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Government credit and trade war

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Abstract

By merging transaction-level trade data from China Customs and loan data from the China Development Bank (CDB), we analyze the effects of government credit on trade activities. We find that CDB credit mainly flows to SOEs in strategic industries at the top of the supply chain. These upstream loans lead to the lower price and higher amount of export goods of private firms in downstream industries, which leads to decreases in employment and performance of the US firms in the same industry. In contrast, the US firms in downstream industries use cheaper intermediate goods imported from China and perform better subsequently.

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. The literature documents various ways of government interventions in trade (e.g., tariffs, quotas, subsidy).[1] However, the evidence is limited for how government credit affects the trade despite the fast-growing government credit across the globe in recent years.[2] On the one hand, the government could distort the credit allocation for mercantilism. On the other hand, government credit could facilitate international trade, especially for credit constraint firms (e.g., Manova, Wei, and Zhang (2015)). China has become the largest trade partner of many countries with the total export amount of approximately USD 2.3 trillion in 2017. The Chinese government has been criticized for its mercantilist policies for trade such as its industrial policies and credit supports.[3] This directly leads to the recent trade war between the US and China.

In this paper, we study the effects of government credit on international trade across the industry supply chain. In particular, we obtain the population data on all export and import transactions in China and the province-industry level loan data from the China Development Bank (CDB). We document two main findings. First, the CDB mainly lend to state-owned enterprises (SOEs) at the top of the supply chain (e.g., strategic industries such as energy and mining) which leads to the surge in export amount and the decrease in prices of export goods of private firms in downstream industries (e.g., manufacturing). Second, the increased export volume with lower price from China leads to decreases in employment and performance of the US firms in the same industry. In contrast, the US firms in downstream industries use the cheaper intermediate goods imported from China and perform better subsequently. This paper shows novel evidence on how government credit reshapes the structure of the supply chain by estimating the spillover effects of upstream industry credit on downstream firms' international trade activities.

Our primary data are from the China 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, firm location, and firm

[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, 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. US 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 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, 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.

ownership). 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 by the end of 2017. It has the mandate to provide subsidized credit to SOEs in strategic industries (e.g., energy and mining) and local governments for infrastructure development. We match the customs data with CDB loan data at the province-industry level from 2000 to 2013.

We first perform the ordinary least square (OLS) regressions of firm export activities on CDB credit across the supply chain. We find that the CDB loans outstanding which mainly flow to SOEs have week positive correlation with SOEs' export volume in the same industry. For down-stream 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 private firms in the downstream industries of the same province. This suggests that the government credit to upstream industries could have positive spillover effects on firms in down-stream industries.

The common identification challenge is that the government credit is allocated endoge-nously. For example, the CDB has the mandate to grant credit to the undeveloped areas and bottle-necked industries in China. In order to establish causal effects, we use the exogenous variation from the pre-determined municipal politicians' turnover cycles. Ru (2018) find that the municipal city secretaries in China tend to borrow significantly more in their early years in office and monoton-ically decrease the borrowings over the pre-determined five-year tenure. Using the same method, we first 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 prov-ince and the turnover cycles of the cities' secretaries. We use the interaction terms as the instruments for CDB loans outstanding. In the first stage regressions, we find that the province borrows signifi-cantly more 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 would be 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 SOEs in the same industry. In particular, a 100% increase in CDB loans out-standing leads to increases in SOEs' export volume, the number of export destinations, and the number of export products by 4.02%, 1.69%, and 1.25%, respectively. For private firms, we do not find any significant effects of CDB loans in the same industry. This is consistent with the fact that approximately 90% of CDB credit for industrial firms goes to SOEs whereby the other 10% goes to the private firms which are typically big corporations with government connections.

Furthermore, besides the effects of CDB credit on the firms in the same industry, we trace the effects of CDB credit across the supply chain. For each firm, we define the industry that a firm sources the majority of its inputs as the upstream industry by using the input-output matrix. We then perform the 2SLS of firm export activities on CDB loans outstanding in the upstream industries. We find that consistent with OLS regressions, increases in CDB loans for upstream industries lead to increases in export activities of private firms in downstream industries. On average, a 100% increase in CDB upstream loans outstanding leads to nearly 2% increase in private firms' export amounts, 1.36% increase in the number of export markets, and 1.23% of the number of products. This positive spillover effect is significantly more pronounced for firms with the higher dependency on the inputs from upstream firms.

Moreover, 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 6.5%. In contrast, these effects of upstream CDB credit are muted for SOEs in downstream industries. In short, CDB upstream loans could help the downstream private firms' exports whereby SOEs in downstream industries cannot capture these positive spillover effects from upstream industry credit.

Next, we study how the surges of export activities caused by government credit in China affect the firms in other countries. Specifically, we focus on the trade between the US and China that is one of the biggest bilateral trade relationships in the world. Based on the estimated coefficients in 2SLS regressions, we calculate the increased export amount from China caused by CDB loans at the industry level according to US industry standard. We then perform the regression of US firms' performance and employment on estimated increases in export amounts from China caused by CDB loans, both in the same industry (i.e., horizontal effect) and across the industry supply chain (i.e., upstream effect). We find these increased exports decrease US firms' assets, sales, and employment in the same industry. However, the exports benefit downstream US firms which tend to source intermediate goods from China. Specifically, when export volume from China increases by 100%, it increases an average US firm's total asset, sale, and the number of employees by 5.2%, 2.7%, and 3.2%, respectively. Although the US firms are crowded out by the cheaper goods from China, the firms in downstream industries could gain from cheaper intermediate goods as inputs of productions from China.

Our contribution to the literature is three-fold. First, this paper adds to the growing literature on how government intervenes in the international trade. It is well documented that governments could use trade policy and tariff to affect the trade activities (e.g., Pavcnik (2002), Amiti and Konings (2007), De Loecker (2011), Khandelwal, Schott, and Wei (2013), Topalova and Khandelwal (2011), Fan, Li, and Yeaple (2015), De Loecker et al. (2016), Brandt et al. (2017)), and strong

financial institutions could facilitate trade, especially for sectors that rely more on external finance (e.g., Kletzer and Bardhan (1987), Beck (2002), Svaleryd and Vlachos (2005), Hur, Raj, and Riyanto (2006), Ju and Wei (2010), Becker, Chen, and Greenberg (2013), Manova (2013)).[4] However, very little attention has been paid to the role of government credit in trade. We fill in this gap by documenting the positive spillover effects of government credit on downstream private firms' export.[5] In particular, the CDB credit could alleviate firms' constraint in financing fixed costs of entering into new markets (i.e., increased number of export destinations) and increase the export amount.[6] This serves as another essential government intervention in international trade.

Second, our findings provide empirical evidence and policy implications regarding the recent trade war between the US and China, one of the largest bilateral trade partners worldwide. China contributes 30% of the global GDP growth whereby the "Chinese mercantilism" has been criticized heavily by many countries that is also one of the main triggers of the recent trade war. On the one hand, our finding of crowding out effects of cheaper goods from China on the US firms in the horizontal industries is consistent with prior literature documenting the negative impact of imports from China on US employment (e.g., 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 US firms in the downstream industries. This complements the recent study by Wang et al. (2018) that finds the intermediate goods imported from China lead to increases in employment of US firms in downstream industries. We provide additional evidence that the government credit leads to the decline in prices of intermediate goods and the subsequent increase of 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.

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

[5] There is a long debate on the economic consequences of government credit. Government credit could crowd out the private sector investments (e.g., King and Levine (1993), Demirguc-Kunt and Maksimovic (1998), Levine and Zervos (1998), Rajan and Zingales (1998), Levine, Loayza, and Beck (2000)) while it could have positive externalities (e.g., Stiglitz (1993)). Our results echo Huang, Pagano, and Panizza (2016) that documents the crowding out effects of local government debt in China.

[6] The number of export destinations are widely used in the literature to measure the performance of firms' export (e.g., Minetti and Zhu (2011), Chan and Manova (2015), Manova, Wei, and Zhang (2015), Muuls (2015)).

II Institution background

China remains a closed economy until the late 1970s. Starting with the economic reform in 1978, China opened its economy, and the trade began to grow. Throughout the reform, the Chinese government reduced tariffs, trade barriers, and regulations, with the overall tariff rate falling from 56% to 15%. More than 60% of the imports were free of tariffs, and only 9% of import 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 reforms to more than $500 billion in 2001. On 11 December 2001, China became an official member of the World Trade Organization (WTO) after going through an arduous and prolonged negotiation of 15 years since its initial application.

After joining the WTO, China's international trade rose rapidly, and firms expanded fast to the global markets. Total trade amounts increased from nearly $510 billion in 2001 to more than $4.1 trillion in 2013 with the export amounts rising from $266 billion to $2.2 trillion. In 2013, China surpassed the US to become the largest trading nation in the world. Over the years, to promote international trade, integrate into the global economy and strengthen economic cooperation with other economies, China has established free trade agreements (FTA) with 14 countries or regions.[7] China has been one of the most important players in international trade and has increasingly engaged in trade organizations and treaties in recent years. Our sample period spans from 2000 to 2013, mainly covering China's post-WTO era of international trade.

Although China employs an open market economy, its economic model is often viewed as the socialist market economy characterized by a mixed system presenting the typical features of both the market and planning economies.[8] The fundamental distinction between the Chinese model and the traditional Western market economy model lies in the degree of state-ownership and underlying authoritarian political philosophy, where the Chinese government has controlling power over the economic activity through corporatized government agencies and the state-owned enterprises. The CDB provides such a tool for the Chinese government to exert controls over the economy and to implement the fiscal policy.[9] The CDB is the largest policy bank in China under direct control by the State Council, which is mandated to provide medium- to long-term financing facilities that serve China's long-term economic and social development strategies, especially in undeveloped areas and

[7] Currently, China has 19 free trade agreements under construction, where 14 of them have been signed and implemented. For example, China-Australia FTA, China-Switzerland FTA, China-ASEAN FTA. (http://fta.mofcom.gov.cn/english/)
[8] See for example: "The rise of state capitalism". The Economist. 21 January 2012. Bremmer, Ian (2009). "State Capitalism Comes of Age". *Foreign Affairs*. Council on Foreign Relations.
[9] The CDB is fully owned by states and See Ru (2018) for a more detailed description of CDB's history and background

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.[10]

The CDB is different from Chinese commercial banks in many ways despite the CDB and the large commercial banks in China are all state-owned.[11] First, the CDB issues policy loans which target mainly the infrastructure projects and the strategic industries in China. Driven by profit primarily, commercial banks employ a different lending strategy and focus on rich provinces in China (e.g., areas along the east coast). Second, the CDB has longer and closer relationships with local governments than commercial banks do. CDB helped many local governments build the financing vehicles to raise debt for them. Above 50% of the outstanding loans of the local governments are coming from the CDB between 2006 and 2013 (Gao, Ru, and Tang (2018)).

Local politicians play an essential role in obtaining credit from the CDB. In China, the Communist Party Committee Secretary at the municipal level (i.e., city secretary) is the leading politician of the city. The city secretary has broad administrative power and controls within the city system and is responsible for the overall development of the city.[12] 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 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 strongly positively associated with CDB loans. Therefore, career concerns incentivize a new city secretary to borrow as soon and much as possible from the CDB. In this paper, we utilize this fact to implement our identification strategy and to explore the variations of CDB loans' changes following local politicians' turnover, thereby examining the causal impact of CDB loans on firms' trade activities.

[10] 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)

[11] 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).

[12] 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.

III Data, variables, and summary statistics

A China customs data and Chinese industry census data

Our international trade data record the universe of firms' export and import transactions from 2000 to 2013, where these data 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 destinations and over 7000 products identified by the eight-digit Harmonized System (HS) codes.[14] For each transaction, the data contain variables such as the identifying information of the exporter/importer, the unit price, trade amount, type of trade, means of transportation, the 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.[15] Based on the ownership information, we categorize firms into two groups: State-owned Enterprises (SOEs) and Private firms. 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 controlled by the local governments. We classify the remaining firms as private firms (i.e., non-SOEs).[16] Figure A.1 shows the time trend of the export amount for the two types of firms. Although SOEs exhibit an increasing trend in export, the vast majority of the increases in Chinese export are driven by private firms (RMB 1 trillion in 2000 to nearly RMB 10 trillion in 2013), consistent with the conventional wisdom that private sectors drive China's economic growth. This fact makes our findings important as we find downstream private firms could benefit from government credit granted to upstream industries.

Since we are interested in how government credit affects the export activities of the manufacturing firms, we exclude export-import firms that do not engage in manufacturing but serve exclusively as intermediaries between domestic producers (buyers) and foreign buyers (producers). Since there is no variable in the Customs data indicating whether a firm is a trade intermediary, we follow standard practice and use keywords in firms' names to identify them (e.g., Ahn, Khandelwal, and Wei (2011), Manova, Wei, and Zhang (2015)).[17] We also drop observations with missing values on important firm characteristics (e.g., ownership type, location, industry). In our sample, the number of exporting manufacturing firms has increased from 55,456 in 2000 to 211,656 in 2013, with the number of export transactions ranging from 2,828,730 in 2000 to 6,692,371 in 2013.

[13] Prior literature (e.g., Manova and Zhang (2009), Jarreau and Poncet (2014), Manova, Wei, and Zhang (2015)) used 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.
[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] See Manova and Zhang (2009) for more detail about the data and stylized facts of firm heterogeneity in Chinese trade.
[16] In this paper, we use the words "private firms" and "non-SOEs" interchangeably.
[17] 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".

We construct three 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 commonly used metric to measure export performance. Second, Manova, Wei, and Zhang (2015) argue that tight credit conditions can reduce the firms' number of export destinations if they face a separate fixed cost to enter the new market. We thus construct *LogNumDestinations* to measure how many markets a firm exports to. Third, studies have shown credit constraints could reduce export firm's types of products (e.g., Muuls (2015)), we construct *LogNumProducts* to measure a firm's export product scope which is represented by the number of distinct four-digit HS product codes.[18] Besides, we also 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 variables' definition can be found in Table A.1.

We rely on the Chinese Industry Census (CIC) data to obtain firm-year level control variables because the Customs data have no such information. 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 20 million in 2011). 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). [19] In total, there are 806,385 firms in CIC from 2000 to 2013. As there is no common firm identifier, we utilize information on the firm name, address, telephone, and postal code to conduct matching between CIC and Customs data.[20] We are able to match approximately 43% of the manufacturing firms in Customs data with the CIC data (i.e., two hundred three thousand out of four hundred seventy-seven thousand).

B CDB loan data and politician profile data

Our unique and proprietary CDB loan data contain information on the outstanding loan amounts, loan issuances and other loan variables across 95 industries and 31 provinces in mainland China

[18] We obtain qualitatively similar results if we use six-digit HS codes to identify products.
[19] The CIC data is widely used in literature (e.g. Song, Storesletten and Zilibotti (2011), Ru (2018)).
[20] The matching is conducted in two steps. First step involves exact matching using firm name, address, and telephone after standardizing them into same format. Second step performs fuzzy name matching. Manual check reveals that many matchings were incorrect even when the match scores were larger than 0.9. Thus, to be accurate and conservative, we only keep the exact matchings in our analyses. Nevertheless, our results hold for the full Customs sample if we do not include control variables obtained from CIC, which mitigates the concern that our results are driven by sample selection issues.

from 1994 to 2013.[21] The loans are at the province-industry-year level. The industries include infrastructure sectors (e.g., road, air, rail transportation, public facilities) and industry sectors (e.g., agriculture, mining, textiles, and machinery). Figure A.5 plots the total provincial CDB outstanding loan amounts. We observe an increasing pattern for both the industrial loans and infrastructure loans over time. At the end of 2013, CDB had outstanding loans amounting to nearly RMB 6 trillion. The mission of CDB is to support strategic industries. In Figure A.6, we plot the top five industries that received loans from CDB in 2002 and 2013 respectively. Not surprisingly, the industries received most loans are utility sectors, road and railway transportation, and public facilities.

We match the CDB loans to firms in China Customs at the province-industry-year level. We define the CDB loan to be *DirectLoan* for a firm if it is in the same province and industry as the CDB loan. We take the log form in regressions. For example, if the CDB loan granted to province P and industry I is 10 million in 2005, the *DirectLoan* for firms located in province P and operating in the industry I is 10 million in 2005. Ru (2018) finds most of the CDB industrial loans go to SOEs and crowd-in downstream private firms. In the same spirit, we investigate how CDB loans to the private firms' upstream industry affect their export performance. We construct *UpstreamLoan* for a firm if the CDB industrial loans are given to the upstream industry of the firm in the same.

We use the national input-output (IO) matrix of 2007 from the National Bureau of Statistics of China to construct the upstream-downstream industry link. The CDB classifies the loans into 95 industries while the input-output matrix has 135 industries which are more detailed. Using 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 upstream industry of industry k. Accordingly, the *UpstreamLoan* is defined using the constructed upstream-downstream industry link.

Given the concern that CDB credit allocation may be endogenous, our identification strategy builds on the manually-collected Chinese local government politician data. It contains detailed information (e.g., gender, age, birthplace) for all city secretaries and mayors at the city-month level for 334 cities from 1949 to 2013.[22] When the local politicians start a new term, they have strong incentives to borrow as much as possible and as early as possible from the CDB to boost GDP, which ultimately contributes to their career progression (Ru (2018)). To identify the causal effect of government credit on the firm's export activities, we employ this dataset to construct the predicted political turnover measures as instrumental variables for CDB loans. The detailed explanation of the identification strategy is in section IV.B.

[21] The CDB industry classification is comparable to the U.S. 2-digit SIC codes.
[22] See Ru (2018) for detailed description of the local politicians' profiles data.

C Data on US firms

We focus on trade between the US and China to study how surges in Chinese export caused by government credit affect performance and employment of the domestic firms of China's trade partners. There are three main reasons to focus on US firms. First, the US and China are the world's largest two economies. Second, the US-China trade relationship is among the largest bilateral trade relationships in the world.[23] Figure A.3 shows the largest ten export destination countries of China and US is China's largest trading partner with the export amount almost doubling that of Japan, the second largest trading partner. Third, prior literature has mixed views on the impact of Chinese exports on US firms' performance and employment (e.g., Autor, Dorn, and Hanson (2013), Acemoglu et al. (2016), Pierce and Schott (2016), Wang et al. (2018)). At the same time, the current trade war between US and China draws much attention. Hence, it is essential to understand the impact of government credit induced Chinese export on US firms.

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

D Summary statistics

Our primary sample contains firm-year observations that are jointly determined in the Customs data, CIC data, and the CDB loan data, spanning from 2000 to 2013. We drop firm-years with missing values on export amounts, the number of destination countries, number of products, and CDB loan measures. We further require our sample to have non-missing values on important firm accounting variables from CIC data: total assets, sales, leverage, ROA, and number of workers. Table A.1 presents detailed variable explanations. Finally, our sample consists of 764,205 firm-year observations.[24]

[23] Only US-EU and US-Canada have larger bilateral trade amounts than US-China. (https://www.investmentfrontier.com/2017/01/30/largest-trade-relationships-world/)

[24] Note that this number is larger than non-missing observations for both CDB loan measures. The reason is that some observations have non-missing *LogDirectLoan* but missing *LogUpstreamLoan* while another part of observations have missing *LogDirectLoan* but non-missing *LogUpstreamLoan*.

Table 1 Summary statistics

Variables	N	Mean	SD	25%	Median	75%
Panel A. Firm-Year Level for Chinese firms						
Export	764,205	73.220	963.644	2.551	10.972	35.103
NumDestinations	764,205	9.070	11.379	2.000	5.000	12.000
NumProducts	764,205	4.415	6.269	1.000	2.000	5.000
LogExport	764,205	2.125	2.198	0.936	2.395	3.558
LogNumDestinations	764,205	1.562	1.154	0.693	1.609	2.485
LogNumProducts	764,205	1.013	0.907	0.000	0.693	1.609
LogAssets	764,205	3.781	1.519	2.708	3.621	4.692
LogSales	764,205	4.051	1.424	3.066	3.908	4.893
ROA	764,205	0.066	0.146	0.003	0.029	0.090
Leverage	764,205	0.543	0.254	0.355	0.556	0.739
LogNumWorkers	764,205	5.386	1.156	4.605	5.384	6.089
LogGDP	764,205	7.847	1.051	7.147	7.896	8.596
LogPopulation	764,205	6.203	0.633	5.829	6.342	6.616
DirectLoan	722,157	7.073	19.044	0.040	0.660	4.500
UpstreamLoan	659,120	8.684	25.940	0.050	1.010	5.050
LogDirectLoan	722,157	-3.885	8.172	-3.229	-0.416	1.504
LogUpstreamLoan	659,120	-3.424	7.986	-2.996	0.010	1.619
Panel B. Firm-Product-Year Level for Chinese firms						
LogPrice	2,782,125	4.225	2.366	2.783	3.771	5.137
LogWTPrice	2,782,125	4.225	2.418	2.766	3.749	5.121
Panel C. Firm-Year Level for U.S. firms						
LogAsset_US	56,686	4.679	2.948	2.889	4.713	6.641
PPE/Assets_US	56,657	0.314	0.281	0.083	0.219	0.495
LogSale_US	48,612	4.620	3.096	2.814	4.808	6.741
NI/Asset_US	56,434	-1.579	35.179	-0.196	0.013	0.093
LogEmployees_US	45,980	-0.803	2.667	-2.688	-0.830	1.163

Notes: This table describes the summary statistics of the main variables used in this study. The sample is restricted to matched firms between the China Customs data and the Chinese Industry Census (CIC) data 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.

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 73.22 million, and exports to 9 markets with 4.4 different groups of products. The median values for *Export*, *NumDestinations*, and *NumProducts* are 10.972, 5, and 2, respectively, which suggests that there are many large exporters. Taking natural logarithm of these variables mitigate the right-skewed distribution problem. The average (median) direct loan is around RMB 710 (66) million while the mean (median) upstream loan is RMB 868 (101) million. The fact that upstream loans tend to be larger than direct loans is consistent with CDB's agenda to lend to strategic industries in that 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 US firms which are jointly determined by the export industries and Compustat.

IV Empirical analyses and results

A CDB loans and export

To investigate the effects of CDB loans on firms' export activities, we begin by examining how CDB direct loans affect the exports of SOEs since CDB loans are granted mainly to SOEs. On the one hand, the government credit allocation may be inefficient, which leads to distortion of credit allocation for mercantilism. As a result, CDB loans could be unrelated to or even negatively affect SOEs' export performance. On the other hand, government credit may alleviate credit constraints of firms thus facilitate international trade. Prior literature shows that credit constraints impede firms' export activities in many dimensions such as participation in the export market, export amounts, number of export markets and products (e.g., Berman and Héricourt (2010), Amiti and Weinstein (2011), Manova (2013)).

To explore the correlations between CDB loan amounts and a firm's export activity, we estimate the following regression model at the firm-year level by regressing measures of export activities on CDB loans:

$$Y_{i,t} = \alpha + \beta LogDirectLoan_{i,t} + \gamma C_{i,t} + \mu_i + \eta_{p\times t} + \varepsilon_{i,t}, \quad (1)$$

where $Y_{i,t}$ denote the three dependent variables *LogExport, LogNumDestinations, and LogNumProducts* for firm *i* and year *t*. They measure the firm's total export amounts, the number of export destination countries, and the number of export product types, respectively. *LogDirectLoan* is the log of CDB outstanding loan amounts granted to the firm's province and industry. $C_{i,t}$ represents a set of control variables including firm size (*LogAssets*), sales (*LogSales*), leverage (*Leverage*), profitability (*ROA*), number of employees (*LogNumWorkers*). We also include two city-level control variables, GDP (*LnGDP*) and population (*LogPopulation*) to account for the economic development and macro factors. μ_i indicates firm fixed effects which are included to mitigate the concern that unobserved time-invariant firm characteristics may affect our results. $\eta_{p\times t}$ indicates

province×year fixed effects which eliminates the province time trends. $\varepsilon_{i,t}$ is the error term. We cluster the standard error at the firm level.

We estimate Equation (1) for SOEs as CDB loans usually go to them. The results are shown in Panel A of Table 2. Albeit insignificant, the coefficients are positive in columns (1)-(2), suggesting that a potentially weak positive correlation between CDB loans and export amounts and the number of export markets for SOEs. Ru (2018) finds that CDB loans crowd-in private firms in the downstream industries in that CDB loans benefit downstream private firms regarding total assets, total sales, and ROA. We modify the regression model in Equation (1) to examine how CDB upstream loans affect private firms' exports in the downstream industries:

$$Y_{i,t} = \alpha + \beta LogUpstreamLoan_{i,t} + \gamma C_{i,t} + \mu_i + \eta_{p\times t} + \varepsilon_{i,t}, \quad (2)$$

where $LogUpstreamLoan_{i,t}$ is the log of CDB outstanding loan amounts granted to firm *i*'s province and its key upstream industry in year *t*. Dependent variables and control variables are the same as in Equation (1). Panel B of Table 2 shows the regression results for private firms. The coefficients on *LogUpstreamLoan* are positive and statistically significant at 1% for all three columns. Consistent with the findings in Ru (2018), we find that CDB loans to the upstream industries are positively related to private firms' export amounts, the number of export markets they can enter as well as the number of types of products they can export.

To further shed light on the channels on how private firms expand their exports, we examine whether they can reduce the prices of exported goods due to relaxed financial constraints induced by CDB loans. To test this conjecture, we regress the average price level of exports at the firm-product-year level on CDB loans. The regression can be represented as follows:

$$Price_{i,j,t} = \alpha + \beta LogUpstreamLoan_{i,t} + \gamma C_{i,t} + \mu_i + \eta_{p\times t} + \lambda_j + \varepsilon_{i,t}, \quad (3)$$

where $Price_{i,j,t}$ is the simple average price (*LogPrice*) or trade amount weighted average price (*LogWTPrice*) of the product *j* exported by firm *i* in year *t*. We include an additional fixed effects - product fixed effects (λ_j) to control for product specific factors in influencing the prices. In Panel C of Table 2, columns (1) and (2) report the results for SOEs and columns (3) and (4) show the results for private firms. Although they are not statistically significant, the coefficients in columns (3)-(4) are negative, indicating a potential negative relation between CDB upstream loan amounts and average export prices of private firms.

Table 2 Effects of CDB loans on export activities (OLS)

Dependent Variable	(1) *LogExport*	(2) *LogNumDestinations*	(3) *LogNumProducts*
Panel A. Effect of Direct Loan on SOEs			
LogDirectLoan	0.00112	0.00003	-0.00018
	(0.00144)	(0.00069)	(0.00058)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	60,164	60,164	60,164
Adjusted R-squared	0.697	0.747	0.684
Panel B. Effect of Upstream Loan on Private Firms			
LogUpstreamLoan	0.00184	0.00081	0.00132
	(0.00040)	(0.00022)	(0.00019)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	577,579	577,579	577,579
Adjusted R-squared	0.771	0.798	0.735

	(1)	(2)	(3)	(4)
Type of Firms	SOE	SOE	Private	Private
Dependent Variable	*LogPrice*	*LogWTPrice*	*LogPrice*	*LogWTPrice*
Panel C. Effect of Upstream Loan on Average Export Prices				
LogUpstreamLoan	0.00042	0.00047	-0.00007	-0.00020
	(0.00099)	(0.00100)	(0.00026)	(0.00026)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes
Observations	246,415	246,415	2,698,704	2,698,704
Adjusted R-squared	0.710	0.701	0.639	0.623

Notes: This table reports the regression results on the effects of CDB loans on firms' export activities. The sample contains matched firms between the China Customs data and CIC data from 2000 to 2013. Panel A reports the effect of CDB loans on SOEs' export activities in the same industry at the firm-year level in terms of export amount (*LogExport*), number of export destinations (*LogNumDestinations*), number of export product varieties (*LogNumProducts*). *LogDirectLoan* denotes the direct CDB loan for the firm and is the CDB industrial loans outstanding for each of the 31 provinces and 38 manufacturing industries per year which is the same as in the firm's industry. Panel B shows the effect of CDB loans on private firms' export activities in the downstream industry. *LogUpstreamLoan* denotes the upstream loan for the firm and is the CDB industrial loans outstanding in the firm's upstream focal industry which is also at province-industry-year level. In Panel C, we regress the logarithm of exported goods price (averaged and aggregated at the four-digit HS code level) on CDB upstream loan at the firm-product-year level. *LogAssets, LogSales, ROA, Leverage, LogNumWorkers, LogGDP,* and *LogPopulation* are included as control variables in all regressions. All variables are defined in Table A.1. In Panel A and B, firm fixed effects and province×year fixed effects are included. In Panel C, one additional fixed effect – product fixed effects – is added. Coefficients of control variables and fixed effects estimates are omitted for brevity. Standard errors are clustered by the firm for all regressions and are reported in parentheses.

B Causal effects of CDB loans on exports

We cannot draw a causal conclusion between CDB loans and firms' export activities from the results in section IV.A since 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 then lend to those upstream industries after observing the growth in downstream private firms' exports. In this subsection, we employ 2SLS to mitigate the endogenous concerns and to explore the causal effects of CDB loans on export activities. In particular, we exploit the exogenous variations of CDB loans allocation using the predicted municipal political turnover following Ru (2018).

As mentioned in section II, city secretaries are strongly incentivized to boost local GDP for career progression. Borrowing from the CDB has been the primary method for city secretaries to drive local economic development. Since it takes time to reveal the economic effects of CDB loans on GDP, city secretaries usually borrow from the CDB as early as possible, i.e., when they take office.[25] The standard term for a city secretary is five years, and cities typically have their own five-year turnover cycles. This allows us to explore the variations of CDB loan amounts brought by the different five-year turnover cycles from different cities.

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.[26] 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 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. For example, city secretary X took office in 2003, and secretary X's successor secretary Y took office in 2007. We then predict the first year of city secretary Y's term to be 2008 (i.e., 2003 + 5). Since the predicted turnover cycle is pre-determined, it is unlikely that this would confound with contemporaneous economic conditions so it can be used as the source of exogenous variation.

Next, we interact the predicted city secretary turnover cycle with city's focal industry defined using CIC data and use these interactions as instruments for province-industry level CDB loan

[25] 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 1 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 1 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.
[26] 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.

amounts. The city's focal industry is identified as the industry of 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. For example, the focal industry of city C is industry I 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 I once he or she takes office. Consequently, CDB loans to industry I in province P increase. Formally, the regression can be represented as follows:

$$LogLoan_{k,p,t} = \alpha + \beta_1 First_{k,p,t} + \beta_2 Second_{k,p,t} + \beta_3 Third_{k,p,t} + \beta_4 Fourth_{k,p,t} + \beta_5 Fifth_{k,p,t} + \mu_k + \eta_{p\times t} + \varepsilon_{i,t}, \quad (4)$$

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 1 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 1 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 included as well. The results are shown in Panel B of Table A.2. We find that CDB loan allocated to a particular industry and province is larger if the industry is one of the within-province cities' focal industry with a secretary in the early part of his or her term. City secretaries borrowed more for the city's focal industries during their early years of the terms, which is consistent with the results in Panel A of Table A.2.

We then use $First_{k,p,t}$ to $Fifth_{k,p,t}$ to instrument CDB loans (i.e. *LogDirectLoan* and *LogUpstreamLoan*) and perform 2SLS regressions. Specifically, the second stage regression is shown as follows:

$$Y_{i,t} = \alpha + \beta \widehat{LogLoan}_{i,t} + \gamma C_{i,t} + \mu_i + \eta_{p\times t} + \varepsilon_{i,t}, \quad (5)$$

where $Y_{i,t}$ still denote the three dependent variables *LogExport, LogNumDestinations,* and *Log-NumProducts* for firm *i* and year *t*. Control variables, $C_{i,t}$, are the same as in Equation (1). Firm fixed effects and province×year fixed effects are included to account for time-invariant firm specific factors and province×year trends.

In Table 3, we first present the 2SLS regression results for CDB direct loans, that is the effect of CDB loans on firms' exports in the same industry. Panel A shows the results for SOEs where the coefficients are positive and statistically significant at 1% level in column (1) and 5%

level in columns (2)-(3). CDB loans increase SOEs' export amounts, the number of markets SOEs enter, and the number of types of products that SOEs export. On average, when CDB direct loans doubled, SOEs in the same industry increased export amounts by 4%. We show the results for private firms in Panel B. We find the coefficient in column (1) is insignificant, indicating that CDB loans do not increase private firms' exports. Private firms cannot benefit from CDB loans granted to the same industry, which is consistent with the fact that CDB loans are allocated mainly to SOEs.[27]

Table 3 Effects of direct CDB loans on export activities (2SLS)

Dependent Variable	(1) *LogExport*	(2) *LogNumDestinations*	(3) *LogNumProducts*
Panel A. Export Activities of SOEs			
LogDirectLoan	0.04024	0.01689	0.01252
	(0.01391)	(0.00657)	(0.00567)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	52,458	52,458	52,458
Adjusted R-squared	0.748	0.790	0.739
Wald F-stat	85.97	85.97	85.97
Panel B. Export Activities of Private Firms			
LogDirectLoan	0.00279	0.00590	0.00306
	(0.00455)	(0.00227)	(0.00194)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	562,772	562,772	562,772
Adjusted R-squared	0.811	0.833	0.785
Wald F-stat	459.5	459.5	459.5

Notes: This table shows the two-stage least squares regression results on the effect of CDB loans on both SOEs and private firms' export activities in the same industry by using *First* to *Fifth* as instrumental variables for the logarithm of the CDB province-industry level outstanding loan amounts in 38 industries and 27 provinces (excluding Beijing, Shanghai, Tianjin, and Chongqing). The sample contains matched firms between the China Customs data and CIC 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*). The independent variable, *LogDirectLoan,* denotes the direct CDB loan for the firm in the same industry as the loan which is at province-industry-year level. In Panel A, the sample is restricted to SOEs. In Panel B, the sample is restricted to private firms. *LogAssets, LogSales, ROA, Leverage, LogNumWorkers, LogGDP,* and *LogPopulation* are included as control variables in all regressions. All variables are defined in Table A.1. Firm fixed effects and province×year fixed effects are included in all regressions. Coefficients of control variables and fixed effects estimates are omitted for brevity. Standard errors are clustered by the firm for all regressions and are reported in parentheses. Cragg-Donald Wald F-statistics for weak identification tests are reported.

[27] Our results hold for all manufacturing firms in Customs data, so they are not driven by the matched sample. In Table A.3, we perform the same analysis as in Table 3 and the only difference is that control variables are not included because we do not use the Customs-CIC merged data where firm-level control variables come from CIC.

In Table 4, we re-estimate the 2SLS regression model in Equation (5) using *LogUpstreamLoan*. Panel A reports the results for SOEs in the downstream industries. Although the coefficients in columns (1)-(3) are positive, all of them are not significant at the conventional level, suggesting CDB loans to the upstream industries do not significantly increase SOEs' exports. This is not surprising because SOEs enjoy the benefits from CDB loans at the same industry rather than from CDB loans granted to the upstream industry.

In contrast, we find CDB upstream loans improve private firms' export performance, as shown in Panel B. The coefficient in column (1) is 0.01983 and significant at 1% level, suggesting CDB upstream loans benefit downstream private firms regarding total export amounts. On average, when the CDB upstream loans doubled, the downstream private firms increased export amounts by nearly 2%. Besides, the positive and significant coefficients in both columns (2) and (3) mean that CDB upstream loans also help downstream private firms to export to more countries and export more types of products. The results are consistent with the view that government credit has positive spillover effects on the downstream private firms.

Moreover, we also explore the strength of the upstream-downstream industry link to substantiate the spillover effects of CDB upstream loans further. In Table 4, Panel C, we interact the *LogUpstreamLoan* with *UpstreamDependence*, which measures how much the downstream industry sources inputs from the key upstream industry. A higher value of *UpstreamDependence* indicates a higher degree of dependence on the upstream industry's inputs. If government credit helps downstream private firms' exports, the effects should be stronger for firms having a higher dependence on the upstream industry's inputs. We find supportive evidence that the coefficients in both columns (1) and (2) are positive at the 1% significance level as shown in the regression results in Panel C. Private firms with a stronger dependence on the upstream industry can benefit significantly more from CDB upstream loans.[28]

[28] Our results hold for all manufacturing firms in Customs data, so they are not driven by the matched sample. In Table A.4, we perform the same analysis as in Table 4 and the only difference is that control variables are not included because we do not use the Customs-CIC merged data where firm-level control variables come from CIC.

Table 4 Effects of upstream CDB loans on export activities (2SLS)

Dependent Variable	(1) *LogExport*	(2) *LogNumDestinations*	(3) *LogNumProducts*
Panel A. Export Activities of SOEs			
LogUpstreamLoan	0.02345	0.01583	0.00798
	(0.02065)	(0.01003)	(0.00842)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	44,978	44,978	44,978
Adjusted R-squared	0.757	0.793	0.742
Wald F-stat	28.46	28.46	28.46
Panel B. Export Activities of Private Firms			
LogUpstreamLoan	0.01983	0.01360	0.01233
	(0.00423)	(0.00215)	(0.00200)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	519,197	519,197	519,197
Adjusted R-squared	0.814	0.834	0.784
Wald F-stat	507.6	507.6	507.6
Panel C. Strength of Upstream-Downstream Industry Link			
LogUpstreamLoan	0.01895	0.01221	0.01233
	(0.00422)	(0.00217)	(0.00199)
LogUpstreamLoan × *UpstreamDependence*	0.01810	0.03246	0.00341
	(0.00525)	(0.00309)	(0.00252)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	519,197	519,197	519,197
Adjusted R-squared	0.813	0.832	0.784
Wald F-stat	907.9	907.9	907.9

Notes: This table shows the two-stage least squares regression results on the effect of CDB loans on downstream SOEs and private firms' export activities by using *First* to *Fifth* as instrumental variables for the logarithm of the upstream CDB province-industry level outstanding loan amounts in 35 industries and 27 provinces (excluding Beijing, Shanghai, Tianjin, and Chongqing). The sample contains matched firms between the China Customs data and CIC 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*). The independent variable, *LogUpstreamLoan,* denotes the upstream CDB loan in the firm's upstream focal industry which is at province-industry-year level. In Panel A, the sample is restricted to SOEs. In Panel B, the sample is restricted to private firms. In Panel C, *UpstreamDependence* is the direct consumption coefficient extracted from the China IO table (2007) measuring how much the downstream industry sources inputs from the key upstream industry. We follow Wooldridge (2002) to include the interaction term in 2SLS. *LogAssets, LogSales, ROA, Leverage, LogNumWorkers, LogGDP,* and *LogPopulation* are included as control variables in all regressions. All variables are defined in the Appendix Table A.1. Firm fixed effects and province×year fixed effects are included in all regressions. Coefficients of control variables and fixed effects estimates are omitted for brevity. Standard errors are clustered by firm for all regressions and are reported in parentheses. Cragg-Donald Wald F-statistics for weak identification tests are reported.

After establishing the causal link between CDB loans and export activities, we investigate the causal impact of CDB loans on another important dimension of export – the price of exported goods. We want to answer whether CDB loans decrease the export prices by relaxing firms' credit constraints.

Using the same 2SLS setting as described above, the second stage regression can be represented as follows:

$$Price_{i,j,t} = \alpha + \beta \widehat{LogLoan}_{i,t} + \gamma C_{i,t} + \mu_i + \eta_{p\times t} + \lambda_j + \varepsilon_{i,t}, \quad (6)$$

where $Price_{i,j,t}$ denote the simple average price (*LogPrice*) or trade amount weighted average price (*LogWTPrice*) of the product code *j* exported by firm *i* in year *t*. $\widehat{LogLoan}_{i,t}$ represent the instrumented *LogDirectLoan* or *LogUpstreamLoan* for firm *i* in year *t*. Control variables, firm fixed effects, province×year fixed effects, and product fixed effects are included as usual.

In Table 5 Panel A, we present the 2SLS regression results for CDB direct loans. CDB loans do not significantly change the average export prices of SOEs in the same industry as shown by the insignificant coefficients in columns (1) and (2). In Panel B, we show the 2SLS results for CDB upstream loans. The insignificant coefficients in columns (1) and (2) suggest that CDB upstream loans do not affect export prices of SOEs. However, we find the coefficients in columns (3) and (4) are both negative and significant at the 1% significance level. This indicates CDB upstream loans decrease the average export prices of private firms in the downstream industries. It may explain the increase in export amounts because they export at a lower price.

In sum, to establish the causal relationship, we utilize 2SLS to exploit the exogenous variations of CDB credit flows brought by predicted political turnover. As expected, CDB loans generally benefit SOEs' exports in the same industry because these loans are granted mostly to SOEs. More importantly, we find CDB loans have strong positive spillover effects on downstream private firms' export performance regarding export amounts, number of countries they can enter, and the number of products they can export. One channel is that CDB upstream loans reduce the average prices of exports by private firms in the downstream industry.

Table 5 Effects of CDB loans on export prices (2SLS)

	(1)	(2)	(3)	(4)
Type of Firms	SOE	SOE	Private	Private
Dependent Variable	*LogPrice*	*LogWTPrice*	*LogPrice*	*LogWTPrice*
Panel A. Effect of Direct Loans				
LogDirectLoan	0.00679	0.00772	0.00353	0.00456
	(0.00688)	(0.00708)	(0.00261)	(0.00271)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes
Observations	233,998	233,998	2,491,366	2,491,366
Adjusted R-squared	0.732	0.724	0.665	0.650
Wald F-test	48.56	48.56	223.8	223.8
Panel B. Effect of Upstream Loans				
LogUpstreamLoan	-0.00889	-0.01085	-0.00651	-0.00690
	(0.01014)	(0.01038)	(0.00240)	(0.00247)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes
Observations	208,598	208,598	2,349,154	2,349,154
Adjusted R-squared	0.728	0.720	0.661	0.646
Wald F-test	24.41	24.41	366.7	366.7

Notes: 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 product is measured at the four-digit harmonized system (HS) code level. The sample contains matched firms between the China Customs data and CIC data from 2000 to 2013. In Panel A, we examine the effects of direct CDB loans, and in panel B, we examine the effects of upstream CDB loans. *LogPrice*, *LogWTPrice* are the average prices and export-amount weighted average prices. In each panel, columns (1) and (2) are restricted to SOEs and columns (3) and (4) are restricted to private firms. *LogAssets, LogSales, ROA, Leverage, LogNumWorkers, LogGDP,* and *LogPopulation* are included as control variables in all regressions. 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. Coefficients of control variables and fixed effects estimates are omitted for brevity. Standard errors are clustered by the firm for all regressions and are reported in parentheses. Cragg-Donald Wald F-statistics for weak identification tests are reported.

C Impact on US firms

In this subsection, we examine the impact of surged exports of China on US firms. On the direct competition channel, previous studies show that imports from China negatively impact the US employment (e.g., Autor, Dorn, and Hanson (2013), Pierce and Schott (2016)). In contrast, Wang et al. (2018) find that the intermediate goods from China to the US lead to increases in employment of US firms in downstream industries. We adopt this industry supply chain perspective to investigate how exports of China to the US affect horizontal and downstream US firms' performance and employment, respectively. In particular, based on the 2SLS estimation results in section IV.B, we estimate the impacts of increased exports from China on the US firm that are caused by CDB loans.

In the first approach, we estimate the impacts of China's exports induced by CDB credit on US firms regarding trade amounts. The idea is to test how US firms perform in response to the surge in exports induced by CDB loans. In particular, we aggregate the imports from China to the US at the industry level and study the impact of the industry level imports on US firms. We use the US Input-Output (IO) table to identify the upstream-downstream link for US firms in this subsection because the US industry supply chain structure may be different from the structure in China.[29] There are 71 industries in the US 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 US IO table. For each of the 71 industries, we construct the CDB-loan induced export amount at the industry-year level by predicting the export amount of individual Chinese exporter based on the coefficients estimated in 2SLS in section IV.B. We then aggregate the predicted amounts of all exporters in that industry. Formally, the following regression models are used to test the impact of China's export induced by CDB loans on US firms:

$$Y\_US_{i,k,t} = \alpha + \beta Estimated\_LogDirectExport_{k,t} + \mu_i + \eta_t + \varepsilon_{i,t}, \quad (7)$$

$$Y\_US_{i,k,t} = \alpha + \beta Estimated\_LogUpstreamExport_{k,t} + \mu_i + \eta_t + \varepsilon_{i,t}, \quad (8)$$

where $Y\_US_{i,k,t}$ denote a set of dependent variables measuring the performance and employment of US firm *i* in year *t* whose primary industry is *k*. These dependent variables are the logarithm of total assets (*LogAsset_US*), tangibility (*PPE/Assets_US*) which is computed as property, plant, and equipment scaled by total assets, the logarithm of total sales (*LogSales_US*), profitability (*NI/Assets_US*) which is the ratio of net income and total assets, and employment (*LogEmployees_US*) which is calculated as the logarithm of the number of employees. In both models, we control for firm fixed effects and year fixed effects. We cluster standard errors by firm.

Equation (7) tests the direct competition channel where characteristics of US firms are regressed on estimated China's exports in the same industry. $Estimated\_LogDirectExport_{k,t}$ is the CDB-loan induced export amount of China in industry *k* and year *t*. Specifically, in Table 3 and 4, we find that CDB loans increase the export amount of SOEs in the same industry and also increase downstream private firms' export amounts so that we predict the firm-year level CDB-loan induced export amount using the 2SLS results in Tables 3 for SOEs and Table 4 for private firms. For example, the coefficient of *LogDirectLoan* is 0.04024 in column (1), Table 3 Panel A. For each SOE, we predict the fitted values of export amount by using the estimated coefficients in the 2SLS. For each private firm, we employ the same calculation by using the coefficient of *LogUpstreamLoan*

[29] The US IO table we used in this study is the 2007 summary table, obtained from Bureau of Economic Analysis.

(i.e., 0.01983 in column (1), Table 4 Panel B) to predict the export amount. Next, for each industry *k* and year *t*, we sum up the predicted export amount of all SOEs and private firms that export in industry *k* and year *t,* and then take the logarithm to obtain $Estimated\_LogDirectExport_{k,t}$.

Furthermore, equation (8) tests the upstream effect channel and examines how US firm *i*, which operates in industry *k,* perform in year *t* reacting to China's exports to its upstream industry ($Estimated\_LogUpstreamExport_{k,t}$). The variable is the CDB-loan induced export amount of China in the upstream industry of industry *k* and year *t*. To compute this variable for each industry *k* and year *t*, we sum up the predicted export amount of all SOEs and private firms that export in the key upstream industry of *k* in year *t,* and then take the logarithm. The estimated export amounts capture the causal effects of CDB loans on the export amounts of China. In other words, these two variables tease out the exogenous variation from the IV.

Panel A of Table 6 reports the results for the direct competition channel where the *Estimated_LogDirectExport* is matched to US firms in the same industry. The coefficients are negative in all five columns and mostly statistically significant. For example, the coefficient in column (1), (3), and (5) are -0.19336, -0.11654, and -0.08691 respectively and all significant at the 1% level. This means, on average, a 100% increase in the estimated export amounts of China would decrease US firms' total assets, sales, and employment by 19.34%, 11.65%, and 8.69% respectively. These results indicate that surge in China's exports leads to decreases in same-industry US firms' total assets, fixed assets, sales, and the number of workers employed that is consistent with prior literature on the crowding-out effect of imports from China on US firms and employment.

In contrast, we find the crowding-in effects of Chinese exports on the downstream US firms in Panel B. In particular, the coefficients in columns (1), (3), and (5) are all positive and significant at the 5% level, meaning that imports from China increase total assets, sales, and employment for US firms in the downstream industry. On average, when estimated export amounts of China double, the total assets, sales, and employment of downstream US firm grow by 5.21%, 2.71%, and 3.17% respectively. These results suggest US firms can benefit from surges in China's exports in their upstream industries. One reason could be these downstream US firms can benefit from sourcing more intermediate goods from China. This also echoes the recent findings in Wang et al. (2018) where they argue the total impact of trading with China is a positive boost to US local employment and real wages mainly due to the downstream US firms.

Table 6 Impact on U.S. firms – Trade amount perspective

Dependent Variable	(1) *Log Asset_US*	(2) *PPE/ Assets_US*	(3) *Log-Sale_US*	(4) *NI/ Asset_US*	(5) *Log Employees_US*
Panel A. Horizontal Effect					
Estimated_LogDirectExport	-0.19336	-0.01616	-0.11654	-0.03861	-0.08691
	(0.01580)	(0.00235)	(0.01749)	(0.13738)	(0.01200)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	56,686	56,655	48,460	56,408	45,700
Adjusted R-squared	0.927	0.829	0.942	0.313	0.962
Panel B. Upstream Effect					
Estimated_LogUpstreamExport	0.05206	0.00249	0.02714	-0.11022	0.03166
	(0.01164)	(0.00222)	(0.01302)	(0.15804)	(0.01196)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	42,068	42,023	35,860	41,873	33,330
Adjusted R-squared	0.944	0.831	0.957	0.309	0.964

Notes: This table shows the results of regressing U.S. firms' characteristics on the instrumented export amount estimated using the coefficients of 2SLS results in Table 3 and 4. The sample contains U.S. public firms from 2000 to 2013 where the firm's industry imports from China. Data on U.S. firms come from Compustat. The dependent variables are *LogAsset_US, PPE/Assets_US, LogSale_US, NI/Asset_US,* and *LogEmployees_US* at firm-year level. *LogAsset_US* is the logarithm of US firm's total assets. *PPE/Assets_US* measures the tangibility defined as plant, property, and equipment divided by total assets. *LogSale_US* is the logarithm of US firm's total sales. *NI/Asset_US* is net income scaled by lagged total assets. *LogEmployees_US* is the logarithm of the number of employees of the firm. The independent variable, *Estimated LogDirectExport,* is at the industry-year level and proxies for the CDB loans-induced export amount that is in the same industry as the US firm. *Estimated LogUpstreamExport,* is at the industry-year level and proxies for the CDB loans-induced export amount that is in the upstream industry of the US firm. For each industry, it is computed as the sum of the predicted export amount of all the firms in that industry, where the individual firm's predicted export amount is calculated using the coefficient estimates of 2SLS regression results. To match the Chinese export industry with 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. In Panel A, we examine how China's export affects US firms in the same industry. In Panel B, we examine how China's export affects US firms in the downstream industry. Firm fixed effects and year fixed effects are included in all regressions. Fixed effects estimates are omitted for brevity. Standard errors are clustered by the firm for all regressions and are reported in parentheses.

In the second approach, we further explore how US firms respond to cheaper exports from China since we document that CDB loans reduce the average export prices for private firms in the downstream industry. Specifically, we study the impact of the industry-level average price drops for the exports of China induced by CDB loans on US firms. Using the same method as described above, we match the US IO industry classification and CDB industry classification and estimate the change of average price levels at the industry level. Following two models are estimated to investigate how US firms are affected by China's exports at lower prices from both the direct competition channel and the upstream effect channel:

$$Y\_US_{i,k,t} = \alpha + \beta Direct\_PriceChange_{k,t} + \mu_i + \eta_t + \varepsilon_{i,t}, \quad (9)$$

$$Y\_US_{i,k,t} = \alpha + \beta Upstream\_PriceChange_{k,t} + \mu_i + \eta_t + \varepsilon_{i,t}, \quad (10)$$

where $Y\_US_{i,k,t}$ denote the same set of dependent variables as in Equation (7) and (8) which measure the performance and employment of US firm *i* in year *t* whose primary industry is *k*. In both models, we control for firm fixed effects and year fixed effects and cluster standard errors by firm.

Equation (9) tests the direct competition channel where we regress US firms' performance measures on estimated average price changes in the same industry. $Direct\_PriceChange_{k,t}$ is the CDB-loan induced average price change of China's export in industry *k* and year *t*. We use the 2SLS regression results in Table 5 to construct the average price change for China's export. To compute the price change of each exporter-year-product combination where the product is identified using four-digit HS code, we multiply the coefficient estimate (i.e., -0.00651 in column (3), Panel B of Table 5) with the logarithm of CDB upstream loan amounts to get the estimated export price drop.[30] Then, for each industry *k* and year *t*, we compute the average of all individual price changes whose products fall in the industry *k* and in year *t* to obtain $Direct\_PriceChange_{k,t}$. It represents the average price change of China's exports in industry *k* and year *t*. Similarly, equation (10) tests the upstream effect channel and examines how US firm *i,* which operates in industry *k,* perform in year *t* reacting to average export price changes from China which take place in firm *i*'s key upstream industry ($Upstream\_PriceChange_{k,t}$). The variable is the CDB-loan induced average price change of China's exports in the upstream industry of *k* and year *t*.

We report the results of this approach in Table 7. Panel A shows the horizontal effect of the reduced export price of China's exports on US firms in the same industry. Since *Direct_PriceChange* represents the decrease in export prices due to CDB loans, the positive and significant coefficients from columns (1)-(5) indicate decreases in the dependent variables. Facing imports from China with reduced prices, US firms in the same industry experience a decline in performance and employment regarding assets, sales, profitability, and employment. In Panel B, we show the results of the upstream effect channel. We find the coefficients in columns (2)-(5) are all negative and significant, suggesting that the lower average prices of China's exports benefit downstream US firms regarding fixed assets, sales, profitability, and employment. On average, a 1% decrease in the average price levels of China's export could lead to an increase of downstream US firms' fixed assets, sales, profitability, and employment by 0.36%, 2.09%, 4.95%, and 1.77% respectively. The findings are consistent with the results in Table 6.

[30] Because we only find significant effects of CDB loans on private firms at the downstream industries, we only consider private firms when aggregating the price changes at the industry level.

Table 7 Impact on U.S. firms – Export price perspective

Dependent Variable	(1) *Log Asset_US*	(2) *PPE/ Assets_US*	(3) *Log-Sale_US*	(4) *NI/ Asset_US*	(5) *Log Employees_US*
Panel A. Horizontal Effect					
Direct_PriceChange	0.14966	0.01227	0.06464	0.03071	0.04499
	(0.01275)	(0.00169)	(0.01174)	(0.01674)	(0.00964)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	56,686	56,655	48,460	48,128	45,700
Adjusted R-squared	0.927	0.828	0.941	0.555	0.962
Panel B. Upstream Effect					
Upstream_PriceChange	0.00075	-0.00362	-0.02087	-0.04955	-0.01765
	(0.01)	(0.00)	(0.01)	(0.02)	(0.01)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	42,068	42,023	35,860	36,041	33,330
Adjusted R-squared	0.944	0.831	0.957	0.572	0.964

Notes: This table shows the results of regressing U.S. firms' characteristics on export price change induced by CDB loans estimated using the coefficients from 2SLS results in Table 5. The sample contains U.S. public firms from 2000 to 2013 where the firm's industry imports from China. Data on U.S. firms come from Compustat. The dependent variables are *LogAsset_US, PPE/Assets_US, LogSale_US, NI/Asset_US,* and *LogEmployees_US* at firm-year level. *LogAsset_US* is the logarithm of US firm's total assets. *PPE/Assets_US* measures the tangibility defined as plant, property, and equipment divided by total assets. *LogSale_US* is the logarithm of US firm's total sales. *NI/Asset_US* is net income scaled by lagged total assets. *LogEmployees_US* is the logarithm of the number of employees of the firm. The independent variable *Direct_PriceChange* is at the industry-year level and denotes the average price change from China's export in the same industry resulting from CDB loans estimated using the coefficient estimate of 2SLS regression result. *Upstream_PriceChange* is at the industry-year level and denotes the average price change from China's export in the upstream industry. To match the Chinese export industry with 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. In Panel A, we examine how US firms react to China's export price reduction brought by CDB loans in the same industry. In Panel B, we examine how US firms in downstream industry react to China's export price reduction. Firm fixed effects and year fixed effects are included in all regressions. Fixed effects estimates are omitted for brevity. Standard errors are clustered by the firm for all regressions and are reported in parentheses.

In sum, the government credit from the CDB leads to an increased amount of export from China to the US. This competition from China's exports could hurt US firms from the direct competition channel. This is consistent with the criticism of China's mercantilism. In contrast, we show that the exports from China, together with the lower prices, could benefit the downstream US firms which tend to source intermediate goods from China.[31] This positive spillover effect serves as an important

[31] In Table A.5 in the appendix, we interact the CDB loans with the dummy variable *NonConsumerGood* which equals 1 if the firm mainly exports non-consumer goods (i.e., raw materials, intermediate goods). Panel A reports the results of the effect of CDB direct loans on SOEs and Panel B reports the results of effect of CDB upstream loans on private firms. The positive coefficient of the interaction terms between CDB loans and *NonConsumerGood* suggest that CDB loans increase more exports in intermediate goods compared to final consumer goods. Figure A.2 shows that majority of the exports from China are non-consumer goods where trading partners could utilize these goods to produce final consumer goods. These findings lend further support to beneficial effects of China's exports on downstream US firms.

consideration in understanding the overall effects of China's international trade activities. Moreover, we shed light on the export price channel of how China's exports can benefit US firms regarding performance and employment.

V Conclusion

This paper examines the heterogeneous effects of government credit across different levels of the supply chain (direct loan vs. upstream loan) on Chinese manufacturing firms' export activities and hence the trade activities between the US and China. By merging the unique loan data from the CDB with the detailed universal transaction-level data from China Customs, we find that CDB loans granted to upstream industries lead to the surge in export amount and the decrease in export prices for private firms in the downstream industries. Moreover, the increase in export amount with decreased prices from China benefits downstream US firms regarding assets, profitability, and employment, although US firms in the same industry still suffer from direct competition from China's exports. Our paper investigates how government credit affects the industry supply chain structure by documenting the positive spillover effects of upstream industrial loans on downstream private firms' export activities. Also, the paper sheds light on the ongoing debate on whether exports from China hurt US firms and employment and provides a potential price channel for the positive impact of China's exports on downstream US firms.

Besides China, many countries have their own national development finance institutions (DFI), even for the most developed economies such as the US and Germany. One major concern for such DFIs is to facilitate and promote international trade. For example, the primary objective for the Export-Import Bank of the United States, which is a wholly owned federal government corporation, is to assist in financing and facilitating US export of goods and services. Based on the empirical findings of this paper, policymakers should consider different types of government credit at different levels along the supply chain when making lending decisions. Hence, this paper's findings are important for policymakers across the globe.

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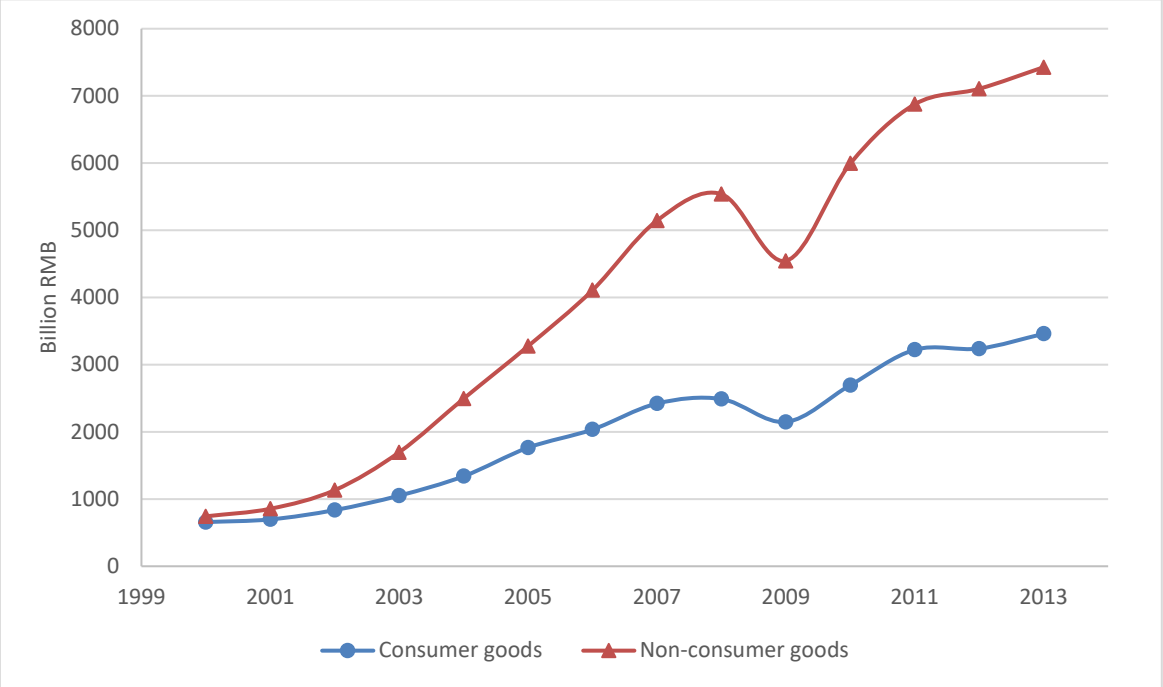
Appendix

Figure A.1 Export amount by firm type

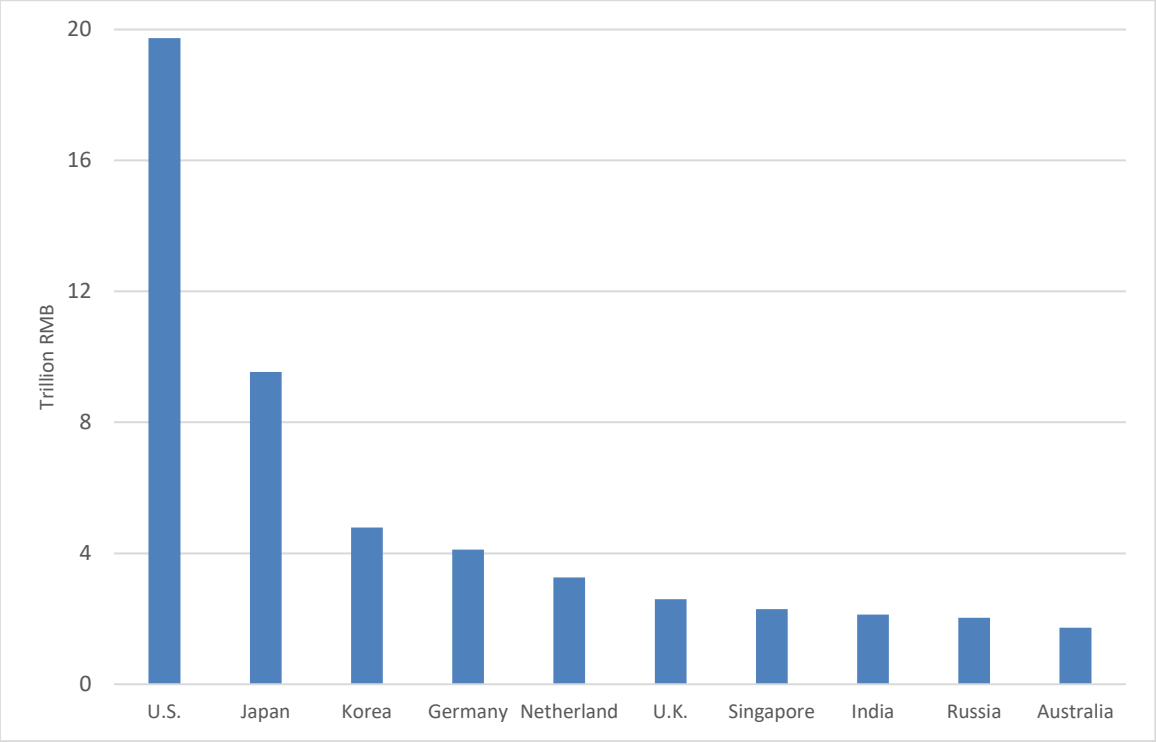
Notes: This figure shows the time trend of export amounts for SOEs and private firms from 2000 to 2013. The calculation is based on the sample containing only manufacturing firms (i.e., excluding trade intermediaries) in the China Customs data. SOEs denote firms that are state-owned enterprises or collectively-owned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

Figure A.2 Export amount by type of goods



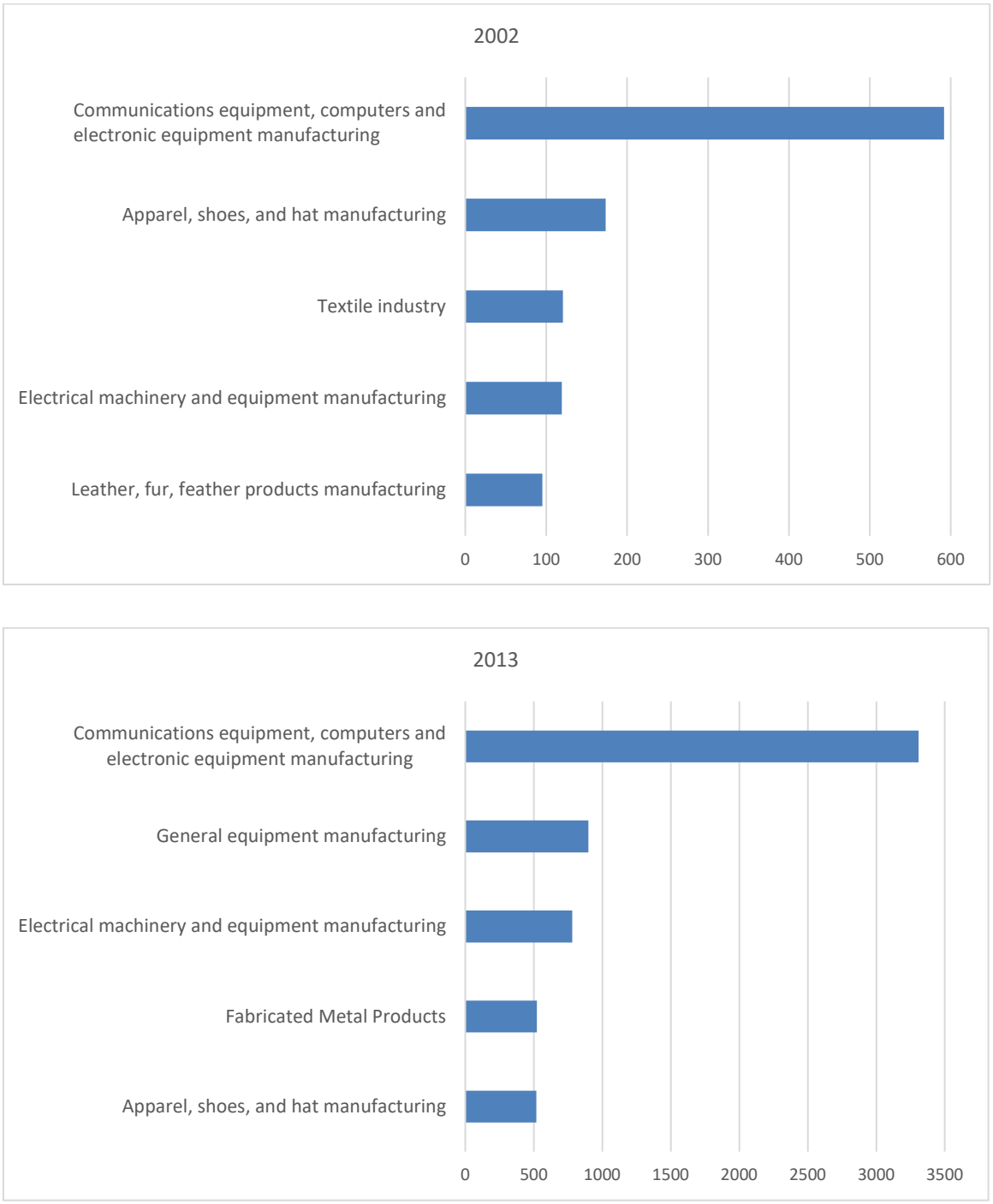
Notes: This figure shows the time trend of export amounts for two types of exported goods: consumer goods and non-consumer goods. Based on the population data of China Customs, we aggregate the export amount from all export transactions (i.e., exports by manufacturing firms and exports by intermediary 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/reference-data.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.

Figure A.3 Top Ten export destination countries



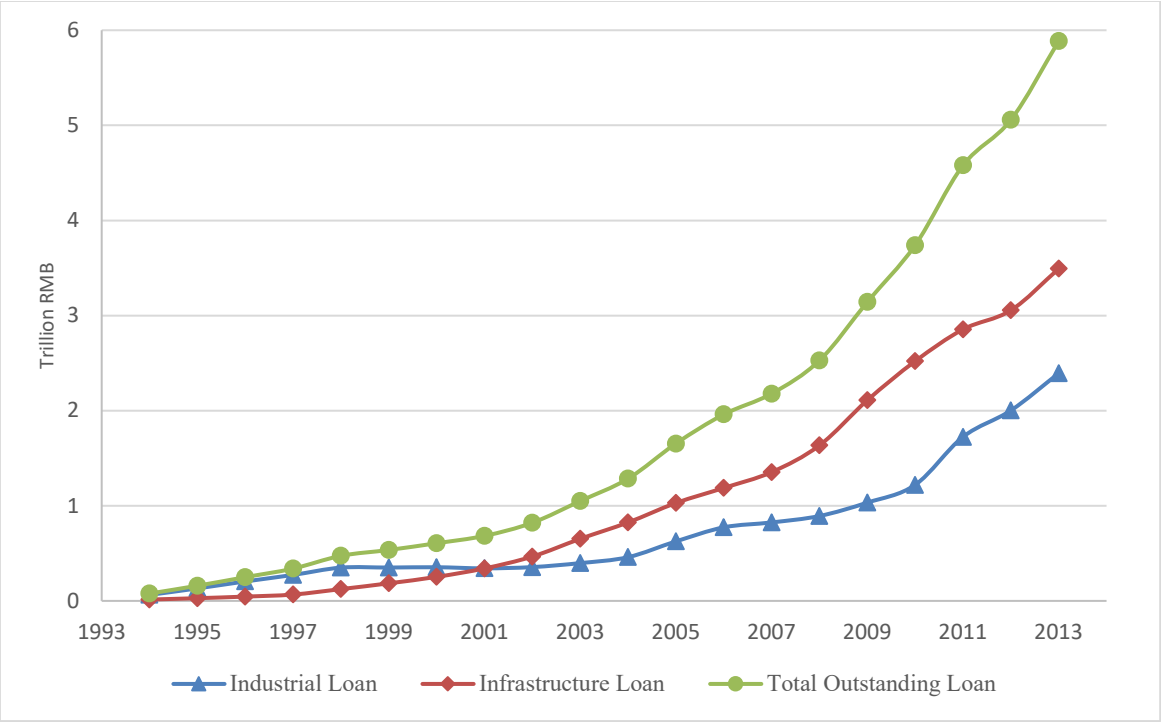
Notes: This figure shows the largest ten destination countries ranked by total export amounts of Chinese firms from 2000 to 2013. Based on the population data of China Customs, we aggregate the export amount from all export transactions (i.e., exports by manufacturing firms and exports by intermediary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

Figure A.4 Top Five export industries



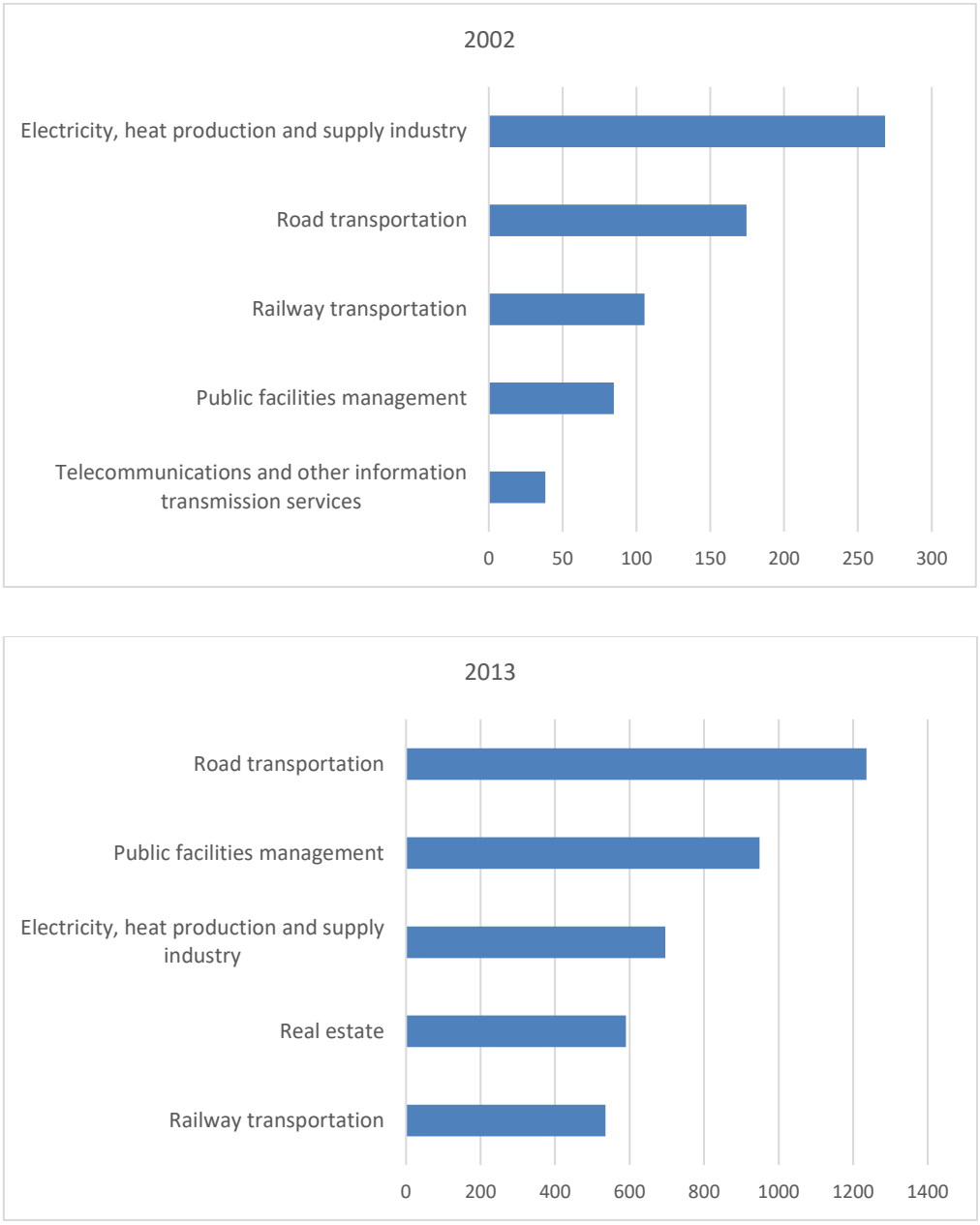
Notes: This figure shows the top five export industries ranked by export amounts for 2002 and 2013, respectively. The sample includes only manufacturing firms (i.e., excluding trade intermediaries) in the China Customs data from 2000 to 2013. The industry is at the two-digit CDB industry classification level, which is comparable with US 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.5 Time trend of CDB outstanding loans



Notes: 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. 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). Industrial loans are credits granted to the industrial firms. By construction, total outstanding loan

Figure A.6 Shifts of CDB industrial loans over time



Notes: 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.

Table A.1 Variables' definition and construction

Variable	Definition
LogDirectLoan	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	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	Logarithm of the export amount (in millions RMB) of the firm in the China Customs data. The variable is at firm-year level.
LogNumDestinations	Logarithm of the number of a firm's export destinations in the China Customs data. The variable is at firm-year level.
LogNumProducts	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.
LogAssets	Logarithm of the firm's total asset in the CIC data. The variable is at firm-year level.
LogSales	Logarithm of the firm's total sales in the CIC data. The variable is at firm-year level.
ROA	Contemporaneous return on assets. It is calculated by dividing a firm's annual earnings by its total assets in the same year in the CIC data. The variable is at firm-year level.
Leverage	Leverage ratio defined as total debt divided by total asset in the CIC data. The variable is at firm-year level.
LogNumWorkers	Logarithm of the firm's number of workers in the CIC data. The variable is at firm-year level.
LogGDP	Logarithm of the city's GDP where the firm locates. The variable is at city-year level.
LogPopulation	Logarithm of the city's population where the firm locates. The variable is at city-year level.
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 the industry has a higher dependence on the upstream industry.
LogPrice	Logarithm of 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	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.
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.
LogAsset_US	Logarithm of total assets for U.S. firms in Compustat.
PPE/Assets_US	Tangibility of U.S. firms in Compustat, computed as property, plant, and equipment divided by total assets.
LogSale_US	Logarithm of total sales for U.S. firms in Compustat.
NI/Asset_US	Profitability of U.S. firms in Compustat computed as net income divided by total assets.

Variable	Definition
LogEmployees_US	Logarithm of the number of employees for U.S. firms in Compustat.
LogCityLoan	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 1 if a city secretary is in his/her first year of the term. The variable is at city-year level.
Second_Year	A dummy variable which equals 1 if a city secretary is in his/her second year of the term. The variable is at city-year level.
Third_Year	A dummy variable which equals 1 if a city secretary is in his/her third year of the term. The variable is at city-year level.
Fourth_Year	A dummy variable which equals 1 if a city secretary is in his/her fourth year of the term. The variable is at city-year level.
Fifth_Year	A dummy variable which equals 1 if a city secretary is in his/her fifth year of the term. The variable is at city-year level. This is the omitted group in Table A.2.
First	A dummy variable equals 1 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 province-industry-year level.
Second	A dummy variable equals 1 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 province-industry-year level.
Third	A dummy variable equals 1 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 province-industry-year level.
Fourth	A dummy variable equals 1 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 province-industry-year level.
Fifth	A dummy variable equals 1 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 province-industry-year level.

Table A.2 CDB loans and political turnover

	Actual Turnover	Predicted Turnover
	(1)	(2)
Dependent Variable	*LogCityLoan*	*LogCityLoan*
Panel A. CDB City-level Loans and City Secretary Turnover		
First_Year	0.42890	0.40616
	(0.25460)	(0.19188)
Second_Year	0.38256	0.30035
	(0.19631)	(0.15292)
Third_Year	0.28909	0.22768
	(0.13643)	(0.11327)
Fourth_Year	0.17065	0.12539
	(0.08164)	(0.07714)
Controls	Yes	Yes
City FE, Secretary FE, Year FE	Yes	Yes
Observations	3,505	3,602
Adjusted R-squared	0.881	0.893

	(1)
Dependent Variable	*LogProvinceLoan*
Panel B. CDB Province-industry Loans and Political Turnover	
First	0.58025
	(0.10690)
Second	0.48555
	(0.13373)
Third	0.31823
	(0.11453)
Fourth	0.25082
	(0.18301)
Fifth	0.33987
	(0.21140)
Province×Year FE, Industry FE	Yes
Observations	5,573
Adjusted R-squared	0.336

Notes: This table shows the relation between political turnover and CDB loans outstanding from 2000 to 2013. In Panel A, we regress CDB city loans outstanding on 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 1 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 direct CDB loans on all manufacturing firms (2SLS)

Dependent Variable	(1) *LogExport*	(2) *LogNum Destinations*	(3) *LogNum Products*
Panel A. Export Activities of SOEs			
LogDirectLoan	0.04129	0.01847	0.00894
	(0.01274)	(0.00593)	(0.00541)
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	106,130	106,130	106,130
Adjusted R-squared	0.715	0.773	0.806
Wald F-stat	103.8	103.8	103.8
Panel B. Export Activities of Private Firms			
LogDirectLoan	0.00144	0.00240	0.00219
	(0.00441)	(0.00205)	(0.00178)
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	1,321,832	1,321,834	1,321,834
Adjusted R-squared	0.753	0.790	0.766
Wald F-stat	743.3	743.3	743.3

Notes: This table shows the two-stage least squares regressions result on the effect of CDB direct loans on both SOEs and private firms' export activities by using First to Fifth as instrumental variables for the logarithm of the direct CDB province-industry level outstanding loan amounts in 38 industries and 27 provinces (excluding Beijing, Shanghai, Tianjin, and Chongqing). The sample contains all manufacturing firms in China Customs data from 2000 to 2013 so control variables are not included in regressions. The dependent variables are the export amount (LogExport), the number of export destinations (LogNumDestinations), the number of export product varieties (LogNumProducts). The independent variable, LogDirectLoan, denotes the direct CDB loan for the firm in the same industry as the loan which is at province-industry-year level. In Panel A, the sample is restricted to SOEs. In Panel B, the sample is restricted to private firms. All variables are defined in Table A.1. Firm fixed effects and province-year fixed effects are included in all regressions. Fixed effects estimates are omitted for brevity. Standard errors are clustered by the firm for all regressions and are reported in parentheses. Cragg-Donald Wald F-statistics for weak identification tests are reported.

Table A.4 Effects of upstream CDB loans on all manufacturing firms (2SLS)

Dependent Variable	(1) *LogExport*	(2) *LogNum Destinations*	(3) *LogNum Products*
Panel A. Export Activities of SOEs			
LogUpstreamLoan	0.04078	0.01837	0.02079
	(0.01526)	(0.00719)	(0.00712)
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	90,703	90,703	90,703
Adjusted R-squared	0.721	0.777	0.804
Wald F-stat	67.82	67.82	67.82
Panel B. Export Activities of Private Firms			
LogUpstreamLoan	0.04003	0.01968	0.01831
	(0.00373)	(0.00172)	(0.00161)
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	1,222,157	1,222,157	1,222,159
Adjusted R-squared	0.750	0.786	0.763
Wald F-stat	948.7	948.6	948.7

Notes: This table shows the two-stage least squares regressions result on the effect of CDB upstream loans on downstream SOEs and private firms' export activities by using First to Fifth as instrumental variables for the logarithm of the direct CDB province-industry level outstanding loan amounts in 39 industries and 27 provinces (excluding Beijing, Shanghai, Tianjin, and Chongqing). The sample contains all manufacturing firms in China Customs data from 2000 to 2013 so control variables are not included in regressions. The dependent variables are the export amount (LogExport), the number of export destinations (LogNumDestinations), the number of export product varieties (LogNumProducts). The independent variable, LogUpstreamLoan, denotes the upstream CDB loan in the firm's upstream focal industry which is at province-industry-year level. In Panel A, the sample is restricted to SOEs. In Panel B, the sample is restricted to private firms. All variables are defined in Table A.1. Firm fixed effects and province-year fixed effects are included in all regressions. Fixed effects estimates are omitted for brevity. Standard errors are clustered by the firm for all regressions and are reported in parentheses. Cragg-Donald Wald F-statistics for weak identification tests are reported.

Table A.5 Effects of CDB loans for non-consumer goods (2SLS)

Dependent Variable	(1) *LogExport*	(2) *LogNum Destinations*	(3) *LogNum Products*
Panel A. Direct Loan on SOEs			
LogDirectLoan	0.06507	0.02461	0.01410
	(0.02189)	(0.01052)	(0.00866)
LogDirectLoan × NonConsumerGood	0.03181	0.01502	0.00762
	(0.00531)	(0.00262)	(0.00217)
NonConsumerGood	0.38746	0.08998	0.04176
	(0.06875)	(0.03079)	(0.02369)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	52,458	52,458	52,458
R-squared	0.725	0.776	0.734
Wald F-stat	52.27	52.27	52.27
Panel B. Upstream Loan on Private Firms			
LogUpstreamLoan	0.01442	0.01264	0.00883
	(0.00457)	(0.00233)	(0.00215)
LogUpstreamLoan × NonConsumerGood	0.00801	0.00158	0.00545
	(0.00130)	(0.00070)	(0.00059)
NonConsumerGood	0.05531	-0.00716	0.03549
	(0.01509)	(0.00698)	(0.00633)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Province×Year FE	Yes	Yes	Yes
Observations	519,197	519,197	519,197
R-squared	0.814	0.834	0.785
Wald F-stat	1016	1016	1016

Notes: This table shows the two-stage least squares regression results on the effects of CDB loans on types of exported goods by using First to Fifth as instrumental variables for the logarithm of the direct CDB province-industry level outstanding loan amounts in 27 provinces (excluding Beijing, Shanghai, Tianjin, and Chongqing). The sample contains the merged firms in China Customs data and CIC 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). NonConsumerGood 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. In Panel A, the sample is restricted to SOEs. In Panel B, the sample is restricted to private firms. LogAssets, LogSales, ROA, Leverage, LogNumWorkers, LogGDP, and LogPopulation are included as control variables in all regressions. All variables are defined in Table A.1. We follow Wooldridge (2002) to include the interaction term in 2SLS. Firm fixed effects and province×year fixed effects are included in all regressions. Coefficients of control variables and fixed effects estimates are omitted for brevity. Standard errors are clustered by the firm for all regressions and are reported in parentheses. Cragg-Donald Wald F-statistics for weak identification tests are reported.

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