Government Credit and Trade War

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JEL: E51, F30, G21, G28
Keywords: Government Credit; Export; Supply Chain; Trade War

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I. Introduction

Government plays an important role in international trade, and the literature has documented various types of government trade policies (e.g., tariffs, quotas, and subsidies).[1] However, few studies spotlight how government direct credit affects trade despite the growing size of such credit across the globe in recent years.[2] Government credit could overcome market failures (e.g., Atkinson and Stiglitz (1980)) and thus facilitate exports, especially for credit-constrained manufactures (e.g., Manova (2013); Manova, Wei and Zhang (2015); Feenstra, Li and Yu (2014)). In contrast, governments could distort resource allocation for mercantilism. China, arguably the largest trade partner for many countries, has been criticized for its mercantilist policies to boost export volumes, such as government-subsidized credit and industrial policies.[3] This criticism has directly led to the recent trade war between the U.S. and China.[4] In this paper, we study how government credit in China affects export activities and its spillover effects on the economy in other countries from the supply chain perspective.

We obtain population data on all export and import transactions in China and the province-industry level loan data from the China Development Bank (CDB). We estimate the effects of subsidized government credit (i.e., CDB loans) on Chinese firms' export activities and the

[1] See, for example, Khandelwal, Schott and Wei (2013) for the effect of eliminating export quotas on trade, Amiti and Konings (2007) for reducing tariff effects on productivity, and Westphal (1990) for the government subsidy in certain industries.

[2] Development banks are prevalent in many countries. For example, there are the KfW Bankengruppe in Germany, the Korea Development Bank, the African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, and the Inter-American Development Bank Group. The U.S. proposed to build the National Infrastructure Reinvestment Bank in 2007. Development finance institutions (DFIs) grew dramatically in size for the past two decades. For example, in 2015, the total assets of DFIs over GDP ratio is approximately 15% on average across 28 countries (Data are from the BankScope). Closely-related is the government ownership of banks across the globe, see La Porta et al. (2002) for an overview.

[3] See, for example, Lim, Wang and Zeng (2018), the Forbes' article on China's mercantilist approach to trade, and the discussion of China's increased foreign exchange reserve and foreign direct investments in NBER digest.

[4] See, for example, the report from the Economist "The US-China trade war is on hold" states that "A more realistic assessment would be that the meeting produced a truce based on two elements: some murky mercantilism, and a deal to talk about a deal."

responses from firms in China's trade partner countries (e.g., the U.S.) across the industry supply chain. We document two main findings. First, the CDB lends mainly to strategic industries in China at the top of the supply chain (e.g., energy and mining), which has positive spillovers on firms in downstream industries (e.g., manufacturing), such as surges in export volumes, export destinations, and product varieties and drops in prices of export goods. Second, the increased export volume with lower prices from China crowd out the U.S. firms in the same industry in terms of employment and performance. In contrast, the U.S. firms in downstream industries benefit from the cheaper intermediate goods imported from China and subsequently perform better. Moreover, the U.S. government understands this trade-off and strategically targets imports from China, which mainly compete with U.S. domestic manufacturers, and have raised tariffs on them in the recent trade war. We show novel evidence on how government credit reshapes trade activities, especially for the spillovers on other countries across the supply chain.

Our primary data are from Chinese customs, which record the universe of firms' export and import transactions. For each transaction, we have detailed information (e.g., product price, the number of products, means of transportation, destination country, firm name, location, and ownership). This granular dataset allows us to trace the dynamics of export activities in intensive and extensive margins. We also obtain the loan data from the CDB, which record the outstanding loan amounts and issuance amounts across 31 provinces and 95 industries. The CDB is the largest policy bank worldwide with total assets of RMB 15.96 trillion in 2017. It has the mandate to provide subsidized credit to state-owned enterprises (SOEs) in strategic industries (e.g., energy and mining) and local governments for infrastructure development.[5] We match the Customs data

[5] The Export-Import Bank of China (EXIM) is a state-owned policy bank under the State Council with the mandate to support China's foreign trade, investment, and international economic cooperation. There are some overlaps between the businesses of the CDB and the EXIM bank, e.g., both banks support industrial firms and infrastructure developments. Please refer to section II.B for a detailed discussion.

with CDB loan data at the province-industry level from 2000 to 2013. For each firm, we define the industry in which a firm sources the majority of its inputs as the upstream industry based on the input-output matrix. For U.S. firms, we use the standard Compustat database.

We first perform the ordinary least squares (OLS) regressions of firm export activities on CDB credit to the firm's own industry and firm's upstream industry. Following the literature, in addition to export volume at the firm-year level, we use the number of export destinations, the number of products, and the number of destination-product pairs, which are standard measurements to capture whether firms can overcome the fixed costs of entering new markets or introducing new products (e.g., Becker, Chen and Greenberg (2013); Berman and Héricourt (2010)).[6] We find that CDB loans outstanding have weak positive correlations with those firms' export activities in the same industry. For downstream firms, we find that the CDB upstream loans outstanding are significantly and positively associated with the export amounts, the number of export destinations, and the number of export products for firms in downstream industries in the same province. This finding suggests that government credit to upstream industries has positive spillovers on firms' exports in downstream industries.

The common identification challenge is that government credit is allocated endogenously. For example, the CDB has the mandate to grant credit to the undeveloped areas and bottle-necked industries in China. To build causality, we use the exogenous variation from the pre-determined municipal politicians' turnover cycles following Ru (2018), which finds that the city secretaries of the Communist Party of China (CPC), the leading politicians in municipalities, tend to borrow significantly more in their early years in office and monotonically decrease the borrowings over

[6] These measures are commonly used in the literature. See, for example, Bernard et al. (2007) and Muûls (2015) for the number of destinations and number of products and Manova, Wei, and Zhang (2015) for the number of destination-product pairs.

the five-year tenure. In China, city secretaries' promotions depend heavily on local economic performance so that they are incentivized to borrow and invest as much and as early as possible. In particular, we identify each city's largest SOE industry (i.e., focal industry), which is often pre-determined. At the province-industry level, we interact the dummy of the focal industries in any cities of a province with the turnover cycles of cities' secretaries. We use this interaction term as the instrument for CDB loans outstanding at the province-industry level. In the first stage regressions, we find that the province borrows significantly more from the CDB for the focal industries of its cities where the city secretaries are in their earlier years in office. In other words, the newly appointed city secretaries tend to borrow significantly more for the focal industry in their cities, which is reflected in CDB province-industry level loan amounts.

In the second-stage regressions, we find that CDB loans lead to significant increases in export activities of firms in the same industry and province. In particular, a 100% increase in CDB loans outstanding leads to increases in firms' export volume, the number of export destinations, the number of export products, and the number of destination-product pairs by 0.89%, 0.3%, 0.52%, and 0.39%, respectively. Then, we trace the effects of CDB credit across the supply chain. Consistent with OLS regressions, we find that, on average, a 100% increase in CDB upstream loans outstanding leads to increases in downstream firms' export volume, the number of export destinations, the number of export products, and the number of destination-product pairs by 2.38%, 0.83%, 0.92%, and 1.15%, respectively.

In short, these positive spillover effects of CDB upstream loans are much larger than the direct CDB loans' effects on firms in horizontal industries. We also find that an increase in CDB upstream loans leads to significant declines in the price of export goods. On average, when CDB upstream loan amounts double, the average price drops by 0.41%. This phenomenon echoes the

increased export volume because the prices of exported goods from China drop. In short, the positive effects are not only on export volumes but also on the number of export destinations and export product variety, suggesting that government credit could help firms overcome market failures, such as financing their fixed costs of entering new markets.

Furthermore, we explore the fundamental mechanisms behind these positive spillovers. In particular, private firms in downstream industries benefit significantly more from CDB upstream loans than SOEs, which is consistent with the conventional wisdom that SOEs are inefficient and thus cannot fully capture these positive spillovers. For firms that depend heavily on the inputs from their upstream industries, the positive spillover effects of upstream loans are much stronger. Additionally, we find that the spillover effects are more pronounced for firms that export mainly intermediate goods. These findings shed light on the fundamental mechanisms of CDB upstream loans' positive spillovers: CDB loans to the strategic industries at the top of the supply chain reduce the costs of inputs for the downstream industries, which are mainly manufacturing firms. This, in turn, helps the exports of these firms downstream.

Next, we study how the surges of export activities and lower-priced goods from China caused by government credit affect firms in other countries. Specifically, we focus on the trade between the U.S. and China, which is one of the most prominent bilateral trade relationships in the world. Based on the estimated coefficients in 2SLS regressions, we calculate the decreases in prices of export goods from China caused by CDB loans at the industry level according to U.S. industry codes. We then perform the regressions of U.S. firms' performance and employment on estimated the price drops of export goods from China caused by CDB loans, both for exports to the same industry as the U.S. firm (i.e., direct competitors) and for exports to upstream industries (i.e., suppliers).

We find that the decreased prices of China's imports caused by CDB credit crowd out the U.S. firms in the same industry. On average, a 1% decrease in the prices of import goods from China leads to an 8.5% decrease in the assets of U.S. firms in the same industry. In contrast, the decreased prices of the upstream goods imported from China crowd in downstream U.S. firms that mainly use these cheaper inputs from China in their productions. On average, when the prices of imported goods from China decreased by 1%, it increases downstream U.S. firms' total assets, sales, and the number of employees by 5.91%, 8.01%, and 4.33%, respectively. In short, although U.S. firms are crowded out by the cheaper competing goods from China, firms in downstream industries could gain from cheaper intermediate goods as inputs of productions from China.

Finally, we estimate the heterogeneity in the spillover effects of cheaper Chinese imports on U.S. firms downstream. In particular, we find that the positive spillover effects are significantly more pronounced for the firms in high-unemployment states. We obtain the headquarters state of the U.S. firms and classify the firms into two groups by the median state-level unemployment rate. We find that U.S. firms can benefit from cheaper Chinese inputs significantly more in states with higher unemployment rates, which enhances the findings of positive spillovers of China's upstream cheaper inputs on job creations in the U.S. Moreover, we select U.S. firms whose upstream industries are on the list of tariff increases in the recent U.S.-China trade war. We find that the positive spillover effects from cheaper Chinese inputs are significantly weaker for these selected firms, which suggests that the U.S. government understands these countervailing effects of imports from China, and strategically avoids raising tariffs on the imports that are used mainly as the inputs for U.S. firms in downstream industries.

We contribute to the literature in three ways. First, this paper adds to the growing literature on how the government intervenes in international trade. It is well documented that governments

could use trade policy and tariff to affect trade activities (e.g., Amiti and Konings (2007); Brandt et al. (2017); De Loecker (2011); De Loecker et al. (2016); Fan, Li and Yeaple (2015); Khandelwal, Schott and Wei (2013); Pavcnik (2002); Topalova and Khandelwal (2011)), and strong financial institutions could facilitate trade, especially for sectors that rely more on external finance (e.g., Beck (2002), Svaleryd and Vlachos (2005); Becker, Chen and Greenberg (2013); Hur, Raj and Riyanto (2006); Ju and Wei (2010); Kletzer and Bardhan (1987); Manova (2013)).[7] However, very little attention has been paid to the role of government credit in trade. We fill this gap by documenting a substantial positive spillover of government credit on downstream firms' exports.[8] The increased export amount caused by CDB loans accounts for 1.14% of annual GDP.[9]

Second, our findings add to the debate on whether government trade policies serve mercantilism (e.g., Brander and Spencer (1985); Rodrik (1995, 2013)) or mainly fix market failures (e.g., Park (1990); Stiglitz (1993)). China contributes 30% of the global GDP growth, whereby "Chinese mercantilism" has been criticized heavily by many countries, which is also one of the primary triggers of the recent trade war (e.g., Atkinson (2012)). We document that the positive spillover effects are not only the export volumes but also on the number of export destinations and the export product variety, which suggests that the CDB credit could help overcome the market failures by alleviating firms' constraints in financing fixed costs of entering

[7] Recent literature documents the negative effects of credit constraints on trade at the firm level (e.g., Amiti and Weinstein (2011); Berman and Héricourt (2010); Fan, Lai and Li (2015); Manova (2008); Manova, Wei and Zhang (2015); Minetti and Zhu (2011); Muûls (2015); Paravisini et al. (2015)).

[8] There is a long debate on the economic consequences of government credit. Government credit could crowd out the private sector investments (e.g., Demirgüç-Kunt and Maksimovic (1998); King and Levine (1993); Levine and Zervos (1998); Levine, Loayza and Beck (2000); Rajan and Zingales (1998)) while it could have positive externalities (e.g., Stiglitz (1993)). Our results echo Huang, Pagano and Panizza (2019) that documents the crowding-out effects of local government debt in China.

[9] The magnitude of our findings is large. For example, Zia (2008) shows that removal of subsidized credit decreases the exports of private firms significantly and yet nearly half of such loans are assigned to publicly listed financially unconstrained firms, implying an output loss to private firms of 0.75% of GDP. Moreover, Wacziarg and Welch (2008) find that countries with overall trade liberalization raised average trade to GDP ratio by roughly 5% based on cross-country data from 1950 to 1998.

new markets (i.e., increased number of export destinations). This finding echoes prior studies by Becker, Chen and Greenberg (2013) and Manova, Wei and Zhang (2015).

Third, this paper has substantial policy implications regarding the recent trade war between the U.S. and China. On the one hand, our finding of crowding-out effects of cheaper goods from China on U.S. firms in horizontal industries is consistent with prior literature documenting the negative impact of imports from China on U.S. employment (e.g., Acemoglu et al. (2016); Autor, Dorn, and Hanson (2013); Pierce and Schott (2016)). On the other hand, we show that the decreased prices of intermediate goods from China could benefit U.S. firms in downstream industries. This finding complements several recent studies on how China's exports affect the U.S. economy from the supply chain perspective. For example, Wang et al. (2018) find that intermediate goods imported from China lead to increases in employment among U.S. firms in downstream industries. Huang et al. (2019) document negative stock market responses to President Trump's announcement of new tariffs in March 2018 for U.S. firms using goods imported from China as inputs in productions. We provide additional evidence that government credit leads to a decline in prices of intermediate goods and a subsequent increase in export volume.

The rest of this paper is organized as follows. We describe the institutional background of China in Section II. We then present our data and summary statistics in Section III. Section IV provides the empirical results. Section V concludes.

II. Institutional Background

A. China's Economic Reform and Trade Policies

China began its economic reform and opened its economy in 1978 under Mr. Deng Xiaoping, and the trade volume has been growing ever since. Throughout the reform, the Chinese

government lowered tariffs and trade barriers and conducted many deregulations. For example, the overall tariff rate has been reduced from 56% to 15%. More than 60% of the imports were free of tariffs, and only 9% of imports were subject to licensing and import quotas by 2001. Trade amount between China and the rest of the world has increased from only $20 billion at the beginning of the reform to more than $500 billion in 2001. On December 11, 2001, China became an official member of the World Trade Organization (WTO) after an arduous and prolonged negotiation of fifteen years.[10] Consequently, China's international trade rose rapidly, and firms expanded rapidly to global markets. In addition, the overall tariff rate on industrial products further decreased to 8.9% in 2010. Total trade amounts increased from nearly $510 billion in 2001 to more than $4.1 trillion in 2013, with export amounts rising from $266 billion to $2.2 trillion. In 2013, China surpassed the U.S. to become the largest trading nation worldwide.

Although China employs an open market economy, it is still under state capitalism. In particular, the Chinese government has controlling power over economic activities through corporatized government agencies and state-owned enterprises. The Chinese government has been criticized for its mercantilist policies for exports, such as industrial policies and credit support (Atkinson (2012); Godement et al. (2011); Hormats (2011)). For example, Rodrik (2013) states "much of China's economic miracle is the product of an activist government that has supported, stimulated, and openly subsidized industrial producers – both domestic and foreign". In particular, the Chinese government has various methods to subsidize the steel industry, including direct cash grants, energy and raw material grants, land grants, credit subsidies in the form of debt-equity swaps, debt forgiveness, tax incentives, preferential loans, and directed credit from state-owned

[10] Besides WTO, China has 24 free trade agreements (FTA) under construction, and 16 of them have been signed and implemented already. E.g., China-Australia FTA, China-Switzerland FTA, China-ASEAN FTA. (http://fta.mofcom.gov.cn/english/index.shtml)

banks (Price et al. (2006)). Consequently, between 1998 and 2005, China's steel exports more than quadrupled. On March 22, 2018, President Donald Trump directed the United States Trade Representative (USTR) to investigate applying tariffs on more than U.S. $50 billion worth of Chinese products, stating that the proposed tariffs were "a response to the unfair trade practices of China over the years", which was the start of the current trade war between U.S. and China.

B. Government Credit and the China Development Bank

One of the primary tools of the Chinese government to affect economic activities is the government direct credit. In particular, the CDB is the largest policy bank in China under direct control by the State Council. It is mandated to provide medium- to long-term subsidized credit to serve China's long-term economic and social development strategies, especially in undeveloped areas and bottle-necked industries. It is also the biggest development finance institution in the world with total assets of RMB 19.56 trillion and balance of loans of RMB 11.04 trillion as of 2017.[11] The CDB provides such a tool for the Chinese government to exert controls over the economy and to implement fiscal policy.

The CDB is different from Chinese commercial banks in many ways even though the CDB and the large commercial banks in China are all state-owned.[12] First, the CDB issues policy loans that mainly target infrastructure projects and strategic industries in China. Driven primarily by profit, commercial banks employ a different lending strategy and focus on rich provinces in China (e.g., areas along the east coast). Second, CDB loans are highly subsidized; interest rates of CDB

[11] Currently, CDB has 37 primary branches and 3 secondary branches on the Chinese mainland, one foreign branch in Hong Kong and five representative offices in Cairo, Moscow, Rio de Janeiro, Caracas, and London. It is also the largest Chinese bank for foreign investment and financing cooperation, long-term lending, and bond issuance. (http://www.cdb.com.cn)

[12] The big four commercial banks in China are Industrial and Commercial Bank of China (ICBC), China Construction Bank (CCB), Agriculture Bank of China (ABC), and Bank of China (BOC).

loans are, on average, 100 bps lower than similar loans from commercial banks. Third, the CDB has longer and closer relationships with local governments than commercial banks do. Specifically, the CDB helped many local governments build financing vehicles to raise debt for them. Above 50% of the outstanding loans of the local governments between 2006 and 2013 came from the CDB (Gao, Ru and Tang (2018)).

Moreover, compared with China's EXIM bank, there are two reasons that this paper focused on CDB credit. First, the size of the CDB is much larger than the EXIM bank, and the CDB has stronger and broader impacts on the Chinese domestic market. By the end of 2018, the total assets for the CDB were RMB 16.18 trillion while the number for the EXIM bank was RMB 4.19 trillion. The outstanding amount for EXIM's export seller's credit was RMB 399.56 billion while the outstanding industrial loans for CDB was more than RMB 2 trillion. Second, the CDB mainly supports strategic industries at the top of the supply chain, and this paper investigates the spillover effects on downstream industries. In contrast, the EXIM bank targets primarily specific firms in high-tech-intensive and high-value-added industries, such as mechanical and electronic products, which are typically at the bottom of the supply chain.

III. Data, Variables, and Summary Statistics

A. China Customs Data

Our trade data record the universe of firms' individual export and import transactions from 2000 to 2013, which have been collected and made available by the China Customs Office.[13] The data report the free-on-board value of firm exports by product and country for more than 200

[13] Prior studies (e.g., Jarreau and Poncet (2014); Manova and Zhang (2009); Manova, Wei, and Zhang (2015)) use the same data to study the export activities of China, and none of them employ a long panel from 2000 to 2013 as in our paper.

destinations and over 7,000 products identified by the Chinese eight-digit Harmonized System (HS) codes.[14] For each transaction, the data contain variables such as the IDs and names of the exporter/importer, trade amount, unit price, type of trade, transportation method, the location of customs office where the transaction was processed, the region or city in China where the product was exported from or imported to, and any potential transfer country or region. Based on the ownership information, we categorize firms into two groups: SOEs and private firms.[15] Figure A.1 shows the time trend of the export amount for the two types of firms. Although SOEs exhibit an increasing trend in exports, the vast majority of the increases in China's exports are driven by private firms (RMB 1 trillion in 2000 to nearly RMB 10 trillion in 2013). This finding is consistent with the conventional wisdom that private sectors drive China's economic growth. Figure A.2 shows the top five export industries in China in the early and ending years in our sample.

We follow the standard approach in the literature (e.g., Ahn, Khandelwal and Wei (2011); Kee and Tang (2016)) to exclude the export-import firms that do not engage in manufacturing but serve exclusively as intermediaries between domestic producers (buyers) and foreign buyers (producers).[16] We also drop observations with missing values on important firm characteristics (e.g., ownership type, location, industry). Overall, the number of exporting manufacturing firms in our sample has increased from 55,182 in 2000 to 210,927 in 2013, with the number of export transactions ranging from 2,826,286 in 2000 to 6,688,085 in 2013.

[14] Product classification is consistent across countries at the six-digit HS level. The number of distinct product codes in the Chinese eight-digit HS system is comparable to that in the ten-digit HS classification for the US.

[15] We follow the official classification of SOE by the National Bureau of Statistics in China. In particular, SOEs consist of the usual state-owned enterprises and the collectively-owned enterprises (COEs), which are owned collectively by all residents in a community and typically controlled by the local governments. We classify the remaining firms as private firms.

[16] We use keywords in firms' names to identify the intermediate firms. We search for Chinese characters that mean "trading" and "importer" and "exporter". In pinyin (Romanized Chinese), these phrases are: "jin4chu1kou3", "jing1mao4", "mao4yi4", "ke1mao4" and "wai4jing1". The percentage of export amounts of these trade intermediaries decreased from 32% in 2000 to 20% in 2013 in terms of total exports, which suggest that our sample represent the vast majority of the Chinese export volume.

We construct four main dependent variables at the firm-year level to measure the export activities of Chinese firms. First, it is of great interest to understand how government credit affects firms' export amounts, *LogExport*, which is the most direct and commonly used metric in the literature to measure export performance. Second, prior literature has documented that credit constraints impede a firm's exports on the extensive margins because firms face various types of costs – both fixed and variable – when they enter a market or sell a new product (e.g., Becker, Chen, and Greenberg (2013); Berman and Héricourt (2010)). Firms incur high initial costs in product design, marketing, and distribution when they intend to export a new product and face a separate fixed cost in each market they enter. Therefore, we construct *LogNumDestinations*, the logarithm-transformed number of export destinations to measure how many markets a firm exports to, and *LogNumProducts*, the logarithm-transformed number of product types to measure a firm's export product scope which is represented by the number of distinct four-digit HS product codes.

Moreover, following Manova, Wei and Zhang (2015), we interact the destination and product variety and use *LogNumDestProducts*, the logarithm-transformed number of destination-product pairs, to examine whether firms can overcome the fixed costs for new markets. In addition, we compute two proxies at the firm-product-year level to measure the average price level of the exports. For each four-digit HS code within a firm-year, we calculate the simple (trade amount weighted) average price for all transactions to obtain *LogPrice* (*LogWTPrice*). Detailed variable definitions are in Table A.1.

B. CDB Loan Data and Politician Profile Data

Our unique and proprietary CDB loan data contain information on the outstanding loan amounts and issuances across 95 industries and 31 provinces in mainland China from 1994 to 2013. The data are at the province-industry-year level. The industries include infrastructure sectors (e.g.,

road, air, rail transportation, and public facilities) and industrial sectors (e.g., agriculture, mining, textiles, and machinery). The CDB industry classification is comparable to U.S. 2-digit SIC codes. Figure A.3 plots the total provincial CDB outstanding loan amounts. We observe an increasing pattern for both industrial loans and infrastructure loans over time. At the end of 2013, the CDB had outstanding loans amounting to nearly RMB 6 trillion. The mission of the CDB is to support strategic industries, which are typically controlled by SOEs in China. In Figure A.4, we plot the top five industries that received loans from the CDB in 2002 and 2013, respectively. The industries that received most loans are utility sectors, road and railway transportation, and public facilities.

We match CDB loans to firms in Chinese customs at the province-industry-year level. We define the CDB loan as *DirectLoan* for a firm if it is in the same province and industry as the CDB loan. For example, if the CDB loan granted to province *p* and industry *k* is 10 million in 2005, the *DirectLoan* for firms located in province *p* and operating in industry *k* is 10 million in 2005. We also construct variable *UpstreamLoan* for a firm if the CDB industrial loans are given to the key upstream industry of the firm in the same province.

We use the national input-output (IO) matrix of 2007 from the National Bureau of Statistics of China to construct upstream-downstream industry links. The CDB classifies the loans into 95 industries while the IO matrix has 135 more granular industries. Using the CDB 95-industry as a base, we match these two industrial classifications by aggregating the 135 IO industries to 95 industries. For each industry *k*, we select the industry that provides the highest supplies of inputs to be the key upstream industry of industry *k*.

For identification, we use local political turnover cycles to construct the instruments for CDB loans. We manually collected data on local Chinese politicians, including detailed information (e.g., gender, age, and birthplace) for all city secretaries and mayors at the city-month level for

334 cities from 1949 to 2013. The detailed discussion of our identification strategy is presented in section IV.B.

C. Data on U.S. Firms

We focus on trade between the U.S. and China to study how surges in Chinese exports caused by government credit affect performance and employment of the domestic firms of China's trade partners. There are two main reasons to focus on U.S. firms. First, the U.S. and China are the two largest economies worldwide, and the trade relationship between them is among the largest bilateral trade relationships in the world. Figure A.5 shows China's ten largest export destination countries. Second, the current trade war between the U.S. and China has drawn much attention from the public. Hence, it is essential to understand the impact of Chinese exports induced by government credit on U.S. firms.

Our data on U.S. firms start with all firms in Compustat from 2000 to 2013, where we can obtain information on multiple performance metrics and the number of workers. We exclude firms whose industries do not have imports from China because we cannot gauge the effect of Chinese exports on U.S. firms in these cases. In particular, we look at the total assets, fixed assets, sales, return on assets, and the number of employees of U.S. firms.

D. Summary Statistics

Our primary sample contains firm-year observations that are jointly determined by the Customs data and the CDB loan data, spanning from 2000 to 2013, which consists of 1,379,517 firm-year observations. Table A.1 presents detailed variable explanations.

Panel A of Table 1 presents the summary statistics for the firm-year export data from 2000 to 2013. An average firm has an annual export amount of RMB 47.54 million and exports to 7.6

markets with six different groups of products. The median values for *Export*, *NumDestinations*, and *NumProducts* are 5.13, 3, and 2, respectively, which suggests that there are many large exporters. The average (median) direct loan is approximately RMB 772 (67) million, while the mean (median) upstream loan is approximately RMB 1,032 (128) million. This information is consistent with CDB's agenda to lend to strategic industries as these industries are more likely to be upstream industries.

Panel B shows the summary statistics for the average price of the exported products. We have a much larger number of observations because the observation is aggregated at the firm-product-year level. The average prices are close to trading-amount-weighted average prices. In Panel C, we report the summary statistics for U.S. firms.

[Insert Table 1 Here]

IV. Empirical Analyses and Results

A. Baseline Regression

We begin by examining the association between CDB loans and firms' export activities at the firm-year level. To formally test it, we estimate the following regression model at the firm-year level:

$$Y_{i,t} = \alpha + \beta_1 LogDirectLoan_{i,t} + \beta_2 LogUpstreamLoan_{i,t} + \mu_i + \eta_{p\times t} + \varepsilon_{i,t}, \qquad (1)$$

where $Y_{i,t}$ denote the four dependent variables representing the export volume and extensive margins – *LogExport, LogNumDestinations, LogNumProducts,* and *LogNumDestProducts* for firm *i* and year *t*. *LogDirectLoan* is the natural logarithm of the CDB outstanding loan amounts granted to firm *i*'s province and industry. *LogUpstreamLoan* is the natural logarithm of the CDB

outstanding loan amounts granted to firm i's province and its upstream industry. μ_i indicates firm fixed effects that are included to mitigate the concern that unobserved time-invariant firm characteristics drive our results. $\eta_{p\times t}$ indicates province×year fixed effects that eliminate the province time trends. We cluster the standard errors at the firm level.

Table 2 shows the regression results. The coefficients of *LogDirectLoan* are positive in all columns but are significant only at the 1% level in column (2), suggesting a weak positive correlation between CDB loans and export activities for firms in the same industry. More interestingly, the coefficients of *LogUpstreamLoan* are all positive in columns (1) to (4) at the 1% significance level. These results suggest that CDB upstream loans, which are usually granted to the strategic industries at the top of the supply chain (e.g., energy), have positive spillover effects on the export activities of firms in downstream industries (e.g., manufacturing). From the OLS regressions, these positive spillover effects are larger than the effects of CDB direct loans on firms in the same industry because most of the CDB loans are for the strategic industries that do not export much.

[Insert Table 2 Here]

In short, CDB upstream loans have positive spillover effects not only on downstream firm export volumes but also on the variety of export goods and destinations, which suggests that government credit does not merely serve mercantilism, as it helps firms mitigate financial constraints, e.g., fixed costs, to enter new markets with broader product scopes.

B. Identification and Instrumental Variables

We cannot draw a causal conclusion between the CDB loans and firms' export activities from the results in the previous section because the CDB credit allocations are not random. For example,

the good export opportunities by private firms in certain provinces and industries may need more inputs from upstream industries, and the CDB could lend to those upstream industries due mainly to such opportunities. In this subsection, we employ 2SLS to estimate the causal effects of CDB loans on export activities. In particular, we exploit the exogenous variations of CDB loan allocation using the predicted municipal political turnover cycles.

Local politicians play an essential role in obtaining credit from the CDB. In China, the CPC Secretary at the municipal level (i.e., city secretary) is the leading politician of a city. The city secretary has broad administrative power and controls within the city system and is responsible for the overall development of the city.[17] Maskin, Qian and Xu (2000) show that promotion is one of the most important career aspirations for politicians in China. It is well known that the GDP performance of the city has been the primary determinant of promotion for city secretaries (e.g., Li and Zhou (2005)). Ru (2018) documents that promotion probabilities of city secretaries are positively associated with CDB loans. Because it takes time to reveal the economic effects of CDB loans on GDP, career concerns incentivize a new city secretary to borrow as soon and as much as possible from the CDB, i.e., when they take office.[18] The standard term for a city secretary is five years, and cities typically have different five-year turnover cycles, which allows us to explore the variations of CDB loan amounts brought by the different five-year turnover cycles from different cities.

[17] For example, a city secretary generally has the sole power to appoint or remove any government officials in the city at the lower political hierarchy.

[18] In Panel A of Table A.2 in the appendix, column (1) shows that city secretaries tend to borrow more from the CDB in their early years of the terms using the actual turnover of the city secretaries, indicated by the significantly positive and monotonically decreasing coefficients for *First_Year, Second_Year, Third_Year,* and *Fourth_Year*. The results are estimated by regressing city-year level CDB loan amounts on *First_Year, Second_Year, Third_Year, Fourth_Year, Fifth_Year*, where *First_Year* is a dummy variable which equals one if the city secretary is in his or her first year of the term. *Second_Year* to *Fourth_Year* are defined in the same way. *Fifth_Year* is a dummy which takes the value of one if the city secretary is in his or her fifth or later years of the term. In the regressions, *Fifth_Year* is the omitted group.

Given the concern that realized political turnover (e.g., promotion) can still be endogenous, we use the predicted turnover timing as instruments to predict exogenous CDB loan changes.[19] In particular, we use a simple way to predict turnover timing: the first year of the current city secretary's term is predicted by adding five years to the first year of the previous city secretary's term. If there is no previous turnover cycle, we assign the actual first year of the city secretary as the predicted first year. Because the predicted turnover cycle is pre-determined, it is unlikely to be confounded with contemporaneous economic conditions.

Next, we interact the predicted city secretary turnover cycle with city's focal industry defined using the Chinese Industry Census (CIC) data and use these interactions as instruments for province-industry level CDB loan amounts.[20] The city's focal industry is identified as the industry in which the SOEs of the city have the largest total assets. The focal industry is vital for the city's economic development and does not change much over time. The city secretary borrows more from the CDB for SOEs in the city's focal industry if the secretary is in the earlier years of the term. We consider it as an exogenous shock to the province-industry level CDB loans. Suppose the focal industry of city *c* is industry *k*, and city *c* belongs to province *p*. If there is a predicted political turnover in city *c*, the new secretary of city *c* will borrow more for industry *k* once he or she takes office. Consequently, CDB loans to industry *k* in province *p* increase. Formally, the regression can be represented as follows:

[19] In Panel A of Table A.2 in the appendix, column (2) shows that predicted political turnover also affect the city-level CDB loan amounts, which is similar to the results using actual political turnover.

[20] The CIC data are collected by the Chinese National Bureau of Statistics and available from 1998 to 2013. It covers all manufacturing firms in China with annual sales of more than RMB 5 million (increases to RMB 20 million in 2011), containing more than 800 thousand firms from 2000 to 2013. It has detailed firm-level characteristics (e.g., location, industry, registration type) and accounting information (e.g., total assets, total debt, net income, number of workers). It has been widely used in the literature (e.g., Ru (2018); Song, Storesletten and Zilibotti (2011)). Therefore, it is appropriate to define the city's focal industry using this large and representative census data.

$$LogLoan_{k,p,t} = \alpha + \beta_1 First_{k,p,t} + \beta_2 Second_{k,p,t} + \beta_3 Third_{k,p,t} + \beta_4 Fourth_{k,p,t} + \beta_5 Fifth_{k,p,t} + \mu_k + \eta_{p\times t} + \varepsilon_{i,t}, \quad (2)$$

where $LogLoan_{k,p,t}$ is the logarithm of the CDB outstanding loan amount in industry *k*, province *p*, and year *t*. $First_{k,p,t}$ is a dummy variable that equals one if there is a city in province *p* whose focal industry is *k* in year *t* and the city's secretary is in his or her first year of office. $Second_{k,p,t}$ is a dummy variable that equals one if there is a city in province *p* whose focal industry is *k* in year *t* and the city's secretary is in his or her second year of office. $Third_{k,p,t}$ to $Fifth_{k,p,t}$ are defined similarly. Industry fixed effects and province×year fixed effects are also included. The results are shown in Panel B of Table A.2. We find that the amount of CDB loans in a particular industry and province is significantly larger if the industry is one of the within-province cities' focal industries and has a secretary in the early part of his or her term, who has strong incentives to borrow and invest.

We denote $First\_D_{k,p,t}$ to $Fifth\_D_{k,p,t}$ as the instruments for CDB direct loans and $First\_U_{k,p,t}$ to $Fifth\_U_{k,p,t}$ as the instruments for CDB upstream loans, and perform 2SLS regressions.[21] Specifically, the second stage regression is shown as follows:

$$Y_{i,t} = \alpha + \beta_1 Log\widehat{Direct}Loan_{i,t} + \beta_2 Log\widehat{Upstream}Loan_{i,t} + \mu_i + \eta_{p\times t} + \varepsilon_{i,t}, \quad (3)$$

where $Y_{i,t}$ still denote the four dependent variables *LogExport*, *LogNumDestinations*, *LogNumProducts*, and *LogDestProducts* for firm *i* and year *t*. Firm fixed effects and province×year

[21] For CDB loans that are in the same industry as the firm where we call direct loans for the firm, we denote the instruments using $First_{k,p,t}$ to $Fifth_{k,p,t}$ and call them $First\_D_{k,p,t}$ to $Fifth\_D_{k,p,t}$ for CDB direct loans. Similarly, we have another set of instruments for CDB upstream loans and name them $First\_U_{k,p,t}$ to $Fifth\_U_{k,p,t}$. We use the ten variables as instruments in the 2SLS regression.

fixed effects are included to account for time-invariant firm-specific factors and province×year trends.

The key identification assumption of our IV is the exclusion condition. In particular, the predicted turnover cycles of city secretaries should affect export activities only through CDB loans. In China, the political system is highly centralized, while the economic system is decentralized (e.g., Xu (2011)). Local politicians such as city secretaries have significant discretion in local economic policies and have various ways to influence economic activities. The most crucial tool of local governments is investment, and local politicians need to raise funding to finance these investments in various ways, such as selling land, asking for more fiscal transfers, and raising more taxes. The identification bar is that local politicians do not engage in these activities significantly more in the early period in their terms rather than not using these tools at all. Ru (2018) shows that local political turnovers do not associate with these channels significantly, which supports the exclusion condition.

In Table 3, we present the 2SLS regression results. The coefficients of *LogDirectLoan* are positive and statistically significant in all columns. On average, when CDB direct loans doubled, firms in the same industry increased export amounts, number of export markets, number of export products, and number of destination-product pairs by 0.89%, 0.3%, 0.52%, and 0.39%, respectively.

Next, we trace the effects of CDB loans along the industry supply chain because the majority of loans were extended to the strategic industries at the top of the supply chain. We find that the coefficients of *LogUpstreamLoan* are significantly positive in all columns at the 1% significance level. The spillover effects across the industry supply chain are both statistically and economically significant. On average, a 100% increase in CDB upstream loans leads to increases in export

volume, the number of export destinations, the number of export products, and the number of destination-product pairs by 2.38%, 0.83%, 0.92%, and 1.15%, respectively. The effects of CDB upstream loans are stronger than those of CDB direct loans.

In summary, government credit not only helps firms in the same industry but also benefits firms in downstream industries, which is consistent with government helping overcome market failure rather than purely aiming for mercantilism because firms can enter new markets and widen their product scopes which require high up-front fixed costs.[22] From a back-of-the-envelope calculation, the estimated increased export amounts that are induced by CDB loans were RMB 677 billion, which accounted for 1.14% of China's annual GDP in 2013.[23]

[Insert Table 3 Here]

C. Heterogeneous Effects of CDB Loans and the Fundamental Mechanisms of Spillovers

In this subsection, we examine the heterogeneous effects of CDB loans on export activities of Chinese firms and explore the possible fundamental mechanisms of the positive spillover effects. We begin by investigating whether the spillover effects are driven primarily by SOEs or private firms, given that most exports are from private firms. SOEs have often been criticized for inefficiency and serving China's mercantilist policies. We construct a dummy variable *PrivateFirm* that takes the value of 1 if the firm is a private firm, and 0 if the firm is an SOE. We interact this dummy variable with *LogUpstreamLoan* in 2SLS regressions.

[22] In Table A.4 in the appendix, we examine the effects of CDB loans on the number of exporting firms, thereby shedding light on the firm's decision of export. We find both CDB direct loans and upstream loans increase the number of exporting firms.

[23] We utilize the estimated coefficients on both CDB direct loans and upstream loans in Table 3 to perform a back-of-the-envelope calculation. First, we estimate the increase in export amounts that are induced by the change of both CDB direct loans and upstream loans for each firm. The aggregate effects are calculated by summing up the estimated increase in the export amount of each firm in our sample.

Table 4 Panel A reports the results. The coefficients of the interaction term between CDB upstream loans and a private firm dummy are positive and significant at the 1% level in all four columns, suggesting that the positive spillover effects of CDB loans mainly impact private firms.[24] This result unveils a new and important perspective – government credit – to explain the tremendous growth of exports by private firms in China. Given the less-developed financial system in China, private firms are often credit constrained. CDB loans to SOEs in upstream industries crowd in private firms in the downstream industries which mainly source their inputs from those SOEs.

Next, we examine the strength of the upstream-downstream industry link to further substantiate this fundamental mechanism. If a firm heavily relies on its upstream industry for inputs, we should observe the positive spillover effects to be stronger for this firm compared to a firm that sources only limited inputs from its upstream. Thus, we construct a variable *UpstreamDependence* to proxy for the degree to which a firm depends on the upstream industry by using the direct consumption coefficients in the 2007 China IO table. A higher value of *UpstreamDependence* indicates a higher degree of dependence on the upstream industry's inputs. Panel B of Table 4 shows that the coefficients of the interaction between CDB upstream loans and *UpstreamDependence* are positive in all columns and statistically significant in columns (2) to (4), supporting our hypothesis that firms that are more dependent on upstream industry enjoy greater benefits from CDB loans in upstream industries.

In Panel C of Table 4, we interact the CDB loans with a dummy variable *NonConsumerGood* to shed light on what types of exporters capture the positive spillover effects of CDB upstream

[24] In Table A.3 in the appendix, we use subsample analysis to further verify the results. In particular, we divide the sample into two groups: SOEs and private firms. We estimate the 2SLS regressions for each of the samples and find that CDB upstream loans primarily benefit private firms in the downstream industries as indicated by the positive and significant coefficients of *LogUpstreamLoan* in Panel B.

loans. *NonConsumerGood* is defined as one if the firm exports mainly non-consumer goods such as raw materials and intermediate goods, and zero if the firm exports primarily consumer goods. The coefficients of the interaction term between CDB upstream loans and *NonConsumerGood* in all columns are significantly positive, which suggests that firms that mainly produce and export intermediate goods benefit more from the CDB upstream loans through spillover effects compared to firms that manufacture mainly final consumer goods. In addition, Figure A.6 shows that the majority of the exports of Chinese firms are non-consumer goods.

[Insert Table 4 Here]

Given that CDB loans increase firms' export volumes, it is of great interest to examine another interesting dimension of export – the price of exported goods. We want to determine whether CDB loans decrease export good prices. Using the same 2SLS setting as described above, we estimate the second stage regression represented as follows:

$$Price_{i,j,t} = \alpha + \beta_1 \widehat{LogDirectLoan}_{i,t} + \beta_2 \widehat{LogUpstreamLoan}_{i,t} + \mu_i + \eta_{p\times t} + \lambda_j + \varepsilon_{i,t}, \quad (4)$$

where $Price_{i,j,t}$ denotes the simple average price (*LogPrice*) or trade amount weighted average price (*LogWTPrice*) of the product code *j* exported by firm *i* in year *t*. $\widehat{LogDirectLoan}_{i,t}$ and $\widehat{LogUpstreamLoan}_{i,t}$ represent the instrumented *LogDirectLoan* and *LogUpstreamLoan*, respectively for firm *i* in year *t*, respectively. Firm fixed effects and province×year fixed effects are included as usual. We add product fixed effects in this regression to control for the impact of products' intrinsic characteristics on price.

In Table 5, we present the 2SLS regression results for the effects of CDB loans on export prices. CDB direct loans do not significantly change firms' average export prices, as shown by the insignificant coefficients of *LogDirectLoan* in columns (1) and (2). However, we find that the

coefficients of *LogUpstreamLoan* in both columns are negative and significant at the 5% significance level, indicating that CDB upstream loans decrease the average export prices of firms in the downstream industries, which explains the increased export amounts.

Taken together, these results shed light on the underlying mechanism: CDB loans to the strategic industries at the top of the supply chain benefit downstream industries that consists mainly of manufacturing firms through cheaper inputs, thereby helping downstream firms mitigate credit constraints to expand exports to more markets and broader product scope.

[Insert Table 5 Here]

D. Spillovers on U.S. Firms

China has been criticized by its trade partners for its mercantilist trade policies. For example, President Trump recently started a trade war with China, which has now become full-scale, as he argued that China was conducting "unfair trade practices"; this trade war has harmed U.S. industry sectors, and caused unemployment in the U.S.

In this subsection, we investigate the impacts of surging export volumes with lower-priced goods from China caused by CDB credit on U.S. firm activities. In particular, Wang et al. (2018) find that intermediate goods from China to the U.S. lead to increases in employment among U.S. firms in downstream industries. We adopt this industry supply chain perspective to investigate how exports in China affect horizontal and downstream U.S. firms' performance and employment.

We use the 2007 U.S. IO table from the Bureau of Economic Analysis to identify the upstream-downstream link for U.S. firms. There are 71 industries in the U.S. IO table and 95 industries in CDB industry classification so that we manually match the two industry classifications by collapsing the 95 CDB industries into the industries in U.S. IO table.

For each of the 71 industries, we estimate the change in average prices at the industry level. We use the estimated coefficients from the 2SLS regression results in Table 5 to construct the average price change for China's exports. In particular, we multiply the coefficient estimate (i.e., -0.0030 in column (1)) with the logarithm of CDB upstream loans to obtain the estimated export price drop. Then, for each industry *k* and year *t*, we compute the average of all individual price changes, whose products fall into industry *k* and year *t*, and then multiply them by negative one to obtain $PriceReduction_{k,t}$ such that higher values indicate stronger decreases in prices. This variable represents the CDB-loans induced average price change of China's exports in industry *k* and year *t*.

For a U.S. firm *i* whose primary industry is *k*, we define *PriceReduction_Direct* using $PriceReduction_{k,t}$, which measures direct competition from China for U.S. firms in the same industry. For upstream effects, we define *PriceReduction_Upstream* using $PriceReduction_{k',t}$, where k' is the upstream industry of *k*. It measures the price changes of the output from the firm's upstream industries that they source as inputs. The following model is estimated to investigate how China's exports with lower prices impact U.S. firms from both the direct competition channel and the upstream effect channel:

$$Y_{US_{i,k,t}} = \alpha + \beta_1 PriceReduction\_Direct_{k,t}$$
$$+\beta_2 PriceReduction\_Upstream_{k,t} + \mu_i + \eta_t + \varepsilon_{i,t}, \quad (5)$$

where $Y\_US_{i,k,t}$ denotes a set of dependent variables measuring the performance and employment of U.S. firm *i* in year *t* whose primary industry is *k*. These dependent variables are the logarithm of total assets (*LogAssetUS*), tangibility (*PPE/AssetsUS*) which is computed as property, plant, and equipment scaled by total assets, the logarithm of total sales (*LogSalesUS*), and employment

(*LogEmployeesUS*). μ_i represents firm fixed effects, and η_t indicates year fixed effects. Standard errors are clustered at the firm level.

We report the results in Table 6. The coefficients of *PriceReduction_Direct* are significantly negative in columns (1) and (2), which suggests that facing imports from China with reduced prices, U.S. firms in the same industry experience a decline in total assets and fixed assets. On average, a 1% decrease in the prices of goods imported from China leads to an 8.5% decrease in the assets of U.S. firms in the same industry. This crowding-out effect of China's exports is consistent with findings in the literature.

In contrast, we show that the coefficients of *PriceReduction_Upstream* are significantly positive in all columns, suggesting that the lower average prices of China's exports benefit downstream U.S. firms. On average, a 1% decrease in the average price levels of China's exports could lead to an increase of downstream U.S. firms' total assets, fixed assets, sales, and employment by 5.91%, 1.7%, 8.01%, and 4.33%, respectively. The results imply that U.S. firms can use cheaper inputs from China, induced by CDB credit, in their productions, which leads to increased investments in assets, employment, and sales.

[Insert Table 6 Here]

Next, we examine the heterogeneity in the spillover effects of cheaper Chinese imports on downstream U.S. firms. In particular, we explore the geographical variations of unemployment across U.S. states to investigate whether such positive spillovers are stronger in states with higher unemployment rates. We obtain the state-level unemployment rate from the Bureau of Labor Statistics in the U.S. and classify the states into two groups – high versus low – based on the median unemployment rate using the data in 1999 (dummy variable *HighUnemployment*). We choose 1999 for two reasons. First, we want to mitigate the endogeneity concerns by using a

historical unemployment rate as our sample starts in 2000. Second, the state unemployment rates are highly persistent so that it can alleviate the concern of measurement errors.

Table 7 reports the results. The coefficients of the interaction term between *HighUnemployment* and *PriceReduction_Upstream* are positive at the 1% significance level in all columns, which means that the spillover effects are more pronounced for firms located in high unemployment states. The effects are particularly strong in column (4) for employment, suggesting that firms in high unemployment states can hire more people, benefited from cheaper inputs from China's upstream industries that are induced by CDB loans. This phenomenon enhances the positive spillovers of cheaper upstream inputs in China on job creation in the U.S.

[Insert Table 7 Here]

Finally, we examine whether the opposing effects of increased imports from China have been taken into account in the recent trade war. U.S. President Donald Trump asked the USTR to investigate applying tariffs on US$50-60 billion worth of Chinese goods on March 22, 2018. We obtain the full list of the products for tariff increase in the USTR report and match the ten-digit product codes to the SIC industries using the concordance table provided by Pierce and Schott (2012). We construct a dummy variable *TradeWarIndustry*, which equals one if the upstream industry of the U.S. firm is in the list of tariff-increase industries and zero otherwise. We interact *TradeWarIndustry* with *PriceReduction_Upstream* and present the results in Table 8. The negative and significant coefficients of *TradeWarIndustry*×*PriceReduction_Upstream* in all columns suggest that the positive spillover effects from cheaper Chinese inputs are significantly weaker for these selected firms. In other words, firms that benefit from cheaper Chinese inputs are less affected by tariff increases in this trade war, which implies that the U.S. government understands

these countervailing effects of imports from China and strategically avoids raising tariffs on imports that are used primarily as inputs for U.S firms in the downstream industries.

[Insert Table 8 Here]

V. Conclusion

This paper examines how government-subsidized credit is filtered through the supply chain and alters international trade. By merging the unique loan data from the CDB with the detailed universal transaction-level data from Chinese customs, we find that CDB loans granted to upstream industries lead to the surge in export activities and the decrease in export prices for private firms in the downstream industries. Moreover, the increase in the export amount with decreased prices from China, in turn, crowd in downstream U.S. firms regarding asset investment, and employment, while the U.S. firms in the same industry are crowded out by this direct competition from China's exports.

This paper sheds light on the ongoing debate on whether exports from China hurt U.S. firms and employment by documenting a substantial positive spillover of China's exports on U.S. firms in downstream industries that mainly use inputs from China. This study, from the perspective of supply chains, has broad implications not only for the recent trade tensions between the U.S. and China but also for trade frictions among countries in general. For example, the Reagan administration began a trade war with Japan in 1987 mainly to restore domestic manufacturers, such as automakers; however, this move also cost U.S. jobs. Moreover, the Smoot-Hawley Act in 1930 raised tariffs on almost all imports to the U.S. to protect domestic jobs but potentially extended the Great Depression. The consequences of these policies are debatable and mixed. This paper shows that policymakers should consider all aspects of trade policies – not only the direct effects but also spillovers.

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Table 1 – Summary Statistics

Variables	N	Mean	SD	25%	Median	75%
Panel A. Firm-Year Level for Chinese firms						
Export	1,379,517	47.536	688.281	1.096	5.128	19.599
NumDestinations	1,379,517	7.605	10.942	1.000	3.000	9.000
NumProducts	1,379,517	6.060	17.448	1.000	2.000	5.000
NumDestProducts	1,379,517	19.133	100.823	2.000	6.000	16.000
LogExport	1,379,516	1.463	2.243	0.092	1.635	2.976
LogNumDestinations	1,379,517	1.337	1.145	0.000	1.099	2.197
LogNumProducts	1,379,517	1.043	1.015	0.000	0.693	1.609
LogNumDestProducts	1,379,517	1.855	1.314	0.693	1.792	2.773
DirectLoan	1,379,517	7.724	22.260	0.024	0.670	4.426
UpstreamLoan	1,379,517	10.317	29.586	0.090	1.275	5.448
LogDirectLoan	1,379,517	-4.038	8.288	-3.730	-0.400	1.487
LogUpstreamLoan	1,379,517	-2.982	7.820	-2.410	0.243	1.695
Panel B. Firm-Product-Year Level for Chinese firms						
LogPrice	9,100,402	3.833	2.438	2.319	3.413	4.766
LogWTPrice	9,100,402	3.831	2.480	2.303	3.400	4.755
Panel C. Firm-Year Level for U.S. firms						
LogAssetUS	42,068	5.277	3.028	3.349	5.459	7.464
PPE/AssetsUS	42,023	0.377	0.282	0.129	0.316	0.614
LogSaleUS	35,860	5.494	2.888	3.900	5.834	7.471
NI/AssetUS	41,873	-1.354	32.868	-0.080	0.047	0.094
LogEmployeesUS	33,330	-0.101	2.602	-1.760	0.215	1.727

This table shows the summary statistics of the main variables used in this study. The sample is restricted to manufacturing firms (excluding trade intermediaries) in the China Customs dataset from 2000 to 2013. Panel A reports the summary statistics at the firm-year level for Chinese firms. Panel B provides summary statistics for export prices at the firm-product-year level for Chinese firms, where the product is identified at the four-digit Harmonized System (HS) code level. Panel C reports the summary statistics at the firm-year level for U.S. firms in Compustat. See Table A.1 for detailed variable definitions.

Table 2 – Effects of CDB Loans on Export Activities (OLS)

Dep. Var.	(1) *LogExport*	(2) *LogNumDestinations*	(3) *LogNumProducts*	(4) *LogNumDestProducts*
LogDirectLoan	0.0001	0.0006***	0.0001	0.0002
	(0.45)	(3.81)	(0.8)	(1.24)
LogUpstreamLoan	0.0033***	0.0013***	0.0018***	0.0018***
	(9.22)	(7.63)	(11.34)	(8.95)
Firm FE	Yes	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes	Yes
Observations	1,379,515	1,379,517	1,379,517	1,379,517
Adjusted R^2	0.697	0.744	0.721	0.728

This table reports the OLS regression results for the effects of CDB loans on firms' export activities. The sample contains manufacturing firms in the China Customs data from 2000 to 2013. Export activities are measured at the firm-year level using natural-logarithm transformed export amount (*LogExport*), number of export destinations (*LogNumDestinations*), number of export product varieties (*LogNumProducts*), and number of export destination-product pairs (*LogNumDestProducts*). CDB loans are measured using the outstanding CDB loan amounts at the province-industry-year level for the 31 provinces and 36 manufacturing industries. *LogDirectLoan* denotes the natural logarithm of direct CDB loan for the firm, which is the outstanding CDB loans in the firm's industry and province. *LogUpstreamLoan* denotes the province-industry-year level upstream loan for the firm, which is the CDB industrial loans outstanding in the firm's upstream industry and province. See Table A.1 for detailed variable definitions. Firm fixed effects and province×year fixed effects are included. Standard errors are clustered by the firm for all regressions and *t*-statistics are reported in parentheses. *, **, and *** indicate the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3 – Causal Impacts of CDB Loans on Export Activities (2SLS)

Dep. Var.	(1) *LogExport*	(2) *LogNumDestinations*	(3) *LogNumProducts*	(4) *LogNumDestProducts*
LogDirectLoan	0.0089***	0.0030*	0.0052***	0.0039**
	(2.65)	(1.92)	(3.69)	(2.17)
LogUpstreamLoan	0.0238***	0.0083***	0.0092***	0.0115***
	(9.13)	(6.90)	(8.33)	(8.04)
Firm FE	Yes	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes	Yes
Observations	1,234,787	1,234,789	1,234,789	1,234,789
Wald F-stat	683.9	683.9	683.9	683.9

This table shows the two-stage least squares regression results for the effect of CDB loans on Chinese firms' export activities across industry supply chain by using *First* to *Fifth* as instrumental variables for the logarithm of the CDB province-industry level outstanding loan amounts in 36 industries and 27 provinces (excluding Beijing, Shanghai, Tianjin, and Chongqing). The sample contains manufacturing firms in the China Customs data from 2000 to 2013. The dependent variables are the export amount (*LogExport*), the number of export destinations (*LogNumDestinations*), the number of export product varieties (*LogNumProducts*), and the number of export destination-product pairs (*LogNumDestProducts*). The independent variable, *LogDirectLoan,* denotes the direct CDB loan for the firm in the same industry and province as the loan, which is at the province-industry-year level. *LogUpstreamLoan* denotes the upstream CDB loan in the firm's upstream industry which is at the province-industry-year level. See Table A.1 for detailed variable definitions. Firm fixed effects and province×year fixed effects are included in all regressions. Standard errors are clustered by the firm for all regressions and *t*-statistics are reported in parentheses. Cragg-Donald Wald *F*-statistics for weak identification tests are reported. *, **, and *** indicate the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4 – Heterogeneous Effects of CDB Loans Across Chinese Firms (2SLS)

	(1)	(2)	(3)	(4)
Dep. Var.	*LogExport*	*LogNumDestinations*	*LogNumProducts*	*LogNumDestProducts*
Panel A. Private Firm vs. SOEs				
LogUpstreamLoan ×	0.0231***	0.0184***	0.0154***	0.0223***
PrivateFirm	(10.76)	(16.55)	(15.05)	(16.72)
LogUpstreamLoan	0.0002	-0.0105***	-0.0065***	-0.0112***
	(0.05)	(-6.45)	(-4.29)	(-5.77)
LogDirectLoan	0.0226***	0.0148***	0.0151***	0.0181**
	(4.59)	(6.38)	(7.28)	(6.71)
Firm FE	Yes	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes	Yes
Observations	1,234,787	1,234,789	1,234,789	1,234,789
Wald F-stat	450.7	450.7	450.7	450.7
Panel B. Strength of Upstream-Downstream Industry Link				
LogUpstreamLoan ×	0.0056	0.0198***	0.0046**	0.0186***
UpstreamDependence	(1.19)	(8.15)	(2.18)	(6.54)
LogUpstreamLoan	0.0225***	0.0069***	0.0084***	0.0100***
	(8.54)	(5.63)	(7.45)	(6.86)
LogDirectLoan	0.0270***	0.0187***	0.0182***	0.0228***
	(5.15)	(7.46)	(8.20)	(7.82)
Firm FE	Yes	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes	Yes
Observations	1,234,787	1,234,789	1,234,789	1,234,789
Wald F-stat	446.3	446.3	446.3	446.3
Panel C. Non-consumer Good				
LogUpstreamLoan ×	0.0144***	0.0049***	0.0079***	0.0082***
NonConsumerGood	(14.66)	(10.14)	(17.91)	(14.59)
LogUpstreamLoan	0.0118***	0.0035***	0.0027**	0.0041***
	(4.24)	(2.72)	(2.30)	(2.66)
LogDirectLoan	0.0233***	0.0153***	0.0155***	0.0188***
	(4.72)	(6.58)	(7.48)	(6.93)
NonConsumerGood	0.0520***	-0.0242***	-0.0047	-0.0252***
	(5.04)	(-5.24)	(-1.06)	(-4.48)
Firm FE	1,234,787	1,234,789	1,234,789	1,234,789
Province×Year FE	Yes	Yes	Yes	Yes
Observations	Yes	Yes	Yes	Yes
Wald F-stat	454.1	454.1	454.1	454.1

This table shows the heterogeneous effects of CDB loans on Chinese firms' export activities using two-stage least squares regressions. In panel A, we classify the firms into SOEs and private firms using *PrivateFirm*, which is a dummy variable that equals one if the firm is a private firm and zero otherwise. In panel B, we construct *UpstreamDependence* using the direct consumption coefficient extracted from the China IO table (2007) measuring how much the downstream industry sources inputs from the key upstream industry. In panel C, we construct *NonConsumerGood,* which is a dummy variable at the firm-year level that equals one if the firm mainly exports non-consumer goods (i.e., raw material, intermediate goods, capital goods) and zero if the firm mainly exports consumer goods. We follow Wooldridge (2002) to include the interaction term in 2SLS. All variables are defined in Appendix Table A.1. Firm fixed effects and province×year fixed effects are included in all regressions. Standard errors are clustered by the firm for all regressions and *t*-statistics are reported in parentheses. Cragg-Donald Wald *F*-statistics for weak identification tests are reported. *, **, and *** indicate the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5 – Effects of CDB Loans on Export Prices (2SLS)

Dep. Var.	(1) *LogPrice*	(2) *LogWTPrice*
LogDirectLoan	0.0018	0.0029
	(0.92)	(1.40)
LogUpstreamLoan	-0.0030**	-0.0041***
	(-2.07)	(-2.76)
Firm FE	Yes	Yes
Province×Year FE	Yes	Yes
Product FE	Yes	Yes
Observations	7,937,373	7,937,373
Wald F-test	114.5	114.5

This table shows the two-stage least squares regression results by using *First* to *Fifth* as instrumental variables for the logarithm of the CDB province-industry level outstanding loan amounts on the exported goods prices at the firm-product-year level. The sample contains manufacturing firms in the China Customs data from 2000 to 2013. The product is measured at the four-digit harmonized system (HS) code level. *LogPrice*, *LogWTPrice* are the average prices and export-amount weighted average prices. *LogDirectLoan* denotes the direct CDB loan for the firm in the same industry as the loan which is at the province-industry-year level. *LogUpstreamLoan* denotes the upstream CDB loan in the firm's upstream industry which is at the province-industry-year level. All variables are defined in Table A.1. The firm fixed effects, province×year fixed effects, and product fixed effects are included in all regressions. Standard errors are clustered by the firm for all regressions and *t*-statistics are reported in parentheses. Cragg-Donald Wald *F*-statistics for weak identification tests are reported. *, **, and *** indicate the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6 – Impact of China's Cheaper Exports on U.S. Firms

Dependent Variable	(1) *LogAssetUS*	(2) *PPE/AssetsUS*	(3) *LogSaleUS*	(4) *LogEmployeesUS*
PriceReduction_Direct	-0.0852***	-0.0235***	0.0146	-0.0146
	(-3.11)	(-5.64)	(0.55)	(0.59)
PriceReduction_Upstream	0.0591***	0.0170***	0.0801***	0.0433*
	(2.71)	(4.30)	(3.16)	(1.81)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	42,068	42,023	35,860	33,330
Adjusted R^2	0.936	0.806	0.950	0.959

This table shows the results of regressing U.S. firms' characteristics on export price reduction induced by CDB loans estimated using the coefficients from 2SLS results in Table 5. The sample contains U.S. public firms from Compustat between 2000 and 2013, where the firm's industry imports from China. The dependent variables are at firm-year level: *LogAssetUS* is the logarithm of U.S. firm's total assets; *PPE/AssetsUS* measures the tangibility defined as plant, property, and equipment divided by total assets; *LogSaleUS* is the logarithm of U.S. firm's total sales; *LogEmployeesUS* is the logarithm of the number of employees of the firm. The independent variable *PriceReduction_Direct* is at the industry-year level and denotes the average price reduction from China's export in the same industry resulting from CDB loans estimated using the 2SLS coefficient estimates in Table 5. *PriceReduction_Upstream* is at the industry-year level and denotes the average price reduction from China's export in the upstream industry. To match the Chinese export industry with the U.S. firm's industry, we collapse the 95 CDB industries into 71 industries as identified by the U.S. IO table summary file from the U.S. Bureau of Economic Analysis. In particular, we use the 2007 data as the benchmark to link CDB industries and U.S. IO industries. The upstream-downstream industry link for U.S. firms is constructed using U.S. IO table as well. Firm fixed effects and year fixed effects are included in all regressions. Standard errors are clustered by the firm for all regressions and *t*-statistics are reported in parentheses. *, **, and *** indicate the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7 – Impact of China's Cheaper Exports on U.S. Firms across States

Dep. Var.	(1) *LogAssetUS*	(2) *PPE/AssetsUS*	(3) *LogSaleUS*	(4) *LogEmployeesUS*
PriceReduction_Upstream	0.2290***	0.0242***	0.2171***	0.1577***
× *HighUnemployment*	(4.03)	(2.86)	(4.38)	(3.47)
PriceReduction_Upstream	-0.0933**	0.0011	-0.0410	-0.0460
	(-2.06)	(0.18)	(-1.04)	(-1.36)
PriceReduction_Direct	-0.0909***	-0.0267***	0.0129	-0.0307
	(-3.14)	(-5.95)	(0.45)	(-1.28)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	36,849	36,806	31,015	28,936
Adjusted R^2	0.931	0.801	0.948	0.958

This table reports the results on the heterogeneous effects of export price reduction induced by CDB loans on U.S. firms. The sample contains U.S. firms from Compustat between 2000 and 2013, where the firm's industry imports from China. We construct a dummy variable, *HighUnemployment*, which equals one if the unemployment rate of a firm's headquarter state is above the median in 1999 and zero otherwise. The independent variable *PriceReduction_Direct* is at the industry-year level and denotes the average price reduction from China's export in the same industry resulting from CDB loans estimated using the 2SLS coefficient estimates in Table 5. *PriceReduction_Upstream* is at the industry-year level and denotes the average price reduction from China's export in the upstream industry. To match the Chinese export industry with the U.S. firm's industry, we collapse the 95 CDB industries into 71 industries as identified by the U.S. IO table summary file from the U.S. Bureau of Economic Analysis. In particular, we use the 2007 data as the benchmark to link CDB industries and U.S. IO industries. The upstream-downstream industry link for U.S. firms is constructed using U.S. IO table as well. Firm fixed effects and year fixed effects are included in all regressions. Standard errors are clustered by the firm for all regressions and *t*-statistics are reported in parentheses. *, **, and *** indicate the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8 – Impact of China's Cheaper Exports on U.S. Firms (Trade War Targets)

Dependent Variable	(1) *LogAssetUS*	(2) *PPE/AssetsUS*	(3) *LogSaleUS*	(4) *LogEmployeesUS*
PriceReduction_Upstream	-0.4136***	-0.0488***	-0.2920***	-0.1869**
× *TradeWarIndustry*	(-4.49)	(-4.22)	(-3.51)	(-2.19)
PriceReduction_Upstream	0.0864***	0.0204***	0.1009***	0.0534**
	(3.81)	(4.92)	(3.92)	(2.22)
PriceReduction_Direct	-0.0698**	-0.0218***	0.0260	-0.0062
	(-2.54)	(-5.20)	(0.97)	(-0.25)
TradeWarIndustry	-0.2036	-0.0083	-0.2805	-0.3370
	(-1.47)	(-0.59)	(-1.43)	(-1.60)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	42,068	42,023	35,860	33,330
Adjusted R2	0.944	0.831	0.957	0.964

This table reports the results on the heterogeneous effects of export price reduction induced by CDB loans on U.S. firms. The sample contains U.S. firms from Compustat between 2000 and 2013, where the firm's industry imports from China. We construct a dummy variable, *TradeWarIndustry*, which equals one if it is the key upstream industry of a firm and is listed for tariff increase in the U.S. section 301 report by USTR at the beginning of the 2018 China-U.S. trade war. The report is available at https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF. The independent variable *PriceReduction_Direct* is at the industry-year level and denotes the average price reduction from China's export in the same industry resulting from CDB loans estimated using the 2SLS coefficient estimates in Table 5. *PriceReduction_Upstream* is at the industry-year level and denotes the average price reduction from China's export in the upstream industry. To match the Chinese export industry with the U.S. firm's industry, we collapse the 95 CDB industries into 71 industries as identified by the U.S. IO table summary file from the U.S. Bureau of Economic Analysis. In particular, we use the 2007 data as the benchmark to link CDB industries and U.S. IO industries. The upstream-downstream industry link for U.S. firms is constructed using U.S. IO table as well. Firm fixed effects and year fixed effects are included in all regressions. Standard errors are clustered by the firm for all regressions and t-statistics are reported in parentheses. *, **, and *** indicate the statistical significance at the 10%, 5%, and 1% levels, respectively.

Online Appendix for

Government Credit and Trade War

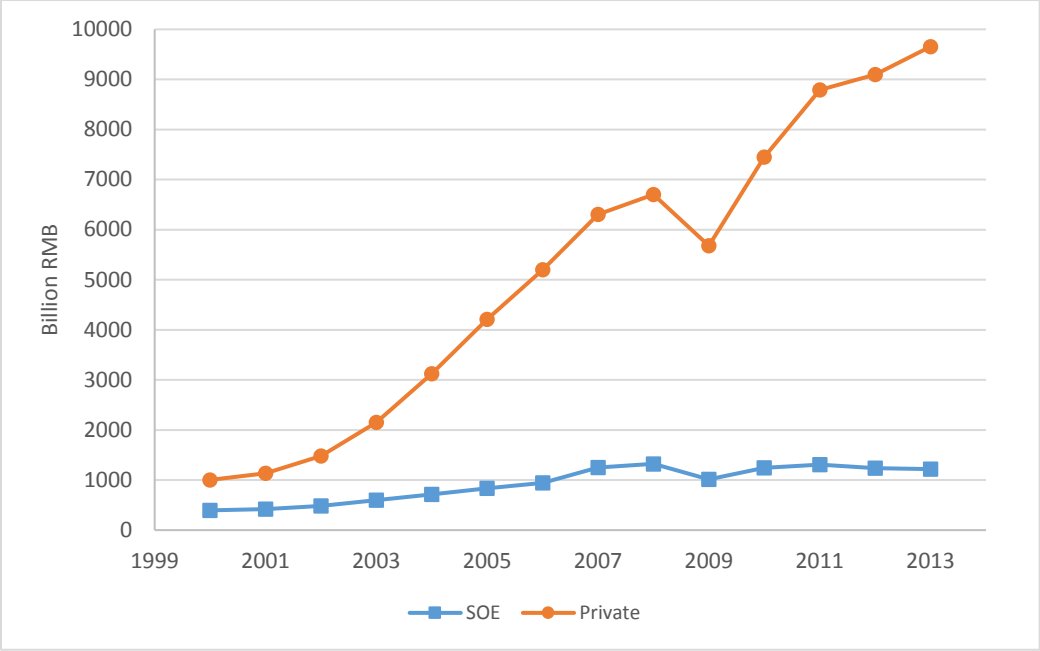

Figure A.1. Export amount By Firm Type

This figure shows the time trend of total export amounts for SOEs and private firms from 2000 to 2013. It is based on the sample containing only manufacturing firms (i.e., excluding trade intermediaries) in the China Customs data. SOEs denote firms that are state-owned enterprises or collectively-owned firms. Private firms denote private firms. The unit is in billion RMB.

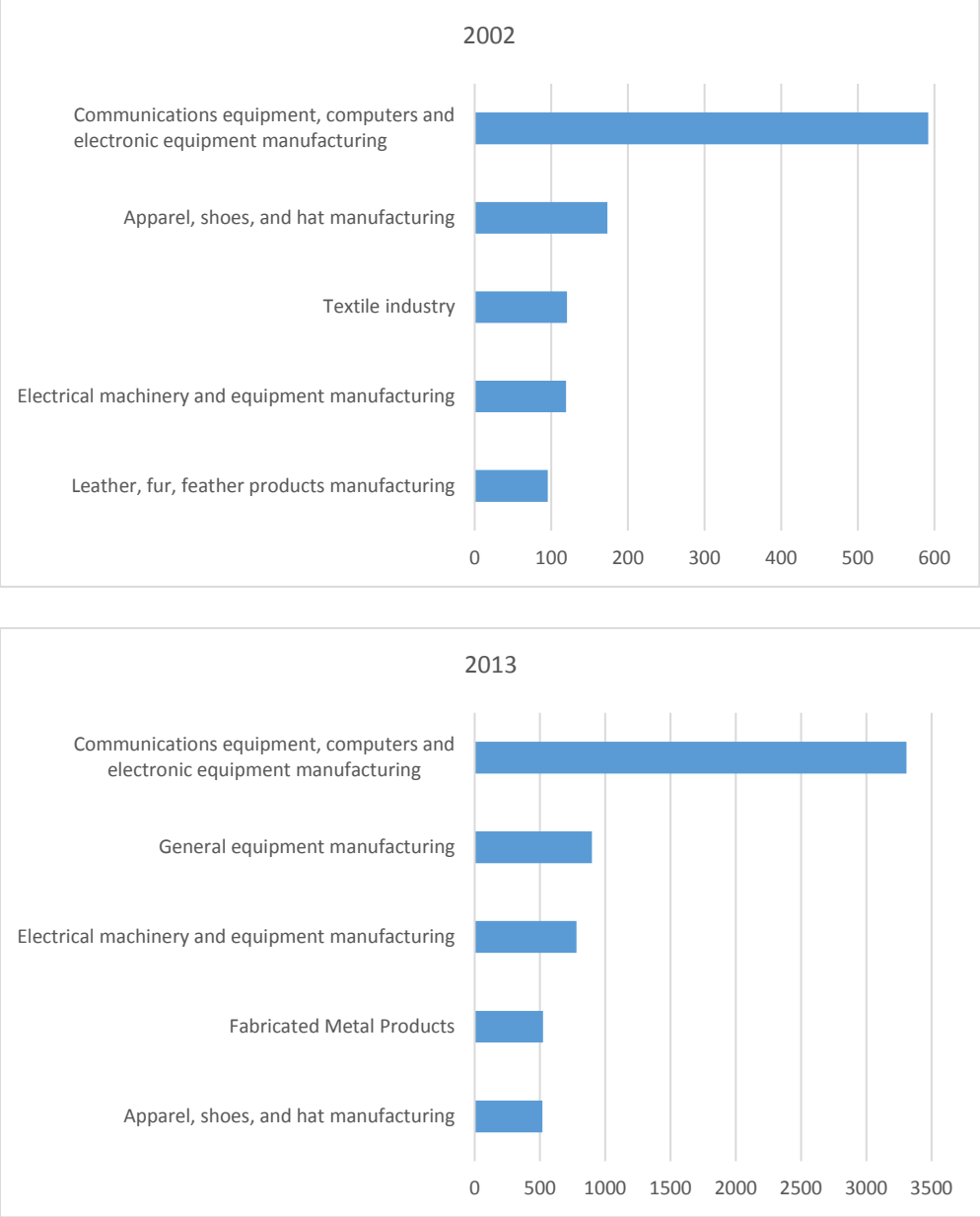

Figure A.2. Top Five Export Industries

This figure shows the top five export industries ranked by export amounts for 2002 and 2013, respectively. The sample includes only manufacturing firms (i.e., excluding trade intermediaries) in the China Customs data from 2000 to 2013. The industry is at the two-digit CDB industry classification level, which is comparable with U.S. two-digit SIC code. The top panel shows the largest five industries ranked by export amounts and the associated export amounts for 2002 while the bottom panel is for 2013. The unit is in billion RMB.

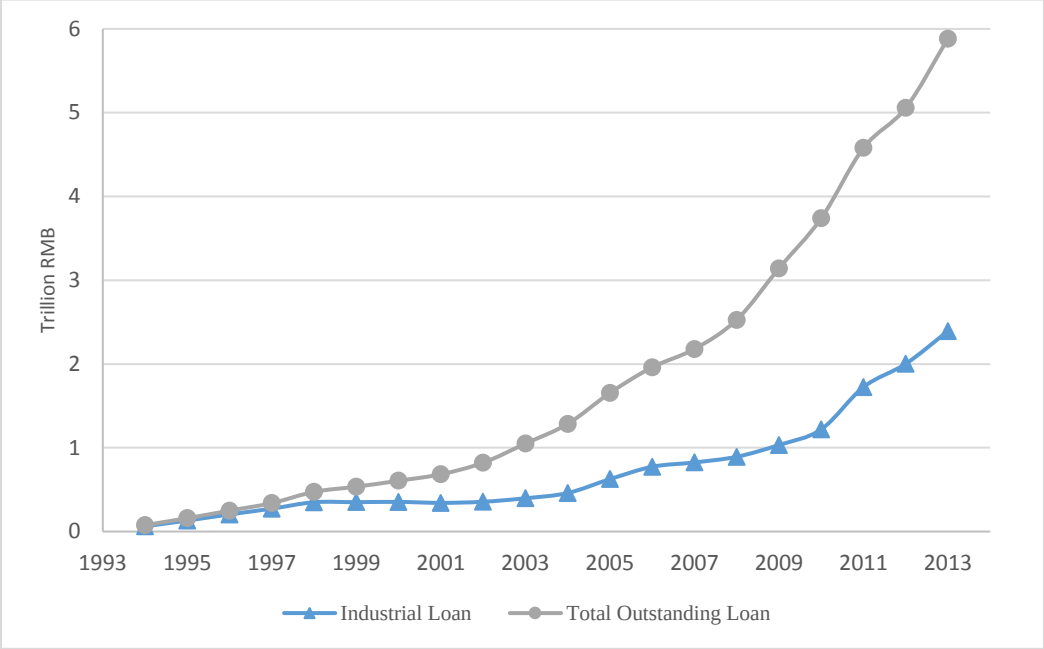

Figure A.3. Time trend of CDB outstanding loans

This figure plots the time trend of aggregate CDB provincial outstanding loan amounts from 1994 to 2013. CDB loans can be classified into two groups: industrial loan and infrastructure loan. Industrial loans are credits granted to the industrial firms. Infrastructure includes transportation (e.g., road, railway, airport, bridge, and tunnel), water supply, energy supply (e.g., gas, electric), telecommunications, and public service (e.g., sewage discharge). The unit is in trillion RMB.

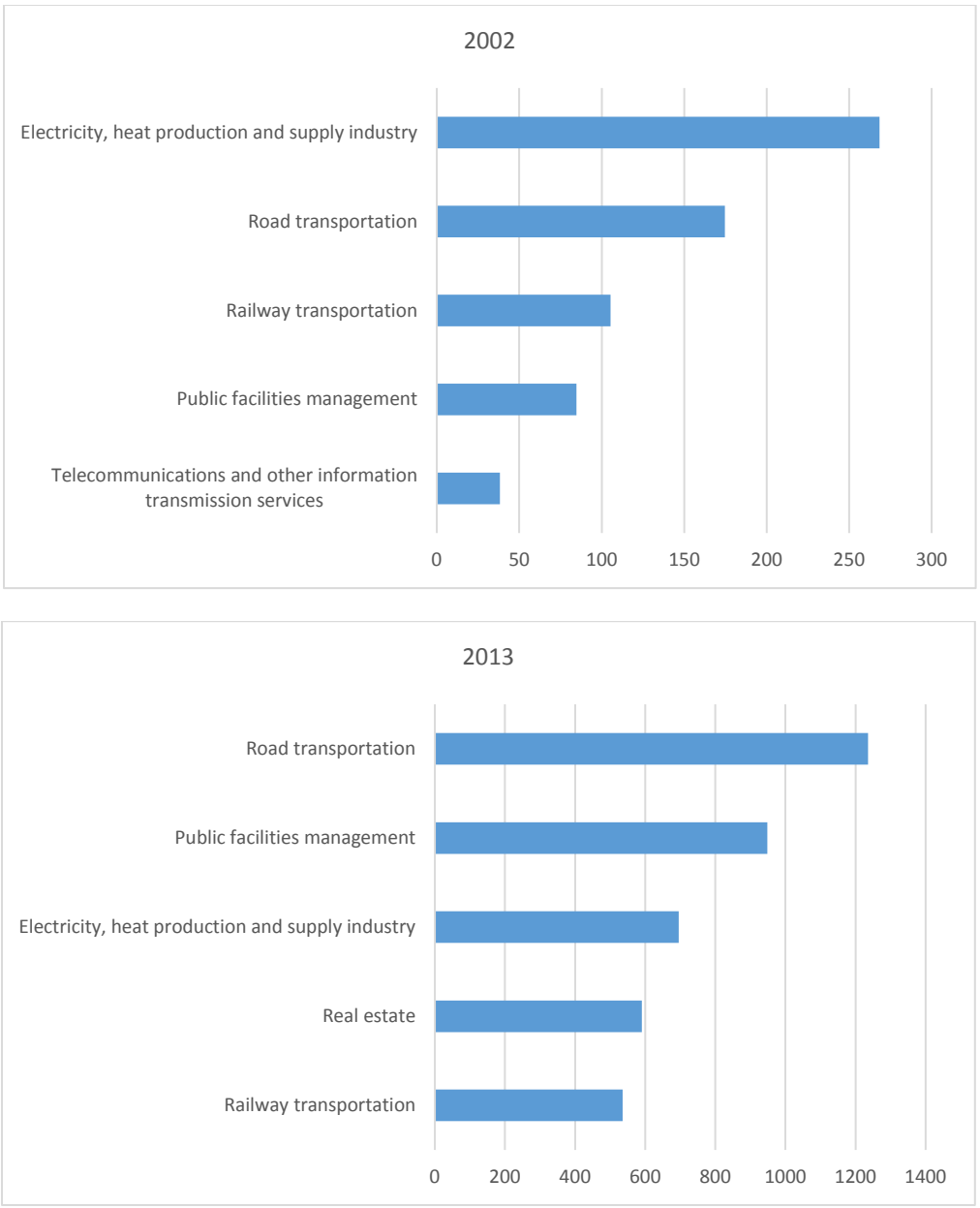

Figure A.4. Shifts of CDB Industrial Loans Over Time

This figure shows the top five industries that have CDB outstanding loans in 2002 and 2013, respectively. Data are restricted to CDB province-level industrial loans across 31 provinces in China. The top (bottom) panel shows the five industries with the largest CDB outstanding loans in 2002 (2013). The amount for each industry is the sum of all CDB outstanding loan amounts across 31 provinces in China. The unit is in billion RMB.

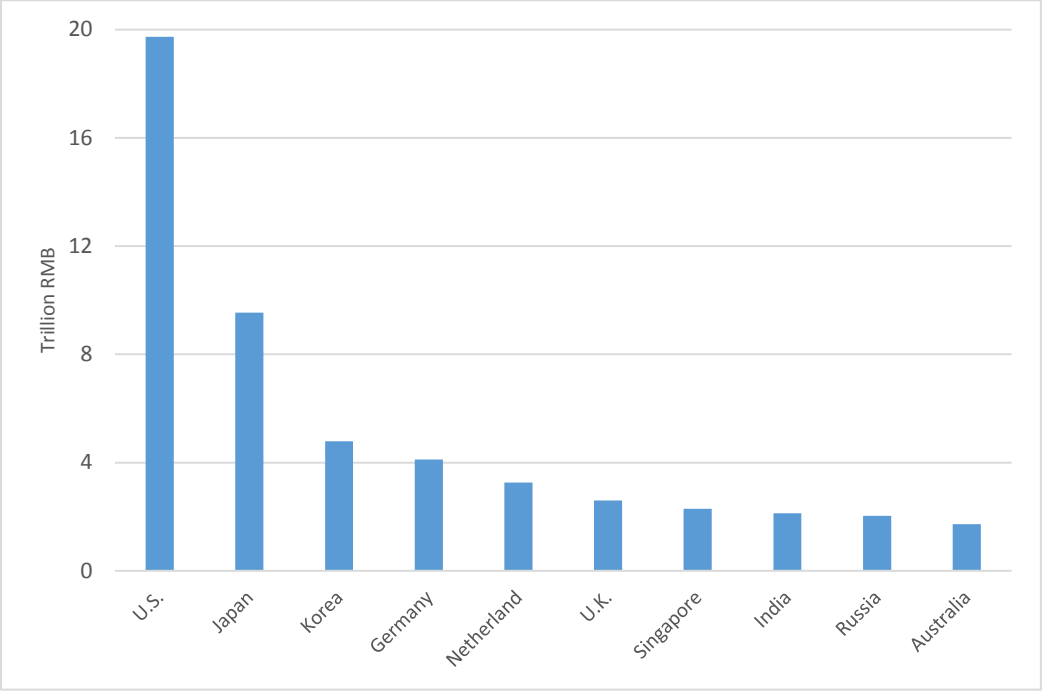

Figure A.5. Top Ten Export Destination Countries

This figure shows the largest ten destination countries ranked by total export amounts of Chinese firms from 2000 to 2013. Based on the population data of China Customs, we aggregate the export amount from all export transactions (i.e., exports by manufacturing firms and exports by intermediary firms) from 2000 to 2013 by destination countries and plot the total export amount for the top ten countries (Hong Kong is excluded). The unit is in trillion RMB.

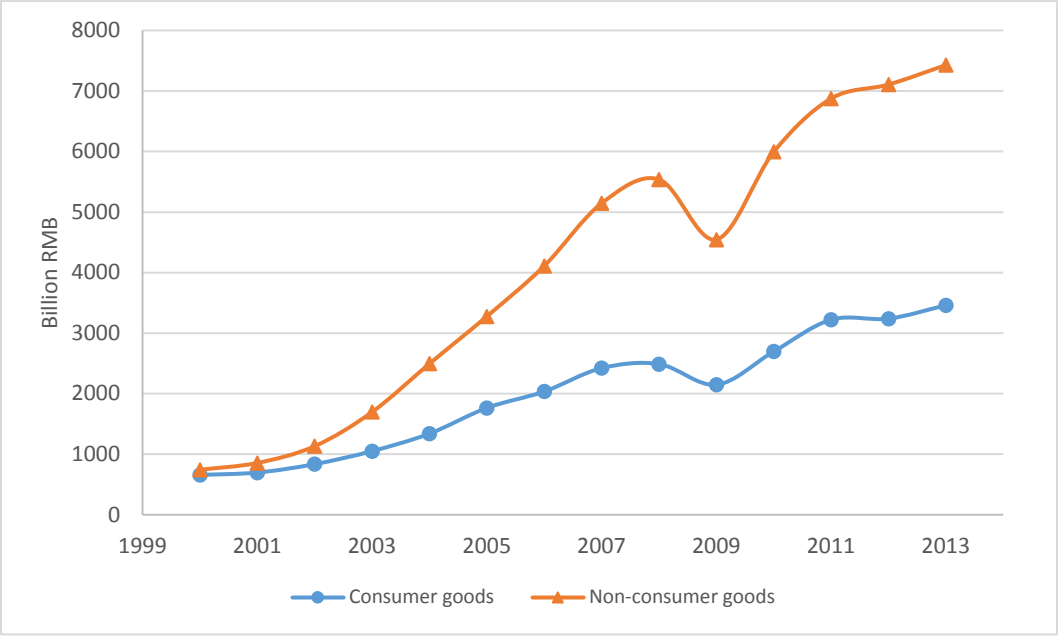

Figure A.6. Export Amount by Type of Goods

This figure shows the time trend of export amounts for two types of exported goods: consumer goods and non-consumer goods. Based on the population data of China Customs, we aggregate the export amount from all export transactions (i.e., exports by manufacturing firms and exports by intermediary firms) from 2000 to 2013. Exported goods are classified as either raw materials, intermediate goods, capital goods, or consumer goods using the concordance table from HS standard product groups (UNCTAD-SoP), which is available at https://wits.worldbank.org/referencedata.html. We classify the first three types of goods into non-consumer goods group, and consumer goods are classified into consumer goods group. We plot the time trend of export amounts for the two groups. The unit is in billion RMB.

Table A.1 – Variable Definitions

Variable	Definition
LogDirectLoan	The logarithm of *DirectLoan*. *DirectLoan* is the direct CDB outstanding loan amount at the province-industry-year level. The loan is defined as "direct" for a firm if the firm is in the same province and industry as the loan. The unit of CDB loan is in hundred million RMB. We take the logarithm form in the regression analyses.
LogUpstreamLoan	The logarithm of *UpstreamLoan*. *UpstreamLoan* is the upstream CDB outstanding loan amount at the province-industry-year level. The loan is defined as "upstream" for a firm if the loan is given to the upstream industry of the firm in the same province. The unit of CDB loan is in hundred million RMB. We take the logarithm form in the regression analyses.
LogExport	The logarithm of the export amount (in millions RMB) of the firm in the China Customs data. The variable is at firm-year level.
LogNumDestinations	The logarithm of the number of a firm's export destinations in the China Customs data. The variable is at firm-year level.
LogNumProducts	The logarithm of the number of a firm's export product types, where the product type is measured by aggregating the eight-digit product code in China Customs data at the four-digit Harmonized System (HS) code level. The variable is at firm-year level.
LogNumDestProducts	The logarithm of the number of a firm's destination-product pairs. Product type is measured at the four-digit HS level. The variable is at firm-year level.
PrivateFirm	A dummy variable that equals one if a firm is a private firm, and zero if a firm is SOE.
UpstreamDependence	Direct consumption coefficient extracted from the China IO table (2007), measuring how much the downstream industry sources the inputs from the key upstream industry. A higher value indicates that the industry has a higher dependence on the upstream industry.
NonConsumerGood	A dummy variable that equals one if the firm mainly exports non-consumer goods (i.e., raw material, intermediate goods, capital goods) and zero if the firm mainly exports consumer goods. A firm is classified as non-consumer goods exporter if the amount of non-consumer goods exports is larger than the amount of consumer goods exports and vice versa. The products are classified as either raw materials, intermediate goods, capital goods, or consumer goods using the concordance tables from HS standard product groups (UNCTAD-SoP), which is available at https://wits.worldbank.org/referencedata.html.
LogPrice	The logarithm of the average export price measured at the firm-product-year level. We compute the simple average of prices at the eight-digit HS product level within a firm-year and aggregate them at four-digit HS product level.
LogWTPrice	The logarithm of export-weighted-average export price measured at the firm-product-year level. We compute the average prices using the export amount as weight at eight-digit HS product level within a firm-year and aggregate them at four-digit HS product level.
LogAssetUS	The logarithm of total assets for U.S. firms in Compustat.
PPE/AssetsUS	The tangibility of U.S. firms in Compustat, computed as property, plant, and equipment divided by total assets.
LogSaleUS	The logarithm of total sales for U.S. firms in Compustat.
LogEmployeesUS	The logarithm of the number of employees for U.S. firms in Compustat.

To be continued……

Table A.1 – Variable Definitions *-continued*

Variable	Definition
HighUnemployment	A dummy variable at the state level that equals one if the unemployment rate of a firm's headquarter state is above the median in 1999 and zero otherwise.
TradeWarIndustry	A dummy variable at the industry level that equals one if it is the key upstream industry of a firm and is listed for tariff increase in the U.S. section 301 report by USTR on March 22, 2018, which is around the beginning of the 2018 China-U.S. trade war. We use the concordance table constructed by Pierce and Schott (2012) to link the HS product codes in the report and the SIC industries. The report is available at the following link: https://ustr.gov/sites/default/files/Section%20301%20FINAL.PDF.
LogCityLoan	The logarithm of CityLoan. CityLoan is the CDB outstanding loan amount at the city-year level. The unit of CDB loan is in hundred million RMB. We take the logarithm form in the regression analyses.
First_Year	A dummy variable which equals one if a city secretary is in his/her first year of the term. The variable is at the city-year level.
Second_Year	A dummy variable which equals one if a city secretary is in his/her second year of the term. The variable is at the city-year level.
Third_Year	A dummy variable which equals one if a city secretary is in his/her third year of the term. The variable is at the city-year level.
Fourth_Year	A dummy variable which equals one if a city secretary is in his/her fourth year of the term. The variable is at the city-year level.
Fifth_Year	A dummy variable which equals one if a city secretary is in his/her fifth year of the term. The variable is at the city-year level. This is the omitted group in Table A.2.
First	A dummy variable equals one if there is a city secretary who is in the predicted first year of his/her term and the city's largest SOE industry (i.e., focal industry) is in the same industry as the provincial industry loans. The variable is at the province-industry-year level.
Second	A dummy variable equals one if there is a city secretary who is in the predicted second year of his/her term and the city's largest SOE industry (i.e., focal industry) is in the same industry as the provincial industry loans. The variable is at the province-industry-year level.
Third	A dummy variable equals one if there is a city secretary who is in the predicted third year of his/her term and the city's largest SOE industry (i.e., focal industry) is in the same industry as the provincial industry loans. The variable is at the province-industry-year level.
Fourth	A dummy variable equals one if there is a city secretary who is in the predicted fourth year of his/her term and the city's largest SOE industry (i.e., focal industry) is in the same industry as the provincial industry loans. The variable is at the province-industry-year level.
Fifth	A dummy variable equals one if there is a city secretary who is in the predicted fifth year or more of his/her term and the city's largest SOE industry (i.e., focal industry) is in the same industry as the provincial industry loans. The variable is at the province-industry-year level.
LogNumFirms	The logarithm of the number of firms that export measured at the province-industry-year level.

Table A.2 – CDB Loans and Political Turnover

	Actual Turnover	Predicted Turnover
	(1)	(2)
Dep. Var.	*LogCityLoan*	*LogCityLoan*
Panel A. CDB City-level Loans and City Secretary Turnover		
First_Year	0.4289*	0.4062**
	(1.7)	(2.1)
Second_Year	0.3826*	0.3003*
	(1.9)	(2.0)
Third_Year	0.2891**	0.2277**
	(2.1)	(2.0)
Fourth_Year	0.1706**	0.1254
	(2.1)	(1.6)
Controls	Yes	Yes
City FE, Secretary FE, Year FE	Yes	Yes
Observations	3,505	3,602
Adjusted R^2	0.881	0.893

	(1)
Dep. Var.	*LogProvinceLoan*
Panel B. CDB Province-industry Loans and Political Turnover	
First	0.5803***
	(5.4)
Second	0.4856***
	(3.6)
Third	0.3182**
	(2.8)
Fourth	0.2508
	(1.4)
Fifth	0.3399
	(1.6)
Province×Year FE, Industry FE	Yes
Observations	5,573
Adjusted R^2	0.336

This table shows the relationship between political turnover and CDB loans outstanding from 2000 to 2013. In Panel A, we regress CDB city loans outstanding on the city secretary turnover cycle. *LogCityLoan* is the logarithm of CDB total loans outstanding at the city-year level. *First_Year* is a dummy which equals one if it is the first year in a city secretary's term. *Second_Year* to *Fourth_Year* are defined in the same way. The dummy for the fifth year is the missing category. Column (1) is for the effect of the actual turnover cycle on the total CDB city loans outstanding, while Column (2) is for the effect of the predicted turnover cycle. Control variables include city-level GDP, income per capita, and population. The city fixed effects, politician fixed effects, and year fixed effects are included in Panel A. Standard errors are clustered at the city level. Panel B reports the results of regressing CDB provincial industry loan amounts on the *First* to *Fifth* dummies at the province-industry-year level. *LogProvinceLoan* is the logarithm of CDB annual province-industry loans outstanding. *First* is a dummy for whether the city secretary is in the predicted first year of his/her term and the city's largest SOE industry (i.e., focal industry) is in the same industry as in the provincial industry loans. *Second* is a dummy for whether the city secretary is in the predicted second year of the term and the city's largest SOE industry (i.e., focal industry) is in the same industry as in the provincial industry loans. The dummies *Third* to *Fifth* are defined similarly. Province×year fixed effects and industry fixed effects are included in Panel B. Standard errors are clustered at the province level and are reported in parentheses.

Table A.3 – Effects of CDB Loans on SOEs and Private Firms

	(1)	(2)	(3)	(4)
Dep. Var.	*LogExport*	*LogNumDestinations*	*LogNumProducts*	*LogNumDestProducts*
Panel A. SOEs				
LogDirectLoan	0.0096	0.0022	0.0025	0.0077
	(0.99)	(0.48)	(0.59)	(1.40)
LogUpstreamLoan	0.0243**	0.0053	0.0066	0.0105
	(2.02)	(0.96)	(1.22)	(1.54)
Firm FE	Yes	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes	Yes
Observations	85,354	85,354	85,354	85,354
Wald F-stat	52.84	52.84	52.84	52.84
Panel B. Private firms				
LogDirectLoan	0.0077**	0.0022	0.0047***	0.0028
	(2.25)	(1.41)	(3.32)	(1.51)
LogUpstreamLoan	0.0226***	0.0087***	0.0097***	0.0121***
	(8.87)	(7.41)	(9.07)	(8.72)
Firm FE	Yes	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes	Yes
Observations	1,149,432	1,149,434	1,149,434	1,149,434
Wald F-stat	625.5	625.5	625.5	625.5

This table shows the two-stage least squares regression results for the effect of CDB loans on SOEs and private firms' export activities across industry supply chain by using *First* to *Fifth* as instrumental variables for the logarithm of the CDB province-industry level outstanding loan amounts in 36 industries and 27 provinces (excluding Beijing, Shanghai, Tianjin, and Chongqing). The sample contains manufacturing firms in the China Customs data from 2000 to 2013. Panel A shows the 2SLS results for state-owned enterprises (SOEs), while panel B shows the results for private firms. The dependent variables are the export amount (*LogExport*), the number of export destinations (*LogNumDestinations*), the number of export product varieties (*LogNumProducts*), and the number of export destination-product pairs (*LogNumDestProducts*). The independent variable, *LogDirectLoan*, denotes the direct CDB loan for the firm in the same industry and province as the loan, which is at the province-industry-year level. *LogUpstreamLoan* denotes the upstream CDB loan in the firm's upstream industry which is at the province-industry-year level. All variables are defined in Appendix Table A.1. Firm fixed effects and province×year fixed effects are included in all regressions. Standard errors are clustered by the firm for all regressions and *t*-statistics are reported in parentheses. Cragg-Donald Wald *F*-statistics for weak identification tests are reported. *, **, and *** indicate the statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.4 – Effect of CDB Loans on Number of Exporting Firms

	(1)	(2)
Regression method	OLS	2SLS
Dep. Var.	*LogNumFirms*	*LogNumFirms*
LogDirectLoan	0.0101***	0.0309***
	(9.53)	(2.81)
LogUpstreamLoan	0.0063***	0.0453*
	(6.54)	(1.78)
Province FE	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes
Observations	8,120	8,120

This table reports the OLS and 2SLS regression results for the effects of CDB loans on the number of exporting firms. The sample contains manufacturing firms in the China Customs data from 2000 to 2013. *LogNumFirms* is the natural logarithm of the number of firms that export in a given province and industry. *LogDirectLoan* denotes the natural logarithm of direct CDB loan for the firm and is the outstanding CDB loans in the firm's industry and province. *LogUpstreamLoan* denotes the upstream loan for the firm and is the CDB industrial loans outstanding in the firm's upstream industry which is also at the province-industry-year level. All variables are defined in Table A.1. Province fixed effects, industry fixed effects, and year fixed effects are included. Robust standard errors are included for all regressions and *t*-statistics are reported in parentheses. *, **, and *** indicate the statistical significance at the 10%, 5%, and 1% levels, respectively.