch.org/ecas/export-credit-agencies
2 They might take the form of governmental departments, official aid agencies or state funds instead of export-import banks. For example, the United Kingdom has a ministerial department named Export Credits Guarantee Department, and Hong Kong employs the Hong Kong Export Credit Insurance Corporation as an ECA.

Table 1: Comparison between CHEXIM, CDB, JBIC and their U.S. and Germany Counterparts

Name	Year Founded	Total Assets 2015 (Million USD, current)	Eng Loan 2005-15 (Million USD, current)
China Export-Import Bank	1993	284,000.00	70,368.00
China Development Bank	1993	1,686,000.00	81,875.82
Japan Bank for Intl Cooperation	1950 (Japan Export Bank) 1999 (as JBIC) 2008 (as branch of JFC) 2012 (as new JBIC)	163,690.00	65,196.00
KfW IPEX Bank	1948 (KfW) 2008 (independent IPEX)	33,244.00	18,820.00
Export-Import Bank of US	1934-2015 (full function) 2015-19 (limited function)	4,892.50	93,13.38

Data source: China's Global Energy Finance Database; various official records on approved bank projects

Literature Review

This section of the paper summarizes the major theories, methods, and evidence of the determinants of overseas investment in order to draw lessons from which to construct an approach to the empirical analysis that follows in further sections of the paper. In general, studies in this area focus on the extent to which overseas public investments are determined by a relative mix of market, political and institutional factors. The literature about determinants on loans therefore consists of three sections; while the framework is not exclusively designed to explain energy-related investments, some factors are more closely related to energy than the others.

Market Based Investment Theories

Traditional investment theories suggest that domestic market of the recipient, the natural resources of the recipient and the potential of becoming an export platform are the three factors that attract general investment, which will be addressed in turn.

1. Market seeking theories point out that the domestic market of the recipient country attracts investment. The market seeking behavior is driven by the overcapacity in the investor country, which can be a result of economic development (developmental theory) or technological improvement (production cycle theory). Akamatsu's flying geese model suggests that the successful regional development in Asia is driven by "leader's imperative for internal restructuring" (Kasahara, 2004) (Akamatsu, 1962). Vernon's production cycle theory offers a natural driving force for transferring mature technologies of production to developing countries (Vernon, 1966), which can be applied to international investment and the establishment of manufacturing sectors in developing countries. Later Japanese theorists develop a "multi-sequentialist" approach to investment in developing countries that combines the production cycle with the regionalization of Asia. For example, in addition to industrial and product cycles, Ozawa argues that the inter-economy economic re-allocations via official (development assistance, market agreements) and private (market-based technology transfer, investments and loans) are also important factors driving the industrial transformation of Asia (Ozawa, 2010). Such trends of thought suggest that governmental institutions can play an active role in regional finance to facilitate investment in certain (strategic) sectors, as mentioned by the Japanese foreign minister, Saburo Okita (Kojima, 2000).

2. Efficiency-seeking theories explain investment in developed markets and the phenomenon of "export platforming" – capital investing in small recipients that are geographically close to major markets. Market efficiency theories treat overseas investment in countries sharing geographic, cultural and institutional proximities with investors as a corporal strategy to overcome an imperfect market. Examples include imperfect exchange rate theory (Crushman, 1985), the theory of internalization by Beckley and Casson (Buckley & Casson, 1976) and Dunning's Ownership-Location-Internalization model. As a result, overseas capital tends to accumulate in areas with a better financial environment. Porter suggests that the competitiveness of companies relies on the capability to absorb knowledge, which is related to culture (Porter 1990). For example, the historical similarities between the US and the UK lead to ownership and location advantages for teak to be an investment recipient (Dunning, 1976). The O-L-I theory argues that ownership, local advantage and internalization influences foreign direct investment by influencing transaction cost (Dunning 1979). In practice, such tendencies in investment are often combined with the gravity model of trade (GMT), which indicates that closer countries share larger bilateral trade flow and are more likely to form a free trade agreement. Studies find that investors might use FDI in a country near a large market as an export platform, as is exemplified by the non-NAFTA investment practices in Mexico and Canada (Hanson, Mataloni, & Slaughter, 2001).

3. Resource-seeking theories: These theories suggest that the abundance of resources in recipient countries leads to investment. On one hand, countries that have natural resources but lack significant capital and technology tend to attract overseas capital (Dunning & Lundan, 2008). On the other hand, multinational companies invest overseas to seek natural resources that the home country cannot produce. The classic international trade model predicts that countries export products that require an intensive use of its relatively advantageous resources (factors of comparative advantage). Mobile resources such as labor and capital might flow to countries with higher payment and unmovable resources such as land might attract overseas investment. However, studies have indicated that investment in developing countries is often used to utilize cheap resources that are in short supply in the home country of investors. There have been various studies analyzing the motivation of private capital investing in developing countries, which mention resource seeking behavior as a potential driving force (Reuber, Crookell, Emerson, & Callais-Hamonno, 1973) (Yoshino, 1976).

   This theory indeed leads to the perception of "resource grabbing", as abundant resources in recipient countries attract overseas investors. However, resource seeking is not limited to energy resource, and is a widely practiced strategy in overseas investment. An example of this can be seen with the practice of investing in developing countries, which can be considered as "importing cheap labor" and has been used by investors from Taiwan and other Asian countries prior to China's global expansion (Gelb, 2005). Also, the phenomenon of relatively newly industrialized countries investing in upstream countries has been repeatedly studied in a variety of Asian economies (Chen & Chen, 1998) (van Hoesel, 1999). The energy perspective argues that the state uses financial support to strengthen trade relationships with energy exporters in order to secure the energy used to fuel industrialization. This trend of studies is discussed below as it is often used to justify the strategic guiding policies of the state in overseas finance.

Political Economic Theories

These theories consider the state as an active player whose strategic goals influence the decision making of state-owned financial institutions such as ECAs. The developmental state argument justifies the presence of state in economic development. The statecraft arguments, on the other hand, treat energy investments – as well as other investments – as tools of achieving political and long-term economic goals. Therefore, the state is incentivized to intervene in the market.

1. The developmental state arguments treat overseas economic expansion as a national interest and stress the guiding role of the state in promoting overseas investment, often using Japan as example

(Johnson, 1982). Japanese financial assistance and trade-promoting loans are instruments to bolster regionalism with Southeast Asian countries for market and resources (Ge, 2014). Other studies consider governmental financial agencies as guidance for corporate investment (Hatch & Yamamura, 1996) (Horiuchi& Sui, 1993), as important inter-conglomerate coordinators (Schneider, 2013) and, in some cases; act as financial supervisors (Gallagher, Irwin, & Koleski, 2012).

In energy investment, state intervention is often implied to be related to energy security, and the two issues become intertwined in recent years as the energy demand from Asia rose and disturbances in resource exporters and environmental pressure on fossil fuel influenced oil price (Yergin, 2006). Some studies (such as Kaplinsky and Messner, 2008) suggest that China and India's investments in resource exporters are often supported by non-market state financial support. Case-based studies of the Chinese policy banks in Africa (Brautigam, 2009) (Foster, Butterfield, Chen, & Pushak, 2009), Russia (Downs, 2011) and Latin America (Gallagher, Irwin, & Koleski, 2012) largely confirm the close ties between the financial assistance of policy banks and the projects of Chinese companies, but most of them do not confirm that state financial support is correlated to energy trade with the recipient country. Brautigam's recent study specifically argues that there is no solid evidence supporting the argument that the Chinese investments aim at resource trade with China (Brautigam, 2015).

2. Compared to statist arguments, statecraft arguments suggests that a state utilize investment as a diplomatic tool to gain political alignment (Norris, 2016). Theories suggest that economic interactions strengthen political alignment between investors and recipients by creating similar interests, strengthening communication and reducing recipients' political and economic dependence on regional hegemons (Piccone, 2016). In Piccone's study of China-Latin America cooperation, both CDB and CHEXIM serve as the loan provider for a variety of Chinese investments. While the paper does not imply a "political goal" for CHEXIM, the study states that it is possible that it supports projects with relatively high political risk and low profitability for political motivation.Compared to the hypothesis of this paper, Piccone's study actually suggests the reverse causality, in which investment creates common interest. On the other hand, Dreher (Dreher, 2009) uses vote alignment in the UN Security Council as a major indicator in IMF bank politics of loan approvals, suggesting that vote alignment can be a driving force that leads to a loan. Thacker (Thacker, 1999) also uses UN alignment as an independent variable in the study of IMF investment. For national ECAs, Fleck and Kilby (2006) suggest that the "friend" status of the recipient country, defined as countries that vote similarly with an investor country (in this particular study, the U.S.), might be a geopolitical factor that leads to more investment.

3. Risk Assessment of Banks: While there have not yet been specialized studies on the politics of the aforementioned policy banks in recent years, the political economic analysis on other financial institutions shed light on the factors influencing risk evaluation of banks. Generally speaking, economic and political stability of a country affects the inclination of a bank to offer overseas loans to specific countries. These concerns are often reflected by the control variables in the study of bank politics. Thacker (1999) studies IMF politics and derives a loan approval model based on economic factors (such as GDP per capita), political alignment (IGO vote alignment and war) and risk factors (such as a previous loan record, debt burden and balance of payment) as independent variables. Fleck and Kilby's study on the World Bank employs similar groups of independent variables in addition to indicators of donor-recipient economic dependence (Fleck & Kilby, 2005). Fleck and Kilby(2006) construct a U.S. bilateral aid model with trade potential (population, GDP per capita, openness), political alignment with the U.S. (UN vote), risk (inflation and exchange rate fluctuation) and international investment (World Bank and small donors' commitments). Other researchers (Bird & Rowland 2000) (Harrigan, Wang, & El-Said, 2006)employ similar categories but use different independent variables for each category. While not directly studied in the decision making process, domestic factors in recipient countries related to social development, such as democracy (Harrigan, Wang, &

El-Said, 2006)and welfare indicators (Ben-Artzi, 2016) are also suspected to have an influence on loan approval in multiple financial institutions.

Methodology

Drawing on existing literature, this section of the paper discusses the approach and data used to answer the central research question for the paper—to what extent do the Chinese banks vary from their largest counterpart, JBIC, in terms of the determinants of overseas energy lending? This section describes the data and variables used in various models, with independent variables based on the aforementioned theories.

To select the data points for this analysis, the following process occurred. First, the study constructs panel data from 2006 to 2015 from various sources for CHEXIM, CDB and JBIC loans in the energy sector, and constructs a corresponding set of data from various sources for independent variables. The time period is selected based on data availability - the pre-2006 record of JBIC and CHEXIM energy loans are limited and China only began to invest in a large number of overseas projects in the decade from 2006 to 2015.

Second, only energy-related loans are selected for the study. This is mainly a concern of data availability, as there is no reliable all-sector project list for CHEXIM loans; the study uses the China Energy Finance database for CHEXIM global loans and constructs a comparable set of loan data for JBIC. That said, energy is a sector that is suited for studying political determinants of governmental-issued loans, as energy sufficiency is a vital concern of most industrialized economies.

Third, the database is the whole record of loans from the selected period, instead of a sample. There are 100 CHEXIM records, 43 CDB records and 101 JBIC records[3] included in the study. Some of the CDB loans are significantly larger, such as deals with Russian, Brazilian and Venezuelan oil companies, while energy loans from CHEXIM and JBIC share more similarities in the amount of single loans and the proportion of loans. The major goal of this comparative study is to compare CHEXIM and JBIC, which are functionally similar and have more observations for comparison. CDB needs to be included as it acts as a de facto ECA. However, a single model using CDB data suffers greatly from the low degree of freedom and potential distortion of large outliers.

Fourth, the data for Chinese banks comes from China's Global Energy Finance database constructed by the Global Development Policy Center (GDP) from Boston University. Another database, AidData (AD) database from William & Mary College, also offers a larger record of Chinese overseas energy investment from CDB and CHEXIM. The study chooses the GDP database (up to 2016) for a more conservative estimate, with several validated AD entries to complement. AD is constructed using TUFF methodology, which can be summarized in three steps: standardized machine selection of news from the Factiva media database, manual validation, and data quality insurance procedures. This method theoretically offers a wide coverage of data thanks to the massive media collection. However, there are records which can only be supported from Factiva or English sources. GDP data, on the other hand, stresses on open news source and manual Chinese-English cross checking to ensure that the project has actually been implemented. About 20% of the AD records are covered in GDP data, and about 12% of the AD records are added in addition to GDP data.

Fifth, energy loans are defined as regular loans (instead of concessional and official development assistance) granted to projects related to investment in any primary and secondary energy sectors, including fuels and various types of electricity. In terms of activity, the projects are generally categorized into three types: power generation, transmission and exploration& reprocessing[4]. The investment records come

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3 Several records are omitted in the regression due to incomplete data.

4 Exploration and processing are technically different sectors; however, the amount of loans to the construction of processing

from the included banks and their predecessors (in the case of JBIC, as the bank has experienced re-arrangement and became independent from national development banks in 2008 and 2007 respectively), with verification from other reports available online. Due to the difference in loan records, this study identifies "energy loans" based on the following standards: (1) the included loan must be granted to a project taken by a domestic company (including its overseas branch) with an overseas destination; (2) involved projects must be related to one of the energy sectors, which include three types of fossil fuels, hydroelectricity, solar energy, nuclear, wind energy etc.; and (3) involved operations must be one of the following activities: exploration and processing, power generation and transmission. There are certain correlations between sectors and activities, such as CHEXIM loans to oil sectors, which mostly involve exploration, but its loans to hydroelectric and coal sectors mostly involve power generation (including the export of equipment).

There are yet to be any empirical studies on the determinants of CDB or CHEXIM's overseas financing in the energy sector. The hypothesis of this study is that the Chinese banks weigh different factors than their Japanese counterpart when issuing loans to overseas energy projects. In order to analyze the relative impacts of the different independent variables identified in the literature review, the full model deployed in this paper is designed as below. Each observation is an energy loan record. For the subscripts, i represents the investor, j represents the recipient and t represents the year.

$$\ln(inv_{ijt}) = \beta_0 + \beta_1 resr_{jt} + \beta_2 \ln(ptl_{jt}) + \beta_4 gdppc_{it} + \beta_3 gdppc_{jt} + \beta_4 divrg_{ijt} + \beta_5 dpd_{it} + \delta X_{ijt} + \varepsilon_{ijt}$$

As for method of regression, this study uses an OLS model with recipient clustering taken into account. The issue of distribution and heterogeneity are mitigated by the relatively large (>30) number of observations. As for the independence of observations, the study is aware of the fact that many characteristics of the recipient countries are not captured by the indicators but can be influential to the approval of loans. There are also examples, such as the 2012 Australian loans by BJIC and the 2015 Pakistani loans by CHEXIM, where multiple loans to one recipient are approved in a short period thanks to bilateral cooperation. In addition, economic cooperation now might lay a foundation for future cooperation by establishing precedence.

Another potential critique is that time should be taken into consideration. This study argues that such a critique would assume that events in a selected year will have the same effect on recipients, which is not necessarily true. First, the recipient countries of these banks include a variety of economies, including developed countries, emerging market economies and underdeveloped countries with poor domestic economic capacity. With various degree of integration into the global market, these recipients are less likely to be affected by the traits of global economy in a specific year. Second, global events such as financial crises take time to spread, and different economies are not influenced by such events simultaneously. Third, various recipients are experiencing rapid economic and political changes in the selected period whereas other countries remain relatively stable, which makes it difficult to argue that external annual factors influence each recipient equally. Therefore, the study does not use a fixed year effect.

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facilities is low in both CHEXIM and JBIC. The study counts them as the same sub-category, which does not affect the statistical research discussed below.

Table 2: Description of Variables

Abbreviation	Variable Name	Theoretical Aspect	Description
Lninv	Logged amount of issued energy loan	Dependent variable	Investment data come from reports from the two banks, as well as matching news reports. Logarithm is used to reduce the distortion of single large loans, which exist in both CHEXIM and JBIC (to avoid sub-zero values, the study uses ln(1+inv) as the logged value, however the amount of investment is large enough to negate the slight distortion).
eng_dpd	Energy dependency of investor	Energy security	Net energy import per energy consumption from the World Development Index (WDI). Both investors are net importers, with China (Rising from 0+ to 10+) as the less dependent investor and Japan (80+) as the more dependent investor.
Resr	Total natural resource rent	Resource seeking	Total natural resource rent as a percentage of GDP of the recipient, from WDI. This measures all natural resource sectors of the recipient country, including non-energy ones.
Lnptl	Foreign market potential logged	Export Platforming	Foreign market potential is calculated using CEPII/Venables 2004 method and CEPII and UN data. The CEPII indicator is the weighted export of recipient countries, with weight calculated based on a number of dyadic relationships like population, history, FTA membership etc. Logarithm is used to counter the distortion of large outliers (to avoid sub-zero values, the study uses ln(1+inv) as the logged value, however there is no potential value smaller than 1).
Divergence	Vote Distance	Political alignment	GDP per capita from WDI, measured by constant 2010 USD (similar to Fleck and Kilby 2005, who use PPP GDPPC). This is used as an indicator for investor wealth, which is a potential motivator of investment in developing countries.
gdppc_i	GDP per capita (constant)	Market seeking	GDP per capita from WDI, measured by constant 2010 USD (similar to Fleck and Kilby 2005, who use PPP GDPPC). This is used as an indicator for investor wealth, which is a potential motivator of investment in developing countries.
gdppc_r			GDP per capita from WDI, measured by constant 2010 USD (similar to Fleck and Kilby 2005, who use PPP GDPPC). It is used as an indicator for recipient wealth and consumption potential.
RDi	R & D expenditure of the investor		Research and development expenditure (percentage of GDP) of the investor from WDI. This variable measures technology advancement, which is a potential motivator of investment in developing countries.
g_gdppc	GDP per capita growth		GDP per capita growth from WDI. This indicates the economic growth in the near future
Pop	Population of recipient		Population WDI. Since we are discussing energy, the amount of users might influence government approval of projects
g_pop	Population growth		Population growth WDI, to show the prospect of potential consumers and cope with huge difference in flat numbers
Inf	Inflation annual change	Macro stability	Inflation, consumer price annual percentage change, from WDI
Ps	Governance indicator	Political stability	Governance indicator from the World Bank. The indicator usually ranges from 2 to -3, with a higher score indicating more stable governance.

Based on the existing literature discussed in the previous section, these variables are expected to respond to empirical exploration in the following manner:

• Factors that will positively correlate to investment: Resource rent of recipient, GDP per capita of investor, GDP per capita (and growth) of recipient, export platform potential of recipient, energy dependency of investor, population (and growth) of recipient. A few variables represent the economic

development and domestic need of the investor: (1) energy dependence is predicted to increase energy investment, mainly exploration investment; and (2)R&D expenditure[5] and GDP per capita of investor are expected to motivate the investor to invest abroad, and the banks respond to the increasing demand of capital by approving more loans. The other indicators are characteristics of the recipient, which generally represent either positive current economy or positive economic prospect, which are expected to attract investment.

- Factors that will negatively correlate to investment: UN vote disagreement and inflation rate of recipient. Because the UN indicator here measures divergence instead of convergence, a negative correlation is predicted based on previous studies, since financial assistance is more likely to be distributed to friends and less likely to enemies. While the UN is different from unilateral assistance (McGillivray, 1989) or international financial institutions (Thacker, 1999), studies in both areas heavily suggest that a major economy such as the US can use its financial leverage to gain political alignment. However, the causation is not clear in theories, as the economic cooperation can take place to create political cooperation (Piccone, 2016) or to reward existing alignment (Fleck & Kilby, World Bank Independence: A Model and Statistical Analysis of US Influence, 2006). Inflation rate is a reflection of economic stability, with higher inflation reflecting a higher degree of instability in the recipient country. This variable is used in various studies (for example, Thacker 1999; Dreher 2006) as a factor discouraging investment.

The dependent variable is the logged loan amount issued for each project, converted to current USD. Logarithms are used to mitigate the distortion of a few major loans – for example, China's oil imports from Brazil and Japan's imports from Australia, which require much larger loan amounts per case compared to the construction of a single power station. The scale of loans from the two banks varies from 20-30 million to a few billion USD[6], which lead to 1-3 differences in terms of the logged amount. For the large projects whose loans are transferred by installment, this study uses only the total loan granted on contract as that is the decision that is influenced by current economic and political factors. Other methods of measurement, such as the proportion of one loan in total loans, do not yield substantial changes in conclusion in practice.

The included independent variables are (1) the resource abundance of the recipient country, measured by total natural resource rent; (2) the percent change of export platform potential of the recipients measured using the Redding-Venables (2004) measure, which is calculated as the weighted summation of exporter fixed effect[7]; (3) the amount of GDP per capita of both investor and recipient (in constant 2011 USD) from the World Bank; (4) R&D expenditure for the investor; (5) the geopolitical variables including energy dependence and political alignment, both of which will be explained below; (6) annual inflation rate (World Development Indicator from the World Bank) and fragile state index (Governance Indicator from the World Bank) as the bank indicators for economic and political risk, discussed below; and (7) unlisted additional control variables generally measuring the domestic consumption potential, including GDP per capita growth, population and population growth (all from the World Bank WDI).

There are two political indicators used in this study. Political alignment is measured using vote alignment, similar to the Piccone's (2016) study on Sino-Latin American UN alignment. While Piccone's study uses only human rights resolutions in the UN General Assembly, this study includes all UN General Assembly

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5 Theoretically, the "technological gap" between the investor and recipient is important for overseas investment (Yao et al, 2017); however, the R&D expenditures of the recipient country suffers from an absence of data. Therefore, only the R&D expenditure of the investor is used.

6 Deals in other currencies are converted to USD using annual average exchange rate

7 The exporter fixed effect and weights on each recipient country are separately calculated using the CEPII data on bilateral trade relationships, as well as dyadic trade data from UN ComTrade. This study uses the Paillacar (2009) model for Redding-Venables weights, which also takes various dyadic factors into consideration, including border effect, contiguity, colonial history, geographic distance and free-trade agreements.

resolutions on UN library record. Considering the participation of recipients vary greatly, the study measures political alignment through the divergence between the recipients and investors in the resolutions where both countries are required to vote. The political gain theories therefore predict a negative relationship between the divergence in UN and investment. UN vote record is also used as a direct indicator inAnderson's (2008) and Thacker's (1999) study of IMF politics and as an indirect variable to measure the "friend or foe" relationship dummy (between investor and recipient) in Kilby's (2008) study of US financial aids. The other "political variable" used here is the energy dependence of the investor. Compared to the recipient resource indicator (1), this variable is an investor-side variable and focuses only on trade in energy instead of trade in all resources. Being two independent variables, the variables resr and dpd do not necessarily result in a multicolinearity issue.

There are a few variables used to measure stability. Drawn from the empirical investigations of previous studies, and to maintain numerous degrees of freedom, this study deploys one indicator for each political and economic variable. The inflation rate is most often used as the variable to examine whether macroeconomic stability is a determinant of overseas loans (Kilby, 2008; Thacker, 1999). Political stability is measured differently in various studies. For example, Harrison (2006) uses a 7-point democracy index, and Anderson (2008) uses several indices from the Country Performance Rating by the World Bank IDA, including political freedom, corruption and human rights. This study uses a single governance score as a political indicator, which takes political freedom, human rights, social development and various aspects of governance efficiency into consideration.A single variable is used because it maintains the number of degrees of freedom and political risk is not the main research focus of this study. The fourth model adds in commonly used national variables of the recipients, such as population and growth, into the model as control variables (6). These indicators are sometimes used together in previous models, including Fleck and Kilby's (2001, 2006) studies.

Data Summary and General Findings

The results of the regressions are shown below. The results indicate a correlation between CHEXIM energy loans and China's energy dependence. Loans from both banks are correlated with the GDP per capita of the recipient country. In addition, CHEXIM energy loans show a relatively weak correlation with political stability and do not correlate with most of the proposed factors. JBIC loans are related with a wider set of variables, including inflation rate, population and GDP growth.

Table 3: Regression Results

VARIABLES	(All banks) lninv	(CHEXIM/CDB) lninv	(CHEXIM) lninv	(CDB) lninv	(JBIC) lninv
lnptl	-0.0989 (0.0985)	-0.362 (0.253)	-0.296 (0.222)	-0.286 (0.681)	-0.0494 (0.0829)
gdppci	2.92e-05 (5.28e-05)	-0.000140 (0.000543)	0.000297 (0.000565)	-0.000662 (0.00149)	0.000222 (0.000236)
gdppcr	1.83e-05*** (5.55e-06)	5.08e-05** (2.14e-05)	3.01e-05** (1.41e-05)	4.98e-05 (5.81e-05)	1.87e-05** (7.02e-06)
nresr	0.0183** (0.00832)	0.0331 (0.0209)	0.0240 (0.0177)	0.0804 (0.0507)	0.00777 (0.0111)
divergence	0.00455 (0.00501)	-0.0103 (0.0102)	0.00157 (0.00595)	-0.0303 (0.0357)	0.00997 (0.00671)
eng_dpd	-0.0426 (0.0289)	0.435* (0.228)	0.357 (0.217)	0.892* (0.434)	-0.0480 (0.0323)
rdi	0.991* (0.547)	-4.264* (2.356)	-5.016** (2.180)	-9.442 (6.534)	-1.766 (1.545)
inf	-0.0153 (0.0136)	-0.0142 (0.0156)	-0.0279 (0.0212)	-0.0453 (0.0273)	-0.0236 (0.0196)
ps	-0.374*** (0.0845)	-0.379*** (0.120)	-0.370*** (0.0926)	-0.421 (0.398)	-0.555*** (0.190)
pop	4.16e-10** (1.87e-10)	5.75e-10** (2.26e-10)	3.47e-10** (1.70e-10)	1.05e-09** (4.96e-10)	-5.02e-10 (5.93e-10)
g_gdppc	-0.0897** (0.0374)	-0.101* (0.0506)	-0.0365 (0.0316)	-0.277*** (0.0547)	-0.0704*** (0.0208)
g_pop	-0.0291 (0.0525)	-0.426** (0.175)	-0.433*** (0.150)	0.259 (0.455)	0.0265 (0.0423)
Constant	5.902*** (1.754)	14.90*** (4.409)	13.85*** (3.930)	20.67* (11.34)	6.262 (7.754)
Observations	228	127	91	36	101
R-squared	0.160	0.234	0.269	0.408	0.216

The Chinese banks show positive correlations with GDP per capita and the population of the recipient. The combined model of CDB and CHEXIM loans show a positive correlation with energy dependence, which is a unique trait compared to the JBIC model. However, several indicators contradict aforementioned predictions. First, R&D expenditure is negatively related to energy investment in the CHEXIM/CDB and CHEXIM models, which contradicts the theories that technological advancement incentivizes investment and therefore increases the demand for loans. Second, the Governance Indicator of recipient countries is negatively correlated to investment in model 4, suggesting that the Chinese banks might be more apt to invest in energy in more politically unstable countries. To an extent, this is also consistent with the criticism that the Chinese companies invest in countries with humanitarian crises. Third, a few coefficients have shown that Chinese banks are more likely to invest in countries with declining economic and demographic growth.

As can be seen in the table, JBIC shares the trend of investing in more fragile countries with CHEXIM, as both linear models show negative and significant coefficients between approved energy loans and governance indicators. This might imply that both banks have a tendency to invest in politically unstable countries, which will be discussed in the following section. In addition, contrary to the theories that better

economic prospect attracts investment and therefore loans, JBIC energy loans are negatively correlated with GDP per capita growth. The JBIC model shares the positive correlation with GDP per capita with the Chinese bank models, indicating that the bank is affected by the market-based demand of investment driven by market seeking investors.

Discussion

The statistical models have shown a certain degree of similarity between the Chinese and Japanese ECAs, mainly in the positive correlation between energy loans and GDP per capita and the negative correlation between loans and political stability of the recipient. The Chinese model is unique in terms of the positive correlation between energy loans and the energy dependence of China, as well as the negative correlation with R&D expenditure. In these regressions, a few correlations in the study need to be explained, including the "similarity" of two banks investing in politically risky countries, and JBIC's unique negative correlation with population and GDP per capita growth. The following section discusses the implications of the models above and offers alternative explanations to discoveries that contradict theories.

It is worth noticing that the R-squared of most models are low, meaning that the models do not have a high degree of predictive power. This is not without precedent: while studies on direct investment (such as Yao et al. 2017) or studies on banks from multilateral banks (such as Thacker, 1999) have models of high predictive power, models aiming to explain the behavior of policy banks (such as Fleck and Kilby, 2006) have lower R-squared values. The conflicting and changing goals of policy banks make it difficult for quantitative models to measure the influence of different factors. For example, while some loans might be driven by political factors, the effects are offset once those market-driven loans are taken into account. Nevertheless, a few similarities and differences are observed in almost all the models and remain robust in several tests (see appendix), which helps to validate these characteristics.

Similarities and Differences among Banks

1. The two banks exhibit similar consideration of the domestic market of the recipient, as higher GDP per capita is significantly accompanied by more investment in all cases. This indicates that the Chinese policy bank investments are based on recipient markets similar to JBIC. The discovery is consistent with a previous study arguing that while Chinese investments in the selected decade are related to state goals to some degree, pursuit for business opportunities remains a strong driving force of Chinese overseas investment (Bräutigam & Tang, 2012). As a result, the Chinese banks are also likely to answer to market demand similar to other financiers in international capital markets even though they are strong policy banks. The market-based factors confirm that some of the largest ECAs in Japan and China share certain similarities with private capital providers.

    Furthermore, the Chinese banks are similar to their Japanese counterpart in terms of their tendency to invest in relatively politically unstable countries. In addition to the aforementioned variables, energy loans from these banks are also significantly influenced by a few other factors, including the growth rate of population and GDP per capita. Contradicting the predictions, these correlations might indicate that a negative economic perspective of the recipient increases energy investments from the selected banks.

2. The results also highlight some differences in the Chinese and Japanese models, which suggest that Chinese banks behave differently than JBIC in terms of energy loans approval in the recent decade. The combined Chinese model (and CDB model, whose credibility is compromised by the low degree of freedom) shows a positive correlation between Chinese energy loans and China's energy dependence. The combined Chinese model and CHEXIM also show a negative correlation with R&D expenditure of China, which contradicts the prediction that technological improvement in investor countries increases overseas investment.

3. In addition to the major similarities and differences determined by this study, it is also worth noting that the resource rent of the recipient country, which is used to indicate energy abundance, is not a significant determinant of energy loan approvals in the bank models of CHEXIM, CDB and JBIC (the only model where resource rent is significant is the three-bank model, which has an extremely low adjusted R-squared). In other words, none of the banks show an explicit tendency to grant more loans to resource abundant countries. In China's case, the results indicate that more energy loan approvals occur according to China's need for overseas energy resources, instead of the resources of the recipients possess. At least for the two selected Chinese banks, this study does not support the perceived practice of "resource grabbing," as a recipient country with higher resource rent does not receive more loans.

The tie with energy dependence is a unique characteristic of CHEXIM that can either be a strategic choice or a market-driven choice. One can either argue that the increasing amount of overseas energy loans from Chinese banks is a result of economic development or a conscientious policy choice of the Chinese government. The Chinese banks are either responding to the growing demand of energy in China or carrying out governmental strategy. In order to dive deeper into the motivation of CHEXIM and the energy policy of China, further quantitative study is required.

Explanations of Unpredicted Anomalies

The study confirms that policy banks are affected by market factors such as GDP per capita of the recipient countries. As major state-owned actors with strategic goals stated in their company profiles, the Chinese and Japanese ECAs still consider the economic condition of recipient. However, energy dependence might not affect energy loans as predicted because different sectors of energy loans are included in the study. In terms of the anomalies where the banks grant loans to economically unprofitable and risky industries, the contradictory correlations generally show that despite the less favorable environment in recipient countries, governmental loans are still issued in the hope of facilitating cooperation. The following section offers alternative explanations to these unexpected discoveries.

The negative correlations between (logged) loan and R&D expenditure in the combined Chinese model and CHEXIM model can be explained by the emergence of alternative energy and the technology seeking motivation. The majority of energy loans from Chinese banks are granted to large state-owned companies specializing in fossil fuels and hydroelectric. Fossil fuel trades do not increase as technology improves - instead, they might decrease as technological advancement increases energy efficiency. In China's case, large state-owned traditional energy companies are more likely to receive loans compared to the smaller, newly emerged alternative energy companies thanks to their credit history; as a result, R&D investment leads to a decrease in expected investment. Another explanation is that some of the Chinese energy investment in the past decade, such as wind and solar Greenfield investment in Europe (Curran, Lv, & Spigarelli, 2017), are technology seeking investments. At least some of these investments are funded by CHEXIM and CDB; when China spend more on its own R&D, it is possible that the need for foreign technology declines accordingly.

The effect of export platform potential is insignificant in all models, which is a result of the bilateral nature of energy trade. While the potential for overseas investment to be attracted to countries to serve as an export platform back to the host country, it is not necessarily surprising that such a pattern is not observed in the energy sector. This is also likely to be a result of power generation and transmission projects—most energy sources, especially electrification, do not travel across borders due to the nature of national energy grids. A World Bank study on electricity markets confirms that the global export of electricity contributes to only 3% of global energy production (Oseni & Pollitt, 2014). Even exploration projects are usually bilateral trade between the recipient and the investor, which is more related to the natural endowment of the recipient than export platform potential. Most of the energy loans included in the study, including power generation and resource exploration, scarcely involve re-export and third-party trade, and the model of

energy loan approval therefore does not follow regular efficiency seeking theories.

The negative correlation between GDP growth or population growth and energy loan in all models can be explained by the nature of energy projects and their business cycles, which further confirms some of the non-market characteristics of these banks. When prices and income are on the upswing the private sector will be more apt to invest to take advantage of higher returns, but is less likely to do so during downturns. Energy loans usually involve infrastructure projects and can be considered as overseas expenditures in public projects that are usually the responsibility of government. If the recipient country has a low GDP growth rate, the country is experiencing an economic slowdown and might cut expenditures on public projects. Energy projects from foreign contractors and matching foreign capital might provide a more cost-efficient alternative to governmental expenditures, as private capital during economic downturns is less likely to provide sufficient capital for public projects. In the absence of private capital and public capital from recipient countries, foreign public capital (such as loans provided by ECAs) is used to finance the desired investment in recipient countries. In addition, energy deals, such as the Sino-Russian gas contract in 2009 and China's financial support to Brazilian petroleum giant Petrobras in 2015-16, might provide a substantial financial boost to recipient countries during an economic downturn. For example, Petrobras sought 3.5 billion credit facilities from the Chinese policy bank in 2015, but the Chinese bank only came in after the company failed to gather sufficient private market subscriptions due to accusation of corruption and delays in financial disclosure. This is a typical case where governmental financial institutions advance despite the poor market prospects of the recipient. Additionally, this case is considered to be somewhat political as Petrobras claimed that the deal will be "strengthening cooperation between the economies of both countries."[8]

The negative correlation between Governance Indicators and energy loans can be observed in both the Chinese and Japanese models, indicating a potential tendency of JBIC and CHEXIM to invest in more politically fragile countries. This can be explained in various ways: First, the resource-abundant recipients are more likely to conduct energy trade with investor countries and they are more susceptible to the "Dutch Disease"– more "fragile" authoritarian leaders might solidify their rules using the economic gain from energy exports. Second, while institutionalist economists assume that stable democratic regimes support investment, other studies, such as O'Donnell (1977) argues that authoritarianism might attract investment as rent seeking is easier than.... Finally, since the role of export credit agencies include supporting investments in politically risky areas where private capital is absent, it is possible that these banks specifically grant loans to politically unstable countries.

Conclusion

Export credit agencies (ECAs) are state agencies offering financial support to international trade and investment. These institutions widely exist among major economies and take the form of export-import banks. ECAs, especially the major export-import banks such as CHEXIM, are often criticized as an intervention instruments for governments that enjoy unfair advantage compared to market capital. The unprecedentedly large size of CHEXIM has also resulted in the opinion that said bank is more of a state agency than a market-oriented capital provider.

In response to the question about the similarities and differences of Chinese investment compared to its foreign counterparts, this study constructed a model for energy loans that includes various theories determining investment and loan approval. JBIC was selected for comparison as the Japanese bank is the largest export-import bank aside from Chinese ECAs and a major energy loan provider with a similar amount of energy loans to CHEXIM from 2006 to 2015. This study contributes to the existing discussion because there has not been a quantitative comparison between Chinese policy banks and other banks;

8 Petrobras, Funding Agreement of USD 5 billion with China Development Bank Corporation, May 2015, http://www.investidorpetrobras.com.br/en/press-releases/funding-agreement-usd-5-billion-china-development-bank-corporation

and the study utilizes a relatively new database of Chinese energy loans.

The loan approval of CHEXIM is significantly influenced by China's energy dependence and the recipient country's domestic market, indicating that the Chinese bank responds to market demand of investment while still being driven by China's own need for energy. Compared to the JBIC models, which are more market-driven by comparison, the CHEXIM models indicate that the energy loans from CHEXIM are featured by China's rising energy dependence - when China is heavily dependent on the international energy market, CHEXIM actively encourages overseas energy investments. On the other hand, JBIC energy loans in the recent decade do not show this close tie with Japan's energy security. Instead it is more affected by market factors such as the wealth and economic stability of the recipient. The banks included in the study share a few similarities, as they respond positively to the national wealth of recipient but show a certain level of risk tolerance. While contradicting the market-based theories of investment, the risk-tolerant behavior can be explained by the nature of public capital. These discoveries indicate that both Chinese and Japanese ECAs are influenced by both market and non-market factors.

The regression models might support the claim that the Chinese agencies act strategically and increases energy finance in traditional sectors when the country needs more energy. However, it does not find evidence of "resource grabbing" in the energy sector – which is often the focus of criticism of neo-colonialism. As this study mostly uses factors that can be observed externally, it does not capture the dynamics of domestic politics and cannot fully explain how certain determinants, such as China's energy dependence in the case of CHEXIM, are integrated into bank-specific loan policies and risk assessments. A follow-up study on the domestic decision making process will contribute to a more detailed picture.

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