

Domestic Bank-Channeled Foreign Credit– A Blessing or a Curse: Evidence from China

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Abstract

Domestic banks in emerging market economies (EMEs) are playing an increasingly important role in transmitting cross-border credit to these economies. This paper proposes and empirically identifies a novel channel through which this structural change in cross-border credit flow generates a welfare impact on the real economy. Exploiting a unique cross-region heterogeneity in the domestic global bank distribution in China, we investigate the real effects of the structural difference in cross-border credit across cities in China during the 2003-2009 global financing cycle. We find that regions in which a larger share of foreign credit being channeled by domestic banks was associated with more volatile real outcomes during the global financing cycle. An examination of deal-level data on the lending relationships of domestic banks that lacked access to international funding market reveals that a more susceptible domestic credit intermediation is a main driving force of excess real fluctuations. Furthermore, using disaggregate firm balance sheet data, we find that firms significantly increase their tangible asset holding during the easing phase of global financing cycle, when access to domestic bank-channeled foreign credit was available. This asset structure distorting behavior on firm side resulted in a larger plummet in the price of collateralizable assets when the global financial condition tightens, and in the local economy this precipitated a more severe downturn. Our findings suggest that the rise of domestic banks in the cross-border credit transmission to EMEs, which marks a completion of the contracting space by allowing cross-border credit contracts to be written against domestic fixed assets as collateral, is a mixed blessing to these economies. Increased flexibility in cross-border debt contracting allows hot money that flows to EMEs to be more efficiently allocated, but it may lead to a less efficient allocation of domestic credit when hot money leaves.

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1. Introduction

Over the past three decades, emerging market economies (EMEs) around the world having been witnessing a deepening integration of their banking sector with the international funding market.¹ Along with the increasingly important role that domestic banks from EMEs play in transmitting cross-border capital, increased real economic co-movements with cycles in the global funding market and susceptibility to external shocks are widely seen in many EMEs around the world, as illustrated in Figure 1.²

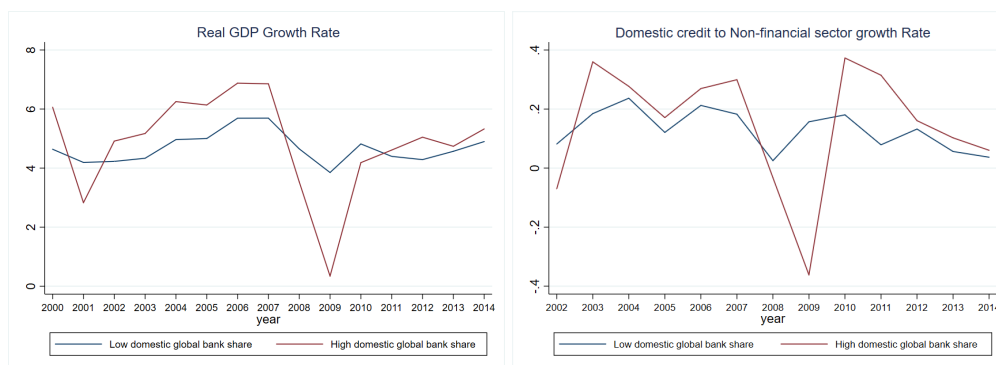


Fig. 1. Banking Globalization and Macroeconomic Volatility

Many research and policy works have paid attention to the increasing degree of interconnectedness in the global economy ([Miranda-Agrippino and Rey \(2015\)](#)). Some have expressed concerns that the financial inter-connection between an emerging market economy's banking sector and the global funding market could be a mixed blessing ([Martin and Rey \(2006\)](#), [Bekaert et al. \(2005\)](#), [Prasad et al. \(2004\)](#), [Edison et al. \(2002\)](#), [Mishkin \(2007\)](#)). A common theme, for example, is that the potential extra volatility and fragility could outweigh the benefits of more credit.³ However, very few have been able to determine whether a greater involvement of domestic banks in the intermediation of cross-border credit could lead to more volatile real economic conditions, and very few have identified the exact channels through which the greater involvement of an EME's own banking sector in the cross-border credit intermediation could bring about real economic outcomes. Without a comprehensive understanding of the potential benefits and pitfalls of allowing domestic banks to play a more significant role in the transmission of cross-

¹See detailed documentation in [Jiang and Xu \(2019\)](#).

²The fast and slow domestic banking sector globalization is defined based on the percentage of cross-border foreign currency credit that was lent by domestic banks after 1995. The fast banking globalization emerging market economies in the figure include Czech Republic, China, South Korea, Poland, Turkey, and Indonesia; and the slow banking globalization emerging market economies include Brazil, Chile, South Africa, Vietnam, Iran, and Ukraine.

³As an illustration, Figure 1 compares two groups of economy's GDP and domestic banking sector credit volatility. One group of economies has a low domestic bank loan making share in the cross-border market, while the other group has a high domestic bank loan share in the cross-border loan market. While the group with the higher domestic global bank presence tends to grow faster when the global financing cycle is in the easing phase, this group also dips deeper during the tightening phase. The high cyclicality of the real economic outcomes in EMEs is also seen in various works, including [Aguiar and Gopinath \(2007\)](#).

border capital, policies that regulate domestic banks' access to foreign capital cannot be made on a completely justified ground.

This paper proposes and empirically identifies a novel channel through which structural differences in cross-border credit translate into real outcomes to EMEs. Exploiting a unique cross-region heterogeneity in the domestic global bank distribution in China, from which exogenous variations in the structure of cross-border credit is extracted, we find that regions in which a larger share of foreign credit being channeled by domestic banks was associated with more volatile real outcomes during the 2003-2009 global financing cycle. We further find that a more susceptible domestic credit intermediation is behind the excess real fluctuations—an evidence suggesting that global financing cycle gets localized. Examination of disaggregate firm-level data reveals a mixed effect of having a higher share of foreign credit being channeled by domestic banks, which is shown to bring more flexibility in cross-border debt contracting, on the efficiency of foreign and domestic credit allocation. We now elaborate.

One salient feature of emerging market economies is their relatively weak legal infrastructure and low average corporate transparency. Foreign banks and domestic banks demonstrate drastically different lending technologies in extending credit to borrowers from EMEs, as documented by [Jiang and Xu \(2019\)](#). In particular, while domestic banks often accept domestic fixed-value assets (primarily land and properties) as collateral for credit extension, foreign banks rarely conduct collateralized lending against physical assets in emerging markets, presumably due to extra difficulties in monitoring and seizing these assets. Instead, the credit extended by foreign banks to EME borrowers is largely covenant-based and earning transparency-based.

Differences in lending technologies map onto different contingency spaces of cross-border debt contracts when foreign credit is being channeled into an EME by distinctive types of lenders. The replacement of foreign banks by domestic lenders from EMEs in the cross-border credit transmission marks the completion of one crucial dimension of the contracting space: it allows credit agreements to be written against domestic hard assets as collateral. Thus, the increased contingency in cross-border debt contracting offers additional flexibility in how borrowers from EMEs can get access to credit in the global funding market.

The main insights of this paper rest on a mixed effect of this newly added flexibility in cross-border debt contracting. In particular, this flexibility in the contracting of cross-border credit agreement can help the economy achieve a more efficient allocation of credit during easing phase of the global financing cycle. Yet it can also induce domestic industrial firms to over-stretch their debt capacity by acquiring excessive tangible collateralizable assets, which would dampen asset prices and impair the intermediation of domestic credit during the tightening phase.

During the easing phase of a global financing cycle, if an economy's cross-border credit is only transmitted by foreign banks, which offer limited contracting space, only

the high cash flow transparency firms will get the foreign credit. This often means that the marginal social value of the last dollar of global credit could have been higher than the marginal productivity of the firm that actually received it. Thus, the economy is not reaping the full benefit of the abundant foreign credit supply. Yet in an economy whose cross-border credit flows are all channeled by domestic banks (and because of the enlarged flexibility in contracting), more firms that have domestic fixed assets can get financed from their lenders. This helps the economy reap the benefits of easy money, boosting real economic growth.

Increased flexibility in cross-border credit contracting, however, could induce firms to stretch their debt capacity by piling up too much land during the easing phase. When the increased demand for industrial land as collateral drives up the economy's industrial land prices, the higher value of the domestic collateral generates a multiplier effect, enabling firms borrowing *domestic* credit to also enlarge their debt capacity. But when the global financial condition suddenly reverses, firms find it no longer necessary to maintain a high debt capacity and hence high asset tangibility is no longer needed. Downward pressure is suddenly placed on the domestic collateral price, impairing firms that borrow domestic credit based on the same set of domestic collateral. As such, the global financing cycle gets localized in EMEs, through this collateral channel.

However, empirically identifying the exact channel through which the structure of cross-border credit could affect real outcomes is not an easy task. The most convenient variation to deploy would be differential shares of cross-border credit channeled by domestic banks across countries; through these one could investigate how this difference correlates with real economic outcomes at the country level. But claims made by cross-country exercises that use only aggregate variables are often limited. Greater involvement of domestic banking sector in cross-border credit market could be driven by unobserved country-specific factors that may simultaneously affect real outcomes. In these cases, the channel underneath a correlation is obscured.

Our empirical identification leverages a unique within-country cross-city heterogeneity of China's domestic global bank distribution and disaggregated data at different scales to identify this channel, over one single global financing cycle: 2003-2009. The global financial cycle pushed a large volume of foreign credit from global funding market towards China. What's more, domestic banks are replacing foreign banks in the intermediation of foreign credit towards the non-financial corporate sector during this episode.⁴ In 2000, foreign banks' total lending balance in China's domestic banking market reached as high as 16%.⁵ By 2007, the total lending balance of foreign banks in the entire banking

⁴In [Jiang and Xu \(2019\)](#), we show that this replacement of foreign banks by domestic lenders from EMEs in cross-border credit transmission could be related to the growing market share of shadow banking institutions in the U.S. money market.

⁵The percentage is calculated as among all types of commercial bank assets including loans to household sector and to agricultural sector, conditioning on credit balance to industrial sector the percentage will be more than 30%.

industry had declined to less than 6.7%.

The key institutional setting that makes this episode a perfect laboratory for studying our research question is the fact that one particular domestic bank, Bank of China, plays a unique and dominant role in international capital intermediation in China. It plays this role because of its special institutional and political background. For a long period Bank of China was the only authorized bank, and within China's economy it was also the most specialized bank to intermediate foreign credit. Because its branching network is sticky and uncorrelated with the global financial cycle, we can construct exogenous variation in the exposure (or access) of industrial companies to foreign credit that is channeled by domestic global banks.

We first examine aggregate patterns at the city level. Our findings suggest that *conditional on the same level of foreign credit*, cities that have a higher fraction of foreign credit flowing into their industrial firms channeled by local domestic banks experienced faster growth in real GDP, a faster growth of employment in industrial sectors, and a faster industrial firm TFP growth during the period 2003-2007. This episode of the global financing cycle features a drastic inflow of hot money. Yet these cities also experience a more severe slowdown in their real GDP, industrial employment, and firm TFP growth during the 2008-2009 episode, when global funding markets tightened and hot money suddenly left.

Empirically, we find that when the volume of foreign credit is controlled, a 10% increase in the share of domestic bank-channeled foreign credit is associated with 2.6% faster real GDP growth at the city level, a 5.57% higher growth in industrial sector employment growth, and a 2.08% increase in local firms TFP growth rate during the 2003-2007 easing period. However, when the global financing condition suddenly tightened in 2008-2009, a 10% higher share of domestic bank-channeled foreign credit during the easing phase (2003-2007) of global financing cycle was associated with 2.20% slower real GDP growth, a 1.12% slower industrial sector employment growth, and a 2.47% slower TFP growth during the downturn, holding the level of total foreign credit flow controlled. Overall, everything else equal, cities that received a higher de facto percentage of foreign credit channeled by domestic banks were associated with a higher real economic volatility over the 2003-2009 global financial cycle.

To obtain a causal claim from the correlation, We instrument for the de facto percentage of foreign credit that local industrial firms received from local domestic banks with the pre-cycle market share of Bank of China in the local area. The existence of a single dominant domestic global bank in China, the Bank of China, gives us an ideal source of within-country regional heterogeneity in the access of firms to domestic bank-channeled foreign credit during the 2003-2009 global financial cycle. We find that the pre-cycle presence of BOC across cities in China strongly predicts the de facto percentage of foreign credit that was channeled by local domestic banks during the 2003-2009 cycle, but is not as significantly correlated with the level of total foreign credit received by firms in

the city.⁶ Furthermore, we provide multiple checks on the exclusion restriction and find that pre-cycle market share of BOC across cities does not exhibit significant correlations with pre-cycle firm- and city-levels characteristics that were likely to affect real economic outcomes during the 2003-2009 cycle. Adopting this IV strategy, we identify an economically and statistically significant effect generated by the structure of foreign credit—the share being channeled by domestic banks—on the real outcomes in each local economy during the 2003-2009 global financing cycle.

Having documented that cities that had a higher share of foreign credit channeled by domestic banks experienced higher volatility in their real economic outcomes during the global financing cycle, we now go one step further to examine how the allocation of credit varied across cities. Using disaggregated firm-level data, we find that the aforementioned impact on aggregate economic outcomes of the structural difference in foreign credit flow across cities is likely to be driven by its impact on the allocation of credit across firms. In particular, we find that when a higher share of foreign credit is channeled by domestic banks, an increased fraction of credit is received by firms in high-tangibility industries, young firms, and firms with high pre-cycle ROA during the easing phase (2003-2007) of the global financing cycle.⁷ Thanks to a more efficient allocation of the hot money, this distortion in the allocation of credit contributes to a higher growth rate in the local real outcomes. However, when global financing tightens, these types of firms also suffer more in cities, where a higher fraction of foreign credit is channeled by domestic banks. This outcome is reflected in a larger cut in credit and a more severe slowdown in TFP and output growth.

If one city experiences a considerably higher volatility in its real outcomes than another city that has the same amount of hot money, then the explanation must lie in the intermediation of domestic credit.⁸ Inspired by this intuition, we probe the underlying source of the amplification effect of domestic bank-channeled foreign credit on local economic fluctuations. We find that underneath the excess volatility in the local real economy is a more affected domestic credit intermediation. To this end, we examine a 1999-2013 firm-bank pair lending panel that provides detailed information about the borrowing firm, its relationship bank, all the loans the firm get from a given relationship bank, the collateral it pledged for the loans, and the location of borrowers. Importantly, we focus on the lending relationship of banks that lacked access to international financ-

⁶A 10% increase in the pre-cycle BOC lending balance market share is associated with a 22.7% increase in the domestic channeled foreign credit during the easing phase of the cycle; and a 10% increase in the number of branches in the city's commercial bank branches is associated with a 6.31% higher domestic channeled foreign credit during the easing phase of the financial cycle.

⁷We find that a 10% increase in the city-level domestic bank-channeled foreign credit is associated with an average 3.6% increase in credit (compared with these types of firms in other cities) that is allocated to firms in high-tangibility industries; an average of 1.45% in credit that is allocated to firms whose age is less than 7 years; and an average increase of 1.06% in credit that is allocated to firms that have a high pre-cycle ROA.

⁸This is particularly true during the tightening phase of the global financing cycle when hot money leaves and the intermediation and allocation of domestic credit becomes particularly relevant.

ing market. For a better measure of debt capacity, we also conduct a sub-sample analysis that focuses on revolving credit loans and examines changes in the limits of these credit line facilities.

We find that during the global financial cycle, lending relationships in cities that experienced higher industrial land price volatility tend to display more drastic expansion and shrinkage in the volume of credit issuance. Moreover, this expansion and shrinkage in borrowing limits was especially severe for firms that relied on commercial and industrial land and properties to get financing. Empirically, we find that while on average the borrowing capacity of firms increased 2.3% during the easing phase of the global financing cycle, firms from high-tangibility sector that were located in cities that underwent significant commercial land price appreciation saw an additional 13.2% increase in the borrowing capacity within their relationship lenders. Similarly, during the tightening phase, while the borrowing capacity of firms shrank 12.1% on average, firms from high-tangibility sector located in cities that experienced a steeper decline in local land prices saw an extra 36.9% reduction in their borrowing capacity.

In the next part of our analysis, we examine the behavior of firms over the global financing cycle. In particular, we investigate changes in firms' tangible asset holdings during the easing phase of the credit cycle. We find that holding the total volume of foreign credit to a city controlled, firms located in cities that received a higher share of domestic bank-channeled foreign credit significantly increase their asset tangibility (measured by PPE/Total assets), make more investments in cumulative fixed assets, and become more levered, as measured by their total debt.⁹ Moreover, we show that within the same city, the difference in asset structure change is more substantial for firms in high-tangibility industries and that have a lower cash flow transparency ex-ante.

To make the identification cleaner, we conduct a time-dependent Diff-in-Diff analysis, utilizing the firms' city-level 2002 BOC presence before the cycle initiated to measure the local exogenous exposure of firms to domestic bank-channeled foreign credit and estimate the year-by-year coefficient. Consistent with the channel depicted in the cross-sectional analysis, we find that a high local presence of BOC does not start to explain differences in local firms' tangibility, fixed asset investment rate and total debt compared with a low BOC presence city, until when the cycle happened.

Next, we conduct an empirical test on changes in local land prices and local land transaction dynamism. We find that variations in the share of domestic bank-channeled foreign credit can explain the cross-sectional difference in the volatility of C&I land prices across cities throughout the entire cycle. Furthermore, we find that from 2003 to 2007, cities that had a high pre-cycle BOC presence experienced a larger appreciation in industrial land prices and higher growth in the annual commercial mortgage issuance. More-

⁹ Empirically, we find that although all firms on average increase their tangibility by 2.1% during the easing phase of the global financial cycle, a 10% higher domestic bank-channeled foreign credit in the local city is associated with a 13.7% higher tangibility growth in the local firms balance sheet.

over, when the global financing cycle suddenly reversed in 2008 - 2009, the cities that featured high pre-cycle exposure to BOC experienced a particularly pronounced drop in industrial land prices and commercial mortgage issuance dynamism.

Related Literature This paper studies how completion of contracting space by domestic banks when intermediating cross-border credit flows during a global financial cycle could translate the global financial cycle into a local financial cycle. This issue is closely related to and related and contributes to several strands of literature.

First, on the macroeconomics side, this study is broadly related to works that examine financial sector development and the real macroeconomic and asset price volatility. Focusing on the international macroeconomic setting, [Wei \(2018\)](#) and [Kose et al. \(2009\)](#) provide a survey of literature that examines the correlation of financial account liberalization and real economic growth. [Obstfeld and Taylor \(2017\)](#) make the point that international resource liquidity should be more seriously taken into concern. Numerous previous works, including [McKinnon and Pill \(1997\)](#), [Prasad et al. \(2004\)](#), [Mishkin \(2007\)](#) have demonstrated that financial globalization or banking globalization could introduce risk to emerging market economies. Moreover, a large set of recent works has documented that spillovers of the center economy's monetary policy affect emerging market economies through bank lending, risk-taking, asset price volatility and exchange rate pass-through: [Miranda-Agrippino and Rey \(2015\)](#), [Bruno and Shin \(2014\)](#), [Rey \(2013\)](#), [Bruno and Shin \(2015\)](#), [Ivashina et al. \(2015\)](#), [Brauning and Ivashina \(2019\)](#), [Kalemli-Ozcan et al. \(2018\)](#), [Baskaya et al. \(2017\)](#), [Alfaro et al. \(2019\)](#), [Morais et al. \(2019\)](#), etc. Our work contributes to this strand in literature through making the point in an EME, the global financial cycle can be transmitted to a local financial cycle using a within-country event-study framework and we provide a novel channel through which the cycle is transmitted by domestic banks.

This paper is also closely related to corporate finance works that examine incomplete contracting, pecuniary externality, and collateralized lending and its real implications in emerging market setting. In theoretical frameworks, [Stulz \(2005\)](#) and [Broner and Ventura \(2016\)](#) have shown that the effectiveness and scope of financial globalization is crucially dependent on the emerging market economies institutional strength, corporate ownership structure, and debt enforcement quality. [Farhi et al. \(2007\)](#), [Caballero and Krishnamurthy \(a\)](#), [Caballero and Krishnamurthy \(b\)](#), [Lorenzoni \(2008\)](#), and [Bianchi \(2011\)](#) qualitatively and quantitatively study how over/under collateralized borrowing due to contracting frictions can lead to amplified financial cycles. More recently, [Diamond et al. \(2019\)](#) and [Diamond et al. \(2018\)](#) demonstrate that easing financing conditions can systematically tilt firms towards their debt capacity resource to the asset-sale-based financing and neglecting the cash-flow-based borrowing. More broadly, our paper is also related to theoretical research that stresses that, in contrast to a first-best benchmark in which financial frictions are absent, such frictions can amplify macroeconomic shocks: [Aoki](#)

et al. (2007), Kiyotaki and Moore (1997), Bernanke and Gertler (1989), etc. Our paper empirically joins this strand of literature through concretely illustrating how completing contracting space by domestic banks' intermediating of cross-border credit flows could result in more volatile real local economic outcomes throughout the cycle.

A third strand in the literature to which our paper is relevant is applied macroeconomics and applied microeconomics work that aims to identify the real effect on the economy of structural change or shocks to the banking sector. These papers include Khwaja and Mian (2008), Mian et al. (2017), Mian and Sufi (2014), Chodorow-Reich (2014), Calomiris et al. (2017), etc. Calomiris et al. (2017) finds that weak movable collateral laws create distortions in the allocation of resources that favor immovable-based production and investment, and they verify the finding in an experimental setting following Slovakia's collateral law reform. Mian et al. (2017) shows that credit supply expansion boosts non-tradable sector employment and the price of non-tradable goods, thus amplifies local business cycle through household demand channel. Our paper enriches this strand of literature through identification of how pure financial market differences across cities, here the differences in the easiness of firms to reach hot money from domestic banks that can write debt contract based on physical assets, could result in drastically different real economic outcomes using detailed firm-level data.

The rest of the paper is organized as follows. Section 2 discusses the empirical and institutional background. Section 3 describes data construction and summary statistics. Section 4 lays out the theoretical framework and the relevant empirical hypothesis to be tested. Section 5 conducts a cross-sectional analysis of the real impact of domestic bank-channeled foreign credit at the city level. In Section 6 we show that impaired domestic credit intermediation underlies the cross-sectional high volatility. Section 7 conduct analysis on local firm behavior over the global financial cycle. Section 8 concludes.

2. Empirical and Institutional Background

2.1. *A Natural Experiment: The 2003-2009 Global Financing Cycle*

In this paper, we explore the real economic effect of having domestic bank-channeling foreign credit from the international money market during the global financial cycle of 2003-2009; where 2003-2007 was the easing period of the global financing cycle and 2008-2009 was the tightening period of the cycle. The cycle has been documented in several studies that have focused on international financial cycle and banking (Miranda-Agrippino and Rey (2015) and Borio (2013), Lane (2012) etc.). Following the loosening of monetary policy in the U.S, economic conditions in various advanced economies started to go through a large-scale expansion in 2002 (Calomiris (2011)). The expansion was driven largely by the households sector (Mian et al. (2013)), which was strengthened by borrowing against rising house prices. The burgeoning debt-financed economic boom

pushed up asset prices and fueled the decrease in global risk aversion in global banks and institutional investors. These forces jointly pushed investment towards emerging market economies (Bruno and Shin (2015), Cetorelli and Goldberg (2012)).¹⁰

This financial cycle, which originated from developed economies, was soon widely transmitted to emerging market economies, resulting in a fast accumulation of cross-border debt, climbing asset prices, and corporate leverage. When the house price suddenly plummeted in 2008-2009 period, the sudden contraction in the credit supply also transmitted to the emerging market world, leading to a "sudden stop" in the cross-border capital flow and a drop in asset prices there. This drastic reversal in global funding market conditions even impaired many emerging market economies' domestic credit intermediation, even though the occurrence and ending of the cycle had purely external origins and was largely uncorrelated to emerging market economies' own real economic conditions.

Figure A2 depicts the initiation and ending of the entire global financial cycle. The solid grey line plots the Global Financial Condition Index (FCI), which is constructed from IMF's GFSR 2018, and the scale is shown on the right-axis. Higher values in the Financial Condition Index means tighter financial conditions, and vice versa. Starting in 2003, the FCI decreased to below zero. Synchronizing this loosening in financial conditions, we see that EME's cross-border credit/GDP ratio increased by nearly 20%. In 2008-2009, when the FCI suddenly tightened from below zero to more than 4, the cross-border credit flow/GDP to the whole emerging market world suddenly dropped to below 35%. This push-factor-driven global financial cycle provides a natural experimental setting for us to explore two issues: how a cycle that is initiated externally (relative to any single emerging market economy) is transmitted to an emerging market economy; and how does its leaving affect the emerging market economy afterwards.

Figure A3 and Figure A5 depict the growth of foreign credit in China and the evolution of the total percentage share of the foreign credit balance of the total credit balance in China, respectively, against the backdrop of the global financial cycle. We measure the total volume of foreign credit in China using the sum of two variables. The first variable is the foreign-currency denominated loan balances issued by all financial intermediaries within the border of China. This variable is available annually from the Almanac of China's Banking and Finance. The second variable is the total cross-border loan balances of the intermediaries that are located outside of China. This variable is available from BIS's Locational Banking Statistics. The total domestic currency-denominated loan balances are also available from the Almanac of China's Banking and Finance. As shown in Figure A5, starting in 2003, the total amount of the foreign credit balance in China grew faster than domestic credit. And Figure A3, between 2003 and 2007, the total foreign credit balance divided by the sum of the total foreign and the domestic credit balance

¹⁰The real monetary policy rate stayed negative over the period of 2002-2005.

increased from 6.5% to over 13%. The evolution of foreign credit in China not only conforms to the external driven global financial cycle, it also indicates that foreign credit was quantitatively important for Chinese economy during that period. Similarly, during the 2008-2009 period, the foreign credit balance decreased dramatically to less than 7.5%, marking the left of hot money.

2.2. *Institutional Background in China during this Cycle*

Aside from the aggregate financial condition changes in the global financing market that function as the external engine that pushes credit from the global market towards emerging market economies, China for two reasons provides an ideal environment for studying the role that domestic banks play in channeling foreign credit and for studying the real impact of that role. First, China's financial market has gone through a big wave of financial globalization since its admission into the WTO. In fact, domestic banks have started to replace foreign banks and become the major role players in channeling foreign credit to domestic firms. Second, for a long time in China only the Bank of China—among the four big state-owned banks—has specialized in foreign currency lending, and this can be attributed to certain political factors. The geographic distribution of Bank of China's branches and its lending market share are pre-determined and sticky relative to the global financing cycle, this gives us exogenous variation in the accessibility of foreign credit that domestic banks provide to local industrial corporations, and that, in turn, allows us to investigate the real impact on local economic outcomes of having access to more domestic bank-channeled foreign credit.

The post-WTO financial opening-up not only includes the further opening-up of foreign banks' operations in China; more importantly, during this process major domestic banks obtained significantly greater access to the global financing market (Garcia-Herrero et al. (2006), Leng (2006), and Branstetter and Lardy (2008)). In 2003, Bank of China became the first state-owned Chinese commercial bank to be selected by the government to be transformed into a publicly-listed shareholding commercial bank. Its transformation into a shareholding company greatly broadened the its funding channels, enabled it to gain ratings and acquire funding in the international market.¹¹ ¹² More importantly, due this wave of financial globalization, during the 2001-2007 episode, domestic banks in China started to replace foreign banks in the foreign currency lending business. Figure A6 compares the percentage of domestic banks and foreign banks' for-

¹¹Accounting information disclosure at international standard was first employed by Bank of China in 2003, detailed information about the balance sheet and income statements by regions, employees compensation plan, investment plans by industry and asset holdings etc.

¹²In 2003, domestic banks' foreign funding balance was only around 0.26 billion USD, when it came to the end of 2007, the foreign funding balance reached 66.8 billion USD. With the public listing, major domestic banks speed up their overseas funding paces through bond and loan issuance. during the episode of 2003-2007, the growth rate of USD bond and loan issuance by domestic commercial banks reached an average of 15.6%.

foreign currency lending foreign currency commercial and industrial lending in China. The sum of the dashed and the solid line represent total share of foreign currency lending balance in total commercial and industrial lending balance. At the end of the 1990s, total foreign currency lending balance was around 22% in total C&I lending balance, and nearly 80% of the FX C&I lending was done by foreign bank. Starting in 2000, the lending balance of foreign banks started to gradually decrease, while the foreign currency lending of domestic banks quickly moved to replace it. By 2003, even foreign banks were overrun.¹³

Moreover, this pattern is also true for second-tier cities and for local firms that are associated with multinational entrepreneurs. Research in 2004 carried out by People's Bank of China, Lianyungang branch, investigated borrowing behavior of 580 joint-ventures in the city (Dong (2004)). Joint ventures are firms that are jointly funded by foreign and domestic partners. These firms are naturally tied to foreign banks at their founding, and, thus, they are more likely to borrow from foreign banks than other firms. Consistent with the situation reviewed by aggregate-level data, the new loan issuance from foreign banks to local joint-ventures decreased by 32.4% in 2003, while the new loan issuance from local domestic banks to these local joint ventures increased by 15%. Among the 68 new joint-ventures established in 2003, none borrowed from foreign banks as their initiation founding. The reason for this replacement is exactly consistent with the findings presented in Jiang and Xu (2019). While foreign banks were only able to take the guarantee of the parent firms of foreign partners a guarantee normally issued in the form of promissory notes that assign future earnings to the lender—domestic banks can accept many more categories of collateral, including land, plants, and equipment. Before domestic banks obtained adequate access to the global funding market, this contracting flexibility was not deployable. As domestic banks became more and more globalized, this flexibility became available and Local firms quickly adopted it

2.3. *Specialty of China: A Single Dominant Domestic Global Bank*

The dominance of the Bank of China in the country's foreign exchange market was driven by special political and institutional background. The Bank of China is the only bank in China that has been operated for more than one hundred years.

Established in 1912, the BOC initially functioned China's central bank under the approval of the provisional president, Mr. Sun Yat-Sun. At that time, the main task of the Bank of China was to transfer and maintain public funds, print money, and act as a fiscal agency. From 1928 to 1949, China went through a series of social revolutions as well as two world wars and internal wars, and the Bank of China was designated to be China's

¹³Foreign banks' declining business in foreign currency lending was not compensated by their RMB lending business during the same period, even though China lifted the restrictions on foreign banks' RMB and deposit taking in China when admitted to WTO, data from Almanac of China's Banking and Finance show that foreign currency lending is still the major lending currency of foreign banks.

special foreign exchange bank. The bank opened branches in international financial centers, such as London, Singapore, New York, and this greatly helped the Bank of China accumulate experience in foreign exchange and market management. Since 1949, due to its special expertise in foreign exchange trading and loan making, which it accumulated following its establishment and during the war period, the Bank of China began to serve as China's only authorized foreign exchange bank.

By 2003, the Bank of China had opened branches in 27 countries with a total of 549 overseas branches, which makes it the most globalized bank in China. Due to the institutional and historical formation of the Bank of China, its dominant role in external funding and the channeling of foreign credit to Chinese firms has been unparalleled among China's commercial banks. The total foreign currency lending balance of the Bank of China reached an historical high of 51.37 billion USD. In 2003, the Bank of China's foreign currency lending balance was about 45.7% of its total lending balance (RMB and foreign currency).¹⁴

3. Data Description

In this paper, we combine data from three main sources: (1) firm-level balance sheet data from the Annual Industrial Survey of China and firm bank relationship lending data CSMAR, Datastream and iFinD; (2) city-level economic data from the Statistical Year Book at either the city or the provincial level; and (3) land transaction and city-level industrial land price data manually extracted from various official websites operated by the Land Bureau of China.

3.1. Firm level data

Industrial firms' asset accumulation, investment, and leverage behavior during the global financing cycle are crucial ingredients of my analysis. Moreover, we wish to investigate how firms borrowing and asset accumulation behavior varies across cities that have different levels of access to China's major domestic global bank (BOC) relative to foreign banks. Two major firm-level databases fit my goal perfectly. The first is the Annual Industrial Survey (AIS in the following paragraphs) and the second is the CSMARs firm-bank relationship lending database for listed firms.

The AIS is a panel survey of all SOEs and privately-owned enterprises that had revenue of at least five million RMBs (about 601.48 k USD in 2003 USD/RMB) during the period 1998 to 2014. The survey includes rich information about firms balance sheets,

¹⁴The Bank of China also is the sole supplier of foreign currency funding in the domestic inter-bank market, allocating foreign currency funding to other domestic commercial banks in China. However, the sum of the foreign currency lending balance of all of the other next largest banks (CBC, ICBC and ABC) was only 20.7 billion USD. In 2003, their foreign currency lending balance was only about 4% of the total lending balance of the other big domestic banks.

income statements, and cash flows as well as the ownership structure of all manufacturing firms. As of 2007, the database consists of more than 330,000 Chinese industrial firms in a wide industry category that includes more than 40 major industrial categories, 90 industrial groups, and 600 industrial classes. The total output value of firms in AIS covers about 95% of China's nation-wide industrial output value. Further, comparing the summary statistics of the total number of firms in each city in the AIS and the city-level total number of industrial firms, the coverage on average exceeds 92%. AIS's high coverage allows us to acquire a perfect measure of the leveraging and asset accumulation as well as the foreign credit issuance of China's industrial firms at the city-level. This is because industrial firms are the main foreign credit issuers in China. We drop SOE's from our sample. This leaves me with a sample of 285,298 firms and 2,368,897 firm-year observations. We rely on the AIS to construct firm-level variables on debt issuance, capital expenditures, and TFP. To measure the leverage of firms, we utilize firms' total debt outstanding scaled by lagged total assets. To measure tangibility of firms, we use the firms' PPE (property, plants and equipment) scaled by lagged total assets. We calculate the firms' TFP for each year from 2003-2009 and aggregate it at city level to gauge the industrial sector's productivity change of in the city over time.

3.2. *City-level Characteristics*

Cities are the other key unit of experimental laboratory of our paper as the source of heterogeneity comes from the city heterogeneous presence of Bank of China. The cities in our analysis are prefecture-level cities, which is the administrative unit one level lower than provincial- or municipality- level administrative unit. There are in total 333 prefecture-level cities in China, with an average 10 in each province.¹⁵ ¹⁶ The average geographical size of a prefecture-level city is comparable to metropolitan statistical areas (MSA) in the U.S.

In this analysis, there are two key sets of variables: the city-level total lending balances of financial institutions in (1) RMB and in (2) RMB plus Foreign Currency. We obtain the city-level total RMB lending balance to the industrial sector from *China City Statistical Yearbook*, and the lending balances in both foreign and domestic currencies from the *China Statistical Yearbook for the Regional Economy*.¹⁷ ¹⁸

Aside from the main variables of concern, we employ a wide category of city-level

¹⁵In our analysis, we exclude Hong Kong SAR and Macao SAR.

¹⁶The establishment of an prefecture-level city must meet the following three criteria: first, the city must have a non-rural population size over 250,000; second, a total gross output value of over 2.5 billion RMB (US\$353 million); third, the total industrial and agricultural output value need to exceed 35% of the local GDP.

¹⁷China City Statistical Yearbook is available from 1985 and China Statistical Yearbook of Regional Economy starts from 2000.

¹⁸In both cases, we supplement the data with the provincial and city-level statistical yearbook for both consistency and completeness of city coverage.

control variables to establish the validity of our identification methodology. We focus on three main categories of city-level characteristics. First are basic macroeconomic development indicators, including GDP, GDP per capita, real GDP growth rate, unemployment rate, and endowment of land supply. Second is the city's industrial structure, among which are the total employment/output in industrial sector, service sector, real estate sector, and financial sector. Third is the city's FDI and Export exposures, among which we include the city's total Export/GDP, FDI/GDP, no. of FDI contracts, % of firms that are exporters. From the China City Statistical Yearbook and the provincial/city-level statistical yearbook we obtain a balanced panel of city-level characteristics for 316 prefecture-level cities. The summary statistics of the city-level variables are provided in Table B1.

3.3. *City-level Land Price and Transactions*

Land is a very special type of asset that joins domestic credit intermediation and cross-border credit intermediation. Because absence of any frictions or limitation on contracting space, land could be used by local firms as collateral to reach both domestic and foreign credit. We obtain the city level land prices and transactions from various resources.

The first piece of this data is city-level industrial and commercial land price data. The main source of this piece of data is the terminal of China Real Estate Information (operated by the National Information Center of China and the China Land Value Monitoring Report.¹⁹ ²⁰ From CREI we obtained collateralized financing by industrial firms at the prefecture city level for 301 prefecture cities. CREI also contains information on industrial and commercial land prices for 70 major cities in China. The China Land Value Monitoring Report records industrial and commercial land prices for 116 cities. Combining these two sources of data and supplementing them with city-level Statistical Yearbook data we obtain commercial and industrial land price data for 214 prefecture-level cities.

The final piece of data for this part is the city level commercial land transactions and commercial mortgage issuance information. This information is collected from the official website of China's Land Transaction website.²¹ The website publishes the *piece-by-piece* land transaction record and land mortgage record. The starting year of the piece-by-piece land transaction record is 1997, each of the 1.8 million total transaction records document the date of the transaction, the buyer and seller of the land, the location of the land, the primary purpose of the land, and the characteristics of the buyer and seller (personal or corporate). The land mortgage publication records a total of 166,756 pieces of transaction between 1999 and 2009. This part of our analysis focuses on transactions between firms and banks.²² Table C6 summarizes data for this part of analysis.

¹⁹<http://www.crei.cn/>

²⁰<http://www.landvalue.com.cn/>

²¹<https://www.landchina.com/>

²²About 80% of the transaction transpires between a local firm and a local bank.

4. Framework of Empirical Tests

In this section, we lay out the framework for our empirical analysis, from which we draw the predictions that will be tested empirically. At the big-picture level, we are interested in the following two questions: 1) Economically, what does the replacement of foreign banks by domestic lenders in cross-border capital transmission boil down to? 2) What does this replacement mean to emerging market economies?

4.1. *Rise of Domestic Banks in Cross-border Credit Transmission: A Completion of Contracting Space*

A salient feature of emerging market economies is their relatively weak legal infrastructure and low average corporate transparency. Based on these facts, (Jiang and Xu (2019)) document that foreign banks and domestic banks have drastically different lending technologies in extending credit to borrowers from EMEs. In particular, while domestic banks often accept domestic fixed assets (primarily land and properties) as collateral for credit issuance, foreign banks rarely conduct collateralized lending against physical assets in emerging markets. This difference in the lending technologies of distinct types of lenders is shown to be related to the challenge that foreign lenders in monitoring and seizing domestic fixed assets.²³ As a result, the credit extended by foreign banks to EME borrowers is largely covenant-based and earning transparency-based.²⁴

Differences in lending technologies translate into differences in the contingency space of cross-border debt contracts when foreign credit is intermediated towards an economy. The replacement of foreign banks by EME domestic lenders in the cross-border credit transmission marks a completion of the *contracting* space that allows credit agreements to be written against domestic hard assets as collateral. In other words, when domestic banks play a major role in channeling cross-border credit, the debt capacity of borrowing firms in EMEs can be made contingent on their choice of asset structure. This option is not available to firms when only foreign banks intermediate external credit; in this case

²³The difficulties that foreign banks have in seizing the physical collateral is reflected in multiple facts. Anecdotal evidence in China's "ghost collateral" cases indicates that domestic steel firms used fraudulent collateral to cheat foreign banks that were unable to conduct frequent monitoring on collateral, and this resulted in big losses from the loan. Furthermore, it has been shown (Jiang and Xu (2019)) that within the emerging market economies, economies that have lower resolving insolvency scores (those economies where it takes longer to register property or longer to resolve insolvency) rarely see foreign bank participation in cross-border loans collateralized by domestic tangible assets. The reasoning is that the more complex and time-consuming the property registration or insolvency process it takes, the higher the cost for foreign lenders relative to domestic lenders it is to make sure the value of the tangible collateral is still guaranteed.

²⁴The work of Jiang and Xu (2019), who examine the same loan package granted to a same borrower, demonstrates that foreign and domestic lenders tend to sort into different tranches that are collateralized by different assets. Furthermore, each 10% increase in the presence of foreign banks in a given tranche decreases by about 23.4% the likelihood that the tranche is secured by land, properties, or real estate, yet it increases the financial covenant inclusion by 13.5%.

the only acceptable collateral is 1) agency guarantee notes and promissory notes of firms or the firms' parent companies with financial covenants, or 2) the assignment of future cash flows etc (Dong (2004)).²⁵

In effect, the increasing role that domestic banks from EMEs play in the transmission of cross-border credit to these economies gives greater flexibility to how the contracts for these credit agreements can be written.

4.2. *Mixed Blessing to the Real Economies*

Increased flexibility in the contracting of cross-border credit agreements can help the economy acquire a more efficient allocation of credit during the easing phase, but it may induce domestic industrial firms to over-reach credit by acquiring domestic hard collateral (land). This dampens asset prices and impairs domestic credit intermediation more during the tightening phase.

During the easing phase of a global financing cycle, if an economy's cross-border credit can only be intermediated by foreign banks, with the limited contracting space they are willing to offer, only the high cash flow transparency firms will get the credit. Consequently, a wedge is likely to emerge between the marginal social value of the last dollar of foreign credit and the marginal productivity of the firm that received it. In this sense, the economy does not fully benefit from the foreign credit supply because the last unit of cross-border capital could have been allocated to the borrowers with a higher marginal product of capital. On the other hand, in an economy in which all cross-border credit flows are channeled by domestic banks, a larger set of borrowers would be eligible to compete for the foreign credit, thanks to the enlarged flexibility in the contracting space. This increased contingency in debt contracting allows firms that have a high marginal productivity of capital to compete for cheap cross-border capital. As such, the economy can reap more benefits from the booming global financial market and boost more of its real economic growth.

However, too much contracting flexibility could induce firms to stretch for debt capacity by overly piling up tangible assets such as C&L land during the easing phase.²⁶ The increased demand for industrial land as collateral drives up the economy's industrial land prices. The higher value of domestic collateral can further generate a multiplier effect, enabling firms that borrow domestic credit to also enlarge their debt capacity. This amplification effect boosts economic growth during the easing phase. But when the

²⁵According to World Bank Doing Business Survey, physical-assets-secured debt in EME is about 75.8% of total non-financial corporate debt. In contrast, Lian and Ma (2018) find that 80% of the debt of U.S. non-financial firms are based on their cash flows, while Benmelech et al. (2019) find that the secured debt on U.S. non-financial firms' balance sheets is steadily declining and the issuance of hard asset secured debt is counter-cyclical.

²⁶The interplay between easing financing conditions and firms' debt capacity stretching behavior has been studied in several previous works, including Calomiris et al. (2017), Almeida and Campello (2007), etc.

global financial condition suddenly reverses, firms find that high tangibility is no longer desirable because there is no need to maintain debt capacity and, thus, they attempt to dump some of the tangible assets they accumulated during the easing phase purely for debt capacity purposes. In this scenario, downward pressure will be exerted on the price of domestic collateral, which impairs firms that borrow domestic credit on the basis of the same set of domestic collateral.²⁷

4.3. Hypothesis for Testing

From the above discussion, which concerns the potential real impact of the rise of domestic banks in cross-border credit transmission to EMEs, some readily testable predictions can be drawn.

Consider two otherwise identical cities A and B. Suppose that during the global financing cycle the volume of foreign credit that the two cities receive is identical. In city A foreign banks channel all foreign credit, whereas in city B domestic banks are in charge of transmitting foreign credit. Based on our discussion in section 4.2, we would expect the real economic outcomes in city B to be more volatile than those in city A during the global financing cycle.

Put formally, in the following empirical analysis, we test the following hypothesis:

Hypothesis: *Conditional on the same volume of foreign credit inflow, a city with a higher fraction of foreign credit flowing into its industrial firms channeled by local domestic banks would*

- *enjoy faster real GDP growth, faster growth of employment in industrial sectors, faster industrial firm TFP growth, and faster overall domestic credit growth during the episode of 2003-2007;*
- *but it also would experience a more severe slow-down in their real GDP, industrial employment and firm TFP growth during the 2008-2009 tightening period.*

Throughout the global financing cycle we also expect that cities that have a higher share of domestic bank-channeled foreign credit will be associated with a more volatile price of domestic collateralizable assets, such as C&L land. Furthermore, firms in such areas tend to respond in their asset structure choice when they seek to issue more foreign credit during the easing phase of the financing cycle. In what follows, we empirically test the implications generated by this mechanism using a natural experiment in China during the global financing cycle of 2003-2009.

²⁷The negative effect of collateral price drop on corporate financing capacity has been investigated by numerous works, such as Gan (2007), Chaney et al. (2012), Cvijanovi (2014), etc.

5. Real Impact of Domestic Bank-Channeled Foreign Credit at city level

In this section, we investigate how the structure of cross-border credit can impact real outcomes. By exploiting variations at the city level, we examine how the share of domestic bank-channeled foreign credit affects a city's real GDP growth, employment growth, and firm TFP growth during the global financing cycle. We conduct the analysis for the boom period, 2003-2007, and the downturn period, 2008-2009.

5.1. *Measuring Domestic Bank-Channeled Foreign Credit*

The goal of this section is to establish causal correlations between local access to domestic bank-channeled foreign credit and local real economic outcomes. We start by constructing the key variable in our analysis, which is the share of foreign credit that was channeled by domestic banks in each city during 2003-2007.

Before constructing a measure of domestic bank-channeled foreign credit, we document a series of characteristics of foreign credit borrowing by industrial firms in China. We find the following three properties of Chinese industrial firms' domestic (proxied by RMB borrowing) and foreign credit borrowing (proxied by FX borrowing):

1. Firms' domestic credit and domestic relationship lending tend to be local;
2. Firms' foreign credit **from foreign banks** tend to be given from foreign banks outside city where the firms is located;²⁸
3. Firms' foreign credit **from domestic banks** tend to be from local branches of a domestic global bank (BOC).

Utilizing lending relationship and bond issuance information for 2916 firms from CS-MAR, Datastream and iFindD, we construct a panel of firm-bank paired lending (or bond issuance) with information on the firms' location, the lenders' location, and the loan's currency of denomination over time.²⁹ On average, for each firm there are 5.89 RMB-loan relationship domestic banks. Of these, 4.56 are located in the same city as the firms for which they arrange loans; for each firm in a given year, 87.2% of total RMB borrowing is acquired through banks located in the firm's home city. Finally, of the 1073 (out of 2916) companies' with USD borrowing, 622 companies borrowed from foreign banks outside their own city location; among those who borrowed USD from local banks in their own city, 80.4% of the borrowing amount came from a BOC branch in that city. An extreme case is the bond issuance behavior of some large industrial firms: Feihe Dairy is a big dairy manufacturer headquartered in Qiqiha'er, a prefecture-level city, in the province of

²⁸Here we exclude four big cities in which there is a high presence of foreign bank offices: Beijing, Shanghai, Guangzhou and Shenzhen.

²⁹We restrict the sample to firm-bank pairs that have lending relationships that span at least 3 years.

Heilongjiang. In 2005, the company tried to issue USD debt, but because the presence of Bank of China branches in the city is low, the company ended up issuing USD bond.³⁰

Given these documented lending patterns, we utilize the de facto measure to capture the share of domestic bank-channeled foreign credit. That is, we calculate the percentage of total foreign credit flow into the city's industrial sector firms that's lent directly by domestic banks:

$$\% \text{Domestic foreign credit} = \frac{\Delta D_c^{\text{FX},03-07,\text{domestic banks}}}{\Delta D_c^{\text{FX},03-07}} \quad (1)$$

$$= \frac{\Delta D_c^{\text{FX},03-07,\text{domestic banks}}}{\Delta D_c^{\text{FX},03-07,\text{foreign banks}} + \Delta D_c^{\text{FX},03-07,\text{domestic banks}}} \quad (2)$$

where c indexes city. The numerator is the total foreign credit flow into the industrial sector that is lent out by domestic banks, while the denominator is total foreign credit flow to the local industrial sector of city c . Throughout our analysis, we proxy the foreign credit using the foreign currency denominated loan and the domestic credit using the RMB denominated loan.

We construct the measure through three steps. First, we aggregate the local industrial firms' total net debt increase from 2003-2007 using the AIS firm balance sheet data. This gives us the measure of total credit flow, including that of domestic credit and foreign credit, into the local industrial sector during the 2003-2007 period.

$$\Delta D_c^{\text{total},03-07} = \underbrace{\sum_i \text{Total debt}_{2007}^{i,c} - \sum_i \text{Total debt}_{2003}^{i,c}}_{\Delta D_c^{\text{FX},03-07} + \Delta D_c^{\text{RMB},03-07}}$$

where i indexes firm i in the industrial sector and c indexes the city. The above expression measures total credit flow into the industrial sector of city c , including both foreign currency denominated and RMB denominated credit.

In the second step, we utilize the data from the city level statistical yearbooks, which gives us the total RMB lending balances to the city's industrial sector of the local banks. We subtract from $\Delta D_c^{\text{total},03-07}$ to get the total foreign credit flow to the industrial sector in city c —i.e., the denominator in 1. To be more precise, we construct

$$\widetilde{\Delta D_c^{\text{FX},03-07}} = \Delta D_c^{\text{total},03-07} - \left[\sum_b (\text{RMB loan balance}_{2007}^{b,c}) - \sum_b (\text{RMB loan balance}_{2003}^{b,c}) \right]$$

³⁰Another real-world example is that of Fuyao Glass and Luoyang Glass, each of which is a major glass product producers in China. Fuyao Glass is located in Fuqing city, in the province of Fujian. In 2006, the firm tried to borrow USD debt, but because there were no BOC branches in the city at that time, the firm borrowed from Citibank Beijing and Citibank Guangzhou. In contrast, that same year, Luoyang Glass, which is located in Luoyang, a city in which BOC has a market share of over 21.1% in 2006, borrowed USD directly from BOC.

where b indexes banks and c indexes the city. In other words, we subtract the total incremental of a firm's debt balance by the incremental of the local banks' RMB lending balance. Noting the empirical pattern wherein the RMB borrowing of firms tend to be from local banks while foreign currency borrowing tends to be from banks located outside of the firm's city, we estimate the firms' total foreign credit issued during the 03-07.

In the third step, while still utilizing the data from city level statistical yearbook, we extract the total foreign currency loan balance increase of local domestic banks through 2003-2007. In other words, we carry out the following approximation:

$$\widetilde{\Delta D_c^{FX,03-07, \text{domestic banks}}} = \sum_b (\text{FX loan balance}_{2007}^{b,c}) - \sum_b (\text{FX loan balance}_{2003}^{b,c})$$

Combining the above three steps, our measurement for domestic bank-channeled foreign credit in city c is:

$$\% \text{Domestic foreign credit} = \frac{\widetilde{\Delta D_c^{FX,03-07, \text{domestic banks}}}}{\widetilde{\Delta D_c^{FX,03-07}}}$$

Summarizing the constructions just described, to construct measures for the total foreign credit that is channeled by local domestic banks at the city level, we combine AIS firms' balance sheet data and local domestic banks' annual year-end lending balance data from city-level statistical yearbook. The construction is based on the fact that the domestic credit of Chinese industrial firms tends to come from local domestic banks, while foreign currency credit tends to come either from a foreign bank outside of the city or a local domestic global bank.

5.2. Baseline Correlations

Having constructed the measure for our key economic variable, We start the analysis with the following set of baseline regression equations that correlate the percentage of domestic global bank-channeled foreign credit with city-level real economic outcome variables.

$$\begin{aligned} \Delta(Y_{03-07})_c &= \alpha + \beta^{\text{easing}}(\% \text{Domestic share of foreign credit}_{03-07}) + \gamma \mathbf{X}_c + \epsilon_c \\ \Delta(Y_{08-09})_c &= \alpha + \beta^{\text{downturn}}(\% \text{Domestic share of foreign credit}_{03-07}) + \gamma \mathbf{X}_c + \epsilon_c \end{aligned} \quad (3)$$

where c indexes a prefecture-level city. Y , the main outcome variable, includes real GDP, the total number of employees in the industrial sector, and the average TFP growth rate of local industrial firms. $\Delta(Y)_c$ is constructed to reflect the average growth rate of the outcome variable between 2003-2007. We calculate the ΔGDP as $\text{Ln}(\text{GDP}_{04-07}) - \text{Ln}(\text{GDP}_{00-03})$, we construct ΔEmp as $\text{Ln}(\text{Emp}_{04-07}) - \text{Ln}(\text{Emp}_{00-03})$ and we construct

Δ TFP growth as $\text{TFP growth}_{04-07} - \text{TFP growth}_{00-03}$. GDP is the real GDP, and GDP_{04-07} is the average GDP of a city between 04-07. Emp is the total number of employees in the industrial sector of the city, and Emp_{04-07} is the average industrial sector employees in the city from 04 to 07. TFP growth is the city-level average of all industrial firms' TFP growth in a given year, while $\text{TFP growth}_{04-07}$ is the average city-wide industrial TFP growth from 2004-2007. \mathbf{X} is a vector of city-level control variables that include the total foreign credit to the city scaled by the city's total credit, the agricultural labor share, the industrial sector labor share, the financial sector labor share, the real estate sector labor share, the average labor wage, unemployment rate, total fixed asset investment scaled by GDP, total population, total land resource, and total foreign-owned firms' value-added scaled by total value-added by all firms.

The coefficients of interest are β^{easing} and β^{downturn} , which capture the effect of having a higher percentage of domestic banks that channel foreign credit towards the local industrial firms, holding other variables fixed. Importantly, to maximize the explanation power of the coefficient, we must control for the level of foreign credit to the city (as a share of total credit to local firms). Otherwise the observed strong correlation between domestic banks-channeled foreign credit share and the real local economic outcome variables could simply be driven by the effect of the differential volume of foreign credit to different cities.

Table B4 and Table B5 show the results of the baseline regression. In Table B4, we find that holding the volume of foreign credit, a 10% increase in the share of domestic bank-channeled foreign credit is associated with 2.6% faster real GDP growth at the city level, a 5.57% higher industrial sector employment growth rate, and a 2.08% increase in the TFP growth rate of local firms. On the other hand, Table B5 indicates that when global financing suddenly tightened in 2008-2009 (and holding the level of total foreign credit flow), a 10% higher share of domestic bank-channeled foreign credit during the easing phase of global financing cycle was associated with a 2.20% reduction in real GDP growth during the downturn, a 1.12% decrease in industrial sector employment growth, and a 2.47% decrease in TFP growth.

These results show that, on the one hand, having a higher share of foreign credit channeled by domestic banks can boost the local real economy growth more during the easing phase of global financial cycle; but on the other hand, it can also result in more severe real sluggishness when the foreign credit suddenly leaves exogenously. Overall, our results suggest that when everything else remains the same, cities that have a higher share of foreign credit channeled by domestic banks experience more volatile real economic outcomes during the global financing cycle.

5.3. Identification Challenges

Although telling, the analysis just described focuses on the documentation of novel correlations. Identifying the causal effect of having a high share domestic bank-channeled foreign credit on local real economic outcomes is challenging for two reasons.

First, the de facto measures of the share of foreign credit received by local industrial firms from domestic banks are equilibrium outcome variables, and these would be determined jointly by credit demand factors and credit supply factors. In this situation, equation 3 will not satisfy $E[\%Domestic\ foreign\ credit_{2003-2007}\epsilon_c] = 0$ because there might be unobserved local factors that are driving up the channeling of foreign credit by domestic banks. This would result in an upward bias of the coefficient of estimation and, more importantly, the estimation would become meaningless. This is so because the ultimate driving force of the observed volatility in real outcome would reside on the demand side and could not be attributed to the role that domestic banks play in transmitting foreign credit during the global financial cycle.

The second challenge is a reverse causality issue. Consider, for example, the boom phase of the financing cycle. Suppose in a city there are many firms that have a high growth potential. In this situation, local domestic banks might find that to meet the demand for credit they need to reach out to the international financing market. In this case, the high share in foreign credit channeled by domestic banks for this city is actually the outcome of the high growth potential of firms in the city. In other words, it would be logically incorrect to attribute the high real growth rate in this city during the boom period to a relatively high share of domestic bank-channeled foreign credit.

In the remainder of this section, we conduct an IV analysis to construct the exogenous component in city-wise variation for identification.

5.4. Instrumental Variable Analysis

The ideal experiment would be as follows. Consider otherwise identical cities *A* and *B*. During the easing years of the global financial cycle 2003-2007, industrial firms in both cities received \$100 USD foreign credit. But for some completely exogenous reasons, for city *A* \$80 of the \$100 USD was lent by local domestic banks; while for city *B* only \$20 was lent by local domestic global banks and the other \$80 was lent by foreign banks. In this setting, differences in real outcomes in the two cities are likely to be driven by the distinctive character of the foreign credit flow to each city.

That said, to obtain the composition differences in the percentage of cross-border credit flows that domestic banks channel into the region, we need exogenous variation in some factors across cities that will precipitate the equilibrium differences seen in the compositional difference. In the case of China, what allows us to conduct this exercise is the fact that a single specialized bank—the Bank of China (BOC) supplies foreign cur-

rency lending and provides access to the global funding market for non-financial firms in China.

The existence of a single dominant domestic global bank provides a perfect source of within-country regional heterogeneity in the access of domestic industrial firms to foreign credit during the 2003-2009 global financial cycle. Figure 8(b) displays the distribution of Bank of China branches across China's 316 cities. The figure shows the number of Bank of China branches per 10 local commercial bank branches in 2002. The cities marked in red are located in areas that have the densest distributions of Bank of China branches, with an average of more than 2 BOC branches in 10 local commercial banks. Although the eastern and coastal regions of China are traditionally regarded as especially developed and open, many cities in the inland regions also have an intensive Bank of China branch distribution. In every province that contains on average 13-16 prefecture cities, there are red-, orange-, and blue-shaded cities, indicating rich within-province heterogeneity. Similarly, in Figure 8(a), we display Bank of China's market share in local commercial banks lending market across the 316 prefecture-level cities in China in 2002. The rich heterogeneity is also apparent in and consistent with the distribution of BOC branching intensity.

(I) Construction of Instrumental Variables

To approximate this ideal setting and overcome the challenges mentioned above, we employ an instrumental variable and utilize the stickiness in the branch network structure of the dominant domestic global bank, the Bank of China. The network structure of the Bank of China across cities fits our purposes well for two reasons. First, as described in section 2.2, of the four largest banks in China, the Bank of China plays the most substantial role in the foreign currency credit market. That being said, firms located in cities where the Bank of China has a relatively high market share can access to domestic bank channeled foreign credit more easily, if lending is local. Second, the branching structure of the Bank of China across cities, as measured by the Bank of China's market share among all commercial banks in each city, was formed over the long run in the past and has been sticky over years.³¹ Therefore, when the 2003-2009 global financing cycle arrived, Bank of China's local branching concentration and local market share were likely to be orthogonal with both the external financial cycle and local demand-side factors that could interact with the global financial cycle.

Combined together, the variation Bank of China's local market share across cities can provide us with a source of exogenous variation in the city-level foreign credit structure that we need for identification purpose. Therefore, by instrumenting the de facto share of domestic bank-channeled foreign credit **flow** with the pre-cycle share of the total lending **stock** balance of the Bank of China among all commercial banks in the city,

³¹China's banking market was concentrated and was not deregulated until after the 2009 crisis. Before deregulation, domestic commercial banks could open only a limited number of branches in each city (Gao et al. (2017)).

we are able to extract the component of the domestic channeled foreign credit that is exogenously determined. In particular, we construct two instrumental variables using the Bank of China's total loan balance market share in city c during the year 2000-2002 $Z_c = Ave. \sum_{t=2000}^{2002} (\frac{Bank\ of\ China\ loan\ balance_{c,t}}{Total\ loan\ balance\ financial\ institution_{c,t}})$, and BOC's branching intensity in different cities before the financial cycle in 2002:

$$(IV-1) Z_c^1 = Ave. \sum_{t=2000}^{2002} \left(\frac{BOC\ loan\ balance_{c,t}}{Total\ loan\ balance\ financial\ institution_{c,t}} \right)$$

$$(IV-2) Z_c^2 = \left(\frac{\#of\ BOC\ branches_{c,2002}}{Total\ \# \ of\ bank\ branches_{c,2002}} \right)$$

(II) Validity of Instrument

Our reduced form estimation will causally identify the effect that having more domestic bank-channeled foreign credit has on local real economic outcomes if the geographical concentration of domestic global banks across cities is not sorted on the basis of local characteristic variables that affect the economic variables of the global financial cycle. One example of the problematic sorting would be that the Bank of China is particularly concentrated in cities that host higher-than-average numbers of exporting firms or FDI projects. Where this is the case, the easing phase of the global financial cycle will lead to a higher demand because of local exporting firm demand and local FDI demand. These special demand-side factors drive up the relative percentage of domestic bank-channeled foreign credit during the easing phase, and these variables will also drive up other local real economic outcome variables, such as real GDP and employment. The regression results thus cannot be interpreted as the causing effect of having a higher domestic bank-channeled foreign credit on local real outcomes.

We establish the exogeneity of the Bank of China's city-specific distribution measure by both the intensity of its branch offices and the loan market share in the city to a rich set of pre-cycle city-level observable characteristic variables. First, we consider the city-level employment distribution across major economic sectors. City-level observable characteristics in this category includes local employment in industrial sectors, real estate sectors, service sectors and financial sector. The second category of local characteristic variables consist of a set of variables that measure a city's basic economic development speed. We include in this category local real GDP growth rate, GDP per capita growth rate, transportation capacity growth rate, city-level construction land areas, and arable land areas. The third category of local variables to be tested consists of measures of city-level FDI and export exposure. We include local FDI/GDP, local export income/GDP, % of local industrial firms that are exporters % of local industrial firms that have foreign ownership, and the output value/GDP of local joint-venture firms. Specifically, I test the following

correlation

$$Ave.X_{c,1999-2002} = \alpha + \beta BOC_{c,2002} + \epsilon_c$$

The left-hand-side variable is the average city-level characteristic variable during the 1999-2002 period, while the right-hand-side variable measures BOC presence in the city; it is either the number of BOC branches per 10 local commercial bank branches in 2002 or the BOCs year-end loan balance in the city in 2002.

The results of the test are reported in Table E3 and Table E4. In Panel A of Table E3 and Table E4, we find that the presence of the Bank of China is slightly positively correlated with local GDP per capita. In all baseline specifications, we include the local GDP per capital as a baseline control variable. Other than this variable, the BOC's local branching intensity is not correlated with other indicators that measure pre-cycle local economic potential and resource endowment. In Panel (B), we report the correlation between measures of BOC presence and local labor force structure by sector. We find no statistical significance between measures of local BOC presence and the percentage of local employees who work in the industrial sector, which is the main focus of this paper.

We also find no significant correlation between local BOC presence and local employment in the real estate sector. The weak correlation between the local BOC presence and the sectoral distribution of labor employment helps us enhance the strength of IV in the respect that the local presence of BOC is unlikely to be correlated to the geographic distribution of specific sectors. Thus any potential reasons that global financial cycle might favor growth of specific sectors is not likely to be correlated with the relative supply of domestic channeled foreign credit by the BOC in the local area.

Finally, in Panel (C), we establish a correlation between local FDI exposure and local BOC presence. In Panel (C) of Table E4, we find a slight positive correlation between the local BOC presence (measured by loan balance market share) and the output/ GDP of local foreign-owned firms. To address this concern, we include this variable in all of our baseline controls.

(III) Baseline Results of IV Regressions

In our IV analysis, we estimate the following two-stage regression model:

First stage:

$$\Delta\%Domestic\ share\ of\ foreign\ credit_{c,03-07} = \alpha + \beta Z_c + \theta X_c + \epsilon_c$$

Second stage:

$$\begin{aligned} \Delta(Y_{03-07})_c &= \alpha + \beta^{easing}(\%Domestic\ share\ of\ \widehat{foreign\ credit}_{03-07}) + \gamma X_c + \epsilon_c \\ \Delta(Y_{08-09})_c &= \alpha + \beta^{downturn}(\%Domestic\ share\ of\ \widehat{foreign\ credit}_{03-07}) + \gamma X_c + \epsilon_c \end{aligned} \tag{4}$$

Table B6 shows the results of first-stage regressions using the pre-cycle BOC market

share and pre-cycle BOC branching intensity as the instrumental variable. A 10% increase in the pre-cycle BOC lending balance market share is associated with a 22.7% increase in the domestic channeled foreign credit during the easing phase of the cycle. A 10% increase in the number of branches in the city's BOC branch network is associated with a 6.31% higher domestic channeled foreign credit during the easing phase of the financial cycle.

Tables B7 and B8 show the results of the 2SLS regression of equations 4. Columns (1), (3) and (5) of Tables B7 and B8 provide the regression results of local real GDP growth with respect to the domestic channeled foreign credit using the pre-cycle BOC market share as the instrumental variable (IV-1). Columns (2), (4) and (6) show the results when BOC pre-cycle branching intensity is used as the instrumental variable (IV-2). Comparing the results with the cross-sectional regression results, we find that the 2SLS results hold robustly. A 10% higher domestic-channeled foreign credit leads to a real GDP growth that is 1.93% faster, a 4.08% higher industrial sector employment growth, and a 1.58% faster local TFP growth during the booming phase of the global financial cycle. But in accordance with our cross-sectional analysis, we find that a 10% higher domestic-channeled foreign credit leads to a 1.99% decrease in the local real GDP growth rate, a 2.01% slowdown in local employment growth in the local industrial sector, and a 1.78% slowdown in local TFP growth when global financial conditions tightened.

5.5. *Allocation of Credit*

In this subsection, we further investigate the real impact of having a higher share of domestic bank-channeled foreign credit in a city during the easing phase of the global financing cycle. In previous sections, we showed that cities that have a higher share of domestic bank-channeled foreign credit experience faster real output growth, faster employment growth, and higher TFP growth. Consider two cities that have comparable levels of foreign credit but a differential proportion of the foreign credit channeled by local domestic banks. If they display differences in real outcomes, it must be that in the two cities the same amounts of foreign credit are allocated differently. To create the mapping between the lender difference and the real outcome difference, the following must hold. First, more credit must have been allocated to firms that are more able to reach credit that is collateralized by hard assets, if they are located in cities that enjoy easier access to domestic banks that channel foreign credit. Second, these firms should experience a higher growth potential in terms of their production expansion and productivity; thus, they are able to create more employment and TFP growth at the city level. To test these two conjectures, we use disaggregated firm-level data across cities and examine two categories of firms: those that had already been operating; and those that were new entrants.

(I) Credit Allocated to Incumbent Firms

We start with our analysis of credit allocation among the incumbent firms. The regression specification is written as follows:

$$\Delta D_{i,j,c} = \alpha + \gamma_j + \beta_0 \text{DCFC}_c + \beta_1 \text{DCFC}_c \times 1[\text{Char}] + \theta X_{i,c} + \epsilon_{i,j,c} \quad (5)$$

where i indexes firm i , j indexes industry j , and c indexes city. $\Delta D_{i,j,c}$ is defined as $\text{Ave.} \frac{\text{Current Liabilities}}{\text{Total Assets}}_{04-07} - \text{Ave.} \frac{\text{Current Liabilities}}{\text{Total Assets}}_{00-03}$, which is the *within-firm* incremental in leverage ratio post the financial cycle compared to its pre-cycle level. DCFC_c stands for city c 's domestic bank-channeled foreign credit for the 2003-2007 time period, which is defined above. $1[\text{Char}]$ is an indicator variable that specifies the features of the firm. It could be $1[\text{High-tangibility}]$, $1[\text{Young firm}]$, $1[\text{High pre-ROA}]$.³²

Table C1 shows the regression results of the above specification. For all of the three dimensions of firm characteristics, we conduct both OLS regression and IV regression using the two instrumental variables constructed in section 5.4. We find that a 10% increase in the city-level domestic bank-channeled foreign credit is associated with an average 3.6% increase in credit (compared with other firms) allocated to firms in high-tangibility industries; an average 1.45% increase in credit allocated to firms that are less than 7 years old; and an average 1.06% more credit allocated to firms with high pre-cycle ROA.

In Figure C1, we demonstrate the dynamics of the credit growth of forms organized by firm characteristics and their pre-cycle exposure to BOC in the city. To display the comparison more clearly, we run the regression while separating firms according to whether their pre-cycle local BOC market share is above or below median, and we run the regression for young/old firms and high-ROA/Low ROA firms separately. The regression equation is specified as follows:

$$D_{i,j,c,t} = \alpha_i + \gamma_{j,t} + \sum_{\substack{q \in [2000-2007] \\ q \neq 2003}} \beta_q 1[t = q] + \theta X_{i,c,t} + \epsilon_{i,j,c,t}$$

The coefficient estimates and 95th confidence intervals are plotted in Figure C1. Consistent with the static cross-sectional regression conducted above, the year-to-year credit growth of firms does not seem to be different across young/old groups or high-ROA/low-ROA groups before the initiation of the global financial cycle. This is true for both high-BOC exposure and low-BOC exposure cities. However, following the initiation of the global financial cycle, young and high ROA firms located in cities that have strong BOC exposure started to display high credit growth on their balance sheet a higher credit growth than that experienced by older or less profitable, and the dispersion is statistically significant. When the tightening phase of the cycle was reached, however, the

³²“High-tangibility” is defined as firms that have average PPE/Assets of above 0.45 during 2000-2003 (or above the 75th percentile). “High pre-ROA” is defined as those firms that had an average annual ROA above 0.07 during 2000-2003 (or above the 75th percentile). A “young firm is defined as those that in 2003 were less than 7 years old (the median of overall firm age distribution is 7).

pattern was reversed: young and profitable firms in cities that had higher pre-cycle BOC exposure experienced a more drastic slowdown in their debt capacity.

(II) Credit Allocated to Newly Entered Firms

We now turn our analysis to new firms. To start, we run the city-level regression paralleling equation 4. The left-hand-side variable is the total number of newly entrant firms during 2003-2007, and on the right-hand side, the main regressor is the fraction of total foreign credit channeled by domestic banks. The control variables are those defined in regression equation 4:

$$\Delta \text{New firms} = \alpha + \beta \text{Domestic channeled foreign credit} + \gamma X_c + \epsilon_c$$

Table C2 shows the result of this specification. Column (1) shows the OLS regression results and column (2) and (3) the results of 2SLS regressions using IV-1 and IV-2, as defined above. A 10% higher domestic bank-channeled foreign credit during the boom period is associated with a 4.04% increase in the total number of new firms that are entering the local industrial sector.

Why have more new firms in cities that have easier access to domestic global banks entered the industrial sector while fewer new firms have entered in cities that have parallel levels of total foreign credit but a poorer domestic global bank presence? Remember that a crucial difference between domestic banks (BOC) and foreign banks is that the former can complete the contracting space by writing debt contracts that are based on the tangible assets of local firms. By investigating the new entrant firms' tangibility property, we can verify and strengthen our conjecture. Table C3 and Figure C2 visualize this part of the analysis.

In Table C3, we show the summary statistics of new entrant firm tangibility and compare it to that of pre-existing firms in the economy. We define tangibility as the total book value of PPE scaled by total assets. Consistent with our conjecture, new entrant firms are more tangible than incumbent firms on average: the median tangibility of existing firms is 0.309, while the mean tangibility of new entrant is 0.343. Furthermore, the median tangibility of new entrant firms in cities that have a high pre-cycle BOC market share (above the 75th percentile, or 33.2%) is 0.393.

In Figure C2, we compare the tangibility distribution of new entrant firms and incumbent firms in the economy overall and in cities with High and Low pre-cycle BOC market share. In the left panel of Figure C2, we compare the tangibility of new entrant firms located in cities that have a high pre-cycle BOC market share and the overall tangibility of pre-existing firms. The five bins are sorted on the basis of the corresponding industries' average tangibility during 1998-2003. The height of the bars represents the percentage of incumbent firms/new entrant firms that come from industries with representative tangibility within the range marked below the bar. It is apparent that the industrial tangibility

of new entrant firms is significantly more distributed to the right than that of the incumbent firms. The right panel compares the new firms tangibility distribution in high BOC-exposure cities and low BOC-exposure cities. The comparison remains sharp.

In Table C4, we conduct a regression analysis that parallels columns (3)-(6) of Table 5, which analyzes the credit growth of young firms in cities. The young firm here is an extreme case; these are new firms that entered between 2003 and 2007. The results are qualitatively and quantitatively similar to those presented in columns (3)-(6) of Table 5, new entrant firms located in cities that have a 10% higher share of domestic bank-channeled foreign credit see an average 2.68% increase in borrowing during the easing phase.

(III) From Credit Allocation to Real TFP Changes

In parts (I) and (II) of this section, we established the overall effects (direct and indirect) on firm credit allocation of having a higher share of domestic bank-channeled foreign credit: (1) young firms from high-tangibility sectors that have a high pre-cycle ROA tend to be able to expand their debt capacity substantially if they are located in cities that provide greater domestic-channeled foreign credit; (2) new firms from high-tangibility sectors tend to be more able to enter the industry, while new firms located in cities that have high domestic-channeled foreign credit tend to have higher overall credit growth.

How does this map onto the differential cross-city differences in TFP growth that we demonstrated in Section 5? Figure C3 shows the overall aggregate TFP growth of firms and firms located in cities that have different pre-cycle BOC market shares. Consistent with the 2SLS regression analysis, firms in cities that have a high pre-cycle BOC market share did bring more volatility to the city's TFP during the cycle.

In Figure C4 and Figure C5, we demonstrate that the enlarged debt capacity of young and high-ROA firms from relatively tangible sectors drove up the TFP growth more in cities that had a higher share of domestic bank-channeled foreign credit. In Panel (a) of C4, we show that across all tangibility bins, young firms had a significantly (about 1.5%) higher TFP growth than old firms. In Panel (b), we show that because of their enlarged debt capacity, young firms located in cities that had a high domestic-channeled foreign credit saw significantly higher TFP growth than older local firms. Similar patterns hold for firms that had high pre-ROA.

In summary, our finding shows that during the study period, a high domestic banks presence led to higher domestic-channeled foreign credit, which translated into a higher debt capacity in new, young, and high ROA firms in tangible sectors. This was so because these firms generally had higher TFP growth, and their enlarged debt capacity contributed to higher city-level TFP growth during the easing phase.

6. Domestic Credit Intermediation during the Global Financing Cycle

In section 5, we demonstrate that given the same level of foreign credit exposure, cities in which a higher share of foreign credit was being channeled by domestic banks had more volatile real outcomes during the 2003-2009 global financing cycle. In particular, we find that these cities enjoyed a higher growth rate in local GDP, employment, and firm TFP during the boom period, but they experienced a more severe slowdown in these real economic outcomes when the hot money suddenly left. A question immediately comes to mind: When the same amount of foreign credit comes and leaves two cities, why is one city affected a lot while the other is considerably less affected?

In this section, we investigate the mechanism that underlies the linkages between more volatile real economic outcomes and higher shares of domestic bank-channeled foreign credit.

6.1. *Lending relationship of domestic banks without global funding access*

More volatile real economic outcomes are usually associated with more volatile credit issuance. Given that the comparison described above experiences the same level of exposure to foreign credit, one natural conjecture would be that volatility in domestic credit issuance drives the excessively volatile real outcomes.

It is not difficult to imagine that in all cities, the foreign currency borrowing of industrial firms will co-move closely with the dynamics of the global financial cycle. This is almost by definition how the supply of foreign currency credit is determined by the global financial market. However, it would be more surprising if the domestic currency borrowing also expands and shrinks sharply over the global financial cycle. After all, the funding cost in the domestic financial market should not be directly affected by changes in international financing market conditions.

In this section, we show that behind the excessive volatility in real economic outcomes is a more affected domestic credit intermediation. In particular, we focus our attention on local firms' lending relationship associated with domestic banks that have no access to the global financing market. In principle these domestic local banks should be immunized to fluctuations in the global financing market because their stable funding source is the domestic financing market.

More precisely, we find that the credit issuance amount of firms that continually borrow from their domestic banks tended to increase during the 2003-2007 global financial cycle and decrease during the 2008-2009 downturn years. Moreover, the sudden expansion and shrinkage of loan amounts is more likely to happen in firms that borrow on the basis of their plant, land and property holdings and in firms located in cities that have highly volatile commercial and industrial land prices. Also, the borrowing capacity

of firms that display sudden expansions and contractions in their borrowing constraints tend to be those that are from high-tangibility industrial sectors.

6.2. Empirical results

In this part, we display the empirical evidence that supports the argument outlined above.

(I) Empirical Specification

To construct the sample for our analysis, we use a panel of firm-bank pair dataset compiled from CSMAR and Datastream, and using a identification technique similar to the one used by (Khwaja and Mian (2008)), we study how loan amounts change within firm-bank pairs during the global financial cycle. We also examine how it interacts with whether the firm is located in a city that went through high land price changes during the financing cycle and whether the firm is from a high-tangibility sector. The summary statistics of the sample used in this section's empirical analysis are shown in Table C5. Our sample covers a total of 3287 firms in 60 major Chinese cities, most of which are listed firms. The average number of relationship banks of firms is 5.89, while the average number of relationship years is 4.6. The sample covers all firms borrowing from their relationship banks during the 1999-2013 time period. We write down the following baseline specification to study how the firms' borrowing amount changes as the global financial cycle condition changes.

$$\begin{aligned} \ln(1+\text{Amount})_{f,b,t} &= \alpha_f + \mu_b + \beta_1 1[\text{Easing/Tightening}]_t \\ &+ \beta_2 1[\text{Easing/Tightening}]_t \times 1[\text{Land}]_{f,b,t} \\ &+ \beta_3 1[\text{Easing/Tightening}]_t \times 1[\text{Land}]_{f,b,t} \times 1[\text{High C-P}]_f + \gamma x + \epsilon_{f,b,t} \end{aligned} \quad (6)$$

where f indexes firm, b indexes bank and t indexes year. The left-hand side is the loan amount from bank b to firm f in year t . $1[\text{Easing}]_t$ is a dummy variable that switches to 1 if the year range is 2004-2007 and $1[\text{Tightening}]_t$ is a dummy variable that switches to 1 if the year range is 2008-2009. $1[\text{Land}]_{f,b,t}$ is an indicator variable that takes the value of 1 if firm f 's borrowing from bank b is based on land, properties and real estate asset as collateral. $1[\text{High C-P}]_f$ is an indicator variable that takes the value of 1 if firm f is located in a city that has high commercial land price volatility during the global financial cycle. ³³

(II) Baseline results

Table C7 and Table C8 display the results of the above baseline specifications in the

³³A city is defined as one with high commercial land price volatility if $\frac{\text{Commercial land price}_{08-09} - \text{Commercial land price}_{07}}{\text{Commercial land price}_{07}}$ is larger than or equal to 15.39%, which is the 75-th percentile of price jump among all the 214 cities.

easing phase and tightening phase, respectively. Firm level fixed effects and bank level fixed effects are included to control for time-invariant factors that might be correlated with the dynamics of the credit amount on both the firms' and the banks side. The industry-year fixed effect is included to capture time-varying industry-wide factors that might be systemically correlated with the cycle and, thus, systemically affect the loan issuance volume of firms in certain industries. Also, the firm-bank pair fixed effect is included so that we can remove variations driven by pair level invariant factors.

In column (1) of Table C7 we show the correlation between the indicator of easing phase of the global financial cycle and the average borrowing amount of firms without interaction terms. On average, during the easing phase, firms' borrowing amount increase by 18.5% from a given relationship domestic bank, despite the fact that these domestic banks do not have access to the booming global financing market. Similarly, shows that during the tightening phase in 2008-2009 of the global financing cycle, the amount that firms borrowed from their domestic relationship lenders in the local area shrank on average by 37.1%. These facts suggest that the lending relationship of domestic local banks, which are not directly affected by global financial conditions, also responded significantly to fluctuations in the global financing market.

(III) Which Types of Lending Relationships are More Affected?

In column (2) of Table C7, we include the interaction of easing-phase dummy variable and the dummy variable indicating whether the loan is secured by the firm's land-related assets. We find that after including the interaction between these two indicator variables, the interaction term absorbed more than half (a magnitude of 0.111) of the significant coefficient on the easing phase indicator itself. This indicates that the increase in the average borrowing amount during the easing phase was driven by firms that borrowed by pledging their land-related fixed assets. Quantitatively, firms that did not borrow on the basis of their fixed assets received on average only about a 5.21% increase in their loan amount, while firms that borrowed using their fixed assets received an additional 11.1% increase in their total loan amount during the same easing phase

(IV) Cross-city Analysis: C&I Land Price and Relationship Lending

In column (3), we add interaction terms between dummy variables that indicate whether the firm is located in a city that has a high commercial land price volatility during the global financial cycle and a dummy variable that indicates the easing phase. As in the pattern in column (2), we find that the added interaction term absorbs most of the quantity on the single easing phase dummy in column (1), indicating that the observed increase in the borrowing amount during the easing phase is driven mainly by firms located in cities whose whose commercial & industrial land prices rise quickly during the financial cycle. Finally in column (4), we add triple interaction term to the easing phase dummy, the fixed-assets collateral dummy, and the high C& I land volatility city dummy. We find that the coefficient of the easing phase dummy goes to the triple interaction term.

This indicates that, during the easing phase of the global financial cycle, *domestic* credit capacity gets stretched out the most by firms pledging their land and property type assets as collateral, and they are able to do so because they are located in cities where the commercial land prices are more pro-cyclical.

Paralleling the analysis with borrowing amount dynamics during the easing phase of the global financial cycle, we perform the same analysis for the tightening phase (2008-2009). The results are reported in Table C8. Symmetric with the results presented in Table C7, the amount that firms borrow on average from the same relationship bank during the 2008-2009 tightening phase shrinks by 37.1%, but most of the average treatment effect of the tightening phase on the debt capacity shrinkage is driven by firms that pledge their land-related fixed assets and that sit in cities that experience a deeper decline in local C&I property prices during the tightening phase. Quantitatively, the shrinkage of the credit capacity of those firms that pledge fixed assets and that are situated in a high C&I land price volatility city is nearly 4 times that of firms located elsewhere.

(V) Subsample Analysis: Revolving Credit Lending Relationships

In the above analysis, we utilize all firm-bank pair lending relationships to investigate (1) how the equilibrium loan amount within pairs changes during the easing and tightening periods of global financial cycles and (2) how the equilibrium loan amount changes with the collateral and collateral price volatility of the city in which the firm is located. The observed loan amount could be driven by both the credit demand side and the credit supply side, but it would not be sharp enough to allow us claim that the observed volatility in the loan amount is driven by the supply side rather than by some unobserved fundamental on the credit demand side. For example, during the tightening period, the observed stronger contraction in the amount borrowed by firms that pledged their office buildings could be simply because the firm simply found it has no promising investment project to finance, thus the firm decides to borrow less. The observed contraction in the loan amount of these firms could not be attributed to impaired domestic credit intermediation driven by a deterioration of local asset price conditions. The reverse causality arises when less firms want to pledge their land thus we see lower land prices in that city.

To tighten our interpretation, we shrink our sample to firm-bank pairs of revolving credit line issuance during the global financial cycle. The loan amount reported in these types of lending refers to the upper bound of the line of credit rather than to the actual usage amount of credit by the firm. Focusing on the revolving credit sub-sample enables us to tease out unobservable demand side factors that are not a banks credit supply to the firm. The results of the revolving-credit line sub-sample are reported in Table C9 and Table C10. All the results are qualitatively and quantitatively similar to the results obtained in the full sample analysis.

We next take one more step to determine which types of firms are most likely to

stretch their debt capacity by pledging their land-related fixed assets during the easing phase. Table C11 and Table C12 report the results for this part of the analysis. Consistent with the findings in the previous tables, during the easing phase, the average borrowing amount tends to be 13.4% higher than during other period, after interacting with indicator variable whether the firm comes from high-tangibility industry, the magnitude of the coefficient on 1[Easing] was largely absorbed, indicating that the observed increase in average borrowing capacity was largely driven by firms from high-tangibility industries. In column (4), the triple interaction among 1[Easing] and 1[High-tangibility], and 1[High commercial land price volatility city] absorbed all the magnitude 1[Easing] on average. This indicates that the borrowing capacity of high-tangibility firms located in high-commercial price volatility cities were the main drivers of the observed increase in average borrowing capacity: while the borrowing capacity of firms increased on average by 2.3%, firms from the high-tangibility sector, which is located in cities that went through high commercial land price, see a 13.2% increase in borrowing capacity within their relationship lender. Similarly, during the tightening phase, as shown in Table C11, while the borrowing capacity of firms shrank on average by 12.1%, firms from the high-tangibility sector located in cities that went through a deeper decline in local land prices saw an additional 36.9% reduction in borrowing capacity.

7. Firm behavior during the Global Financial Cycle

In the previous two sections, we show that cities with high domestic global bank (BOC) exposure will see a higher share of foreign credit channeled by local domestic global banks during the easing phase of the global financing cycle. Accompanying the more active role played by domestic global banks in the cross-border credit transmission, these cities experience a higher degree of volatility in real economic outcomes. We find that as a main driving force of the excess volatility in real outcomes, the intermediation of domestic credit is also affected during the global financing cycle, especially in areas that feature more volatile C&L land prices.

In this section, we address the following questions: 1) Why are C&I land prices in certain areas more volatile than in others? 2) Through what channel can the price of C&I land affect the intermediation of domestic credit when foreign credit leaves? 3) What role does domestic bank-channeled foreign credit play in this process?

7.1. *What Firms can do about their Debt Capacity?*

Our answers to the questions posed above hinge crucially on firm behavior during the global financing cycle. Consider an emerging market economy with no domestic global banks that can access the global funding market. For firms in this economy, the only possible source of foreign credit is borrowing directly from foreign banks. But as

documented in (Jiang and Xu (2019)), foreign banks are generally unable to lend against fixed assets as collateral to extend credit to borrowers from emerging markets. Instead, in lending to these borrowers, foreign banks rely heavily on the inclusion of covenants that guarantee the transparency of borrowers cash flow. In this situation, during the easing phase of global financing cycle, although firms in this EME hope to enlarge their debt capacity in order to support more foreign credit issuance, playing with their asset tangibility is not a solution.

Let us now consider a scenario in which all foreign credit received by an emerging market is channeled by its domestic banks. Unlike foreign banks, which monitor closely and frequently, domestic banks in EMEs are more able to write debt contracts on tangible assets as collateral to extend cross-border capital. That said, the debt capacity of a firm could be made contingent on the firms tangible asset holding if the firm is borrowing from a domestic bank. When domestic banks actively engage in the transmission of foreign credit to local industrial firms, one dimension of contracting contingency gets completed: cross-border credit agreements can now be written on domestic tangible assets as collateral. This newly emerged contracting contingency allows and incentivizes firms to actively increase their tangible asset holdings, allowing firms to enlarge their debt capacity and reap the benefit of cheap foreign credit during the easing phase of the global financial cycle.

The flexibility offered by this additional contracting contingency in cross-border capital transmission can be beneficial in that it allows the foreign credit to be more efficiently allocated to firms that need it most. Borrowers with a high marginal product of capital can now pledge their tangible input assets as collateral in order to support the amount of credit they want to borrow. As a by-product of such debt capacity stretching behavior by firms seeking to borrow foreign credit, C&I land prices increase during the easing phase, allowing firms that borrow against these assets to receive more domestic credit. But once the global financial condition reverses, high debt capacity no longer needs be maintained on the firms side. Instead, firms want to get rid some of the tangible assets that they accumulated to increase their debt capacity. This exerts a downward pressure on local collateral prices, which then spreads out to negatively impact domestic credit intermediation because domestic credit and foreign credit are contingent on the common collateral base in the local economy

Mapping this reasoning onto this paper's empirical setting, one can easily imagine that in cities where the foreign credit supply of domestic banks is more elastic, firms would be more likely to engage in such debt-capacity reaching behavior. Firms' debt-capacity reaching behavior will lift up local domestic collateral prices, amplifying the foreign-credit-induced credit boom into the domestic credit market, thereby boosting real output, employment, and TFP growth. But when this amplification becomes large enough, the coming global financial cycle reversal will more negatively impact the local domestic collateral price, resulting in a more severe real outcome slow-down. This

mechanism perfectly explains the cross-sectional general equilibrium findings noted in Section 5, and it is in line with the previous literature about financial liberalization and macroeconomic volatility in the non-tradable sector asset prices (Tornell and Westermann (2002)).

7.2. Changes in Firm Tangibility over Global Financing Cycle

In this section, we use firm and city-level dataset from China to empirically investigate changes in firms asset structure during the global financing cycle. Specifically, the goal of this section is to characterize how firms will react differently in terms of their tangible asset accumulation when their city has a differential availability of domestic global banks that channel foreign credit. We also determine which types of firms engage in such asset structure distorting behavior during the global financing cycle.

(I) Differences in Firm Behavior across Regions

Consistent with the set-up in Section 5, we exploit the exogenous heterogeneity in the different shares of foreign credit that are channeled by domestic banks at the city level, and we examine whether firms located in different cities display different asset accumulation and debt issuance patterns. To measure a firms leveraging behavior we examine its year-to-year change in short-term debt scaled by lagged total assets. We also measure the asset accumulation behavior of firms using the year-to-year change in fixed assets. Consistent with the measurement construction presented in Section 5, we we measure firms exposure to domestic bank-channeled foreign credit during the global financial cycle through the share of foreign currency credit that is lent by domestic banks in the city where the firm is located. The following equation specifies the regression for this part of analysis.

$$\Delta y_{i,c,2003-2007} = \alpha + \beta(\% \text{Domestic share of foreign credit}_{c,2003-2007}) + \gamma X + \epsilon_{i,c} \quad (7)$$

where $\Delta y_{i,c,2003-2007}$ is the outcome variable, it is either $\frac{\text{Total Debt}_{2007}}{\text{Assets}_{2006}} - \frac{\text{Total Debt}_{2004}}{\text{Assets}_{2003}}$ or $\Delta \text{Tangibility}$ is $\frac{\text{PPE}_{2007}}{\text{Assets}_{2006}} - \frac{\text{PPE}_{2004}}{\text{Assets}_{2003}}$ or $\frac{\text{Total fixed investment between 2004-2007}}{\text{Assets}_{2003}}$. i indexes firm, c indexes city, X is a vector of firm controls and city controls that takes out other firm and city level unobservables that may interfere with the effect of the domestic bank-channeled foreign credit. Table D1 shows the regression results in the specification above.

The estimation of interest is the coefficient of the interaction term between the easing-phase dummy and the city's domestic global bank exposure. Column (1) shows the regression without control variables and interaction terms. It shows that during the easing phase of global financial cycle, firms on average are 1.64% faster in their year-to-year short-term debt issuance. In column (2), we add the interaction term between the firm is exposure to domestic bank-channeled foreign credit and the easing-phase dummy, and we find that the magnitude of the coefficient of the interaction term absorbs the coeffi-

cient of the easing-phase dummy. This means that the observed average treatment effect of the global financial cycle on the within-firm short-term debt growth is mostly driven by firms located in cities that have high domestic global bank exposure. 10% of the domestic bank-channeled foreign credit share in the city is correlated on average with a 12.4% higher annual short-term debt growth at the firm level.

Similarly, in column (3) and (4), we find that although all firms on average increase their tangibility by 2.1% during the easing phase of the global financial cycle, a 10% higher domestic bank-channeled foreign credit in the local city is associated with a 13.7% higher tangibility growth on the local firms balance sheet. In other words, firms located in areas where a larger fraction of foreign credit is transmitted by domestic banks generally increase more of their asset tangibility during the easing phase of the global financing cycle.

(II) Firm Behavior and Firm Types

Through the following cross sectional regression, we next investigate what types of firms are more likely to stretch for high debt capacity by distorting their asset structure during the easing phase of the global financial cycle:

$$\begin{aligned} Ave.\Delta y_{i,c,2003-2007} = & \alpha + \beta_1(\%Domestic\ share\ of\ foreign\ credit_{2003-2007}) \\ & + \beta_2(\%Domestic\ share\ of\ foreign\ credit_{2003-2007}) \times 1[High\ tangibility] + \gamma X + \epsilon_{i,c} \end{aligned} \quad (8)$$

The unit of observation in this regression is firm i in city c . The left-hand side variable $Ave.\Delta y_{i,c,2003-2007}$ is either the firm i 's average short-term liability growth or tangibility growth during the the easing phase in city c . On the right-hand side, we interact the share of domestic bank-channeled foreign credit with the indicator variable that takes value 1 if the firm is from a high-tangibility industry sub-category or if the firms' pre-cycle accounting transparency is low. The results of the specification are reported in Table D2. Paralleling the pattern of results in Table D1, and controlling for the level of foreign credit that flows into a city, firms that have a higher tangible asset structure and that are less transparent tend to have a faster short-term debt capacity growth if the higher percentage of the city's foreign credit is channeled by domestic banks rather than foreign banks.

7.3. C&I Land Price over Global Financing Cycle

Having examined the behavior at the firm end , we now study how the behavior of these firms affects local collateral prices during the global financial cycle , especially during its tightening phase (2008-2009).

We explore how the cross-sectional differences in city-level commercial and industrial land prices change across cities and how these changes are related to different levels in the share of domestic bank-channeled foreign credit. We investigate how different cities collateral prices change during both the easing and tightening phases of the global

financial cycle. We write down the following cross-sectional regression specification:

$$\begin{aligned}\Delta(P_{2003-2007}^{\text{land}})_c &= \alpha + \beta_1(\% \text{Domestic share of foreign credit}_{2003-2007}) + \gamma X + \epsilon_c \\ \Delta(P_{2008-2009}^{\text{land}})_c &= \alpha + \beta_1(\% \text{Domestic share of foreign credit}_{2003-2007}) + \gamma X + \epsilon_c\end{aligned}\quad (9)$$

The unit of observation is the city. The left-hand side variable $\Delta(P_{2003-2007}^{\text{land}})_c$ and $\Delta(P_{2008-2009}^{\text{land}})_c$ are defined as $\frac{P_{2007}^{\text{land}} - P_{2003}^{\text{land}}}{P_{2003}^{\text{land}}}$ and $\frac{\text{Ave. } P_{2008-2009}^{\text{land}} - P_{2007}^{\text{land}}}{P_{2007}^{\text{land}}}$, which measures degree of the commercial and industrial land price decline between the tightening phase and the easing phase.

In columns (1) and (3), we run the OLS specification that relates the share of domestic bank-channeled foreign credit during 2003-2007 with to the degree of the land price drop in the city. And in columns (2) and (4), we run the same set of regressions using the 2SLS approach described in Section 5. We find that a 10% increase in the share of domestic bank-channeled foreign credit will lead to a 30% heavier decrease in the land price during the tightening period.

7.4. A Dynamic Diff-in-Diff Analysis

To further nail down the mechanism, we examine how the time-varying dynamics of city level industrial land transactions by firms and industrial land prices differ when the industrial firms in the cities are differently exposed to Bank of China at the beginning of the global financial cycle. We write down the following regression specifications:

$$y_{c,t} = \alpha_c + \mu_s + \sum_{t=1999, s \neq 2003}^{2009} \beta_s \text{BOC}^{\text{pre}} \mathbf{1}[s = t] + \theta \left(\frac{\text{Total FX credit}}{\text{GDP}} \right)_{c,t} + \gamma \mathbf{X}_{c,t} + \epsilon_{c,t} \quad (10)$$

where c indexes city, t indexes year, and $E_{\text{pre}}^{\text{domestic}}$ is the measure of the city's exposure to the Bank of China. The specification is measured either in the market share of BOC in the city's lending market in 2002 or as the total number of BOC branches per 10 local commercial bank branches. We estimate the above specification for 214 cities.

We utilize four key variables related to local firm industrial land transactions. The first is the total value of financing collateralized by land in the city; the second is the industrial land price; the third is the total number of sums of industrial land transactions; and the fourth is the total number of pieces of industrial land that have been traded on the land market. Graphical illustrations of the results on β_s as well as the 95% confidence intervals are shown in Figure D3 and Figure D4. In Figure D3, the measure used to determine city-level exposure to domestic global banks before the initiation of global financial cycle is the city level BOCs market share in the local loan market in year 2002. In Figure D4, the city level BOC's branch network is measured by the number of BOC branches per 10 commercial bank branches.

In the years leading up to the initiation of the global financial cycle in 2003, there was

no difference in local industrial land transactions in cities that had high relative to low domestic global bank presence. The insignificance of the estimation results during the pre-2003 period indicates that the observed ex-post effect that domestic global bank exposure had on the industrial land transaction behavior of industrial firms was probably not driven by local demand cycles, local firms expectations switches, or corporate investment expansion that had started long before the global financial cycle. The local land transaction dynamism by local industrial firms started to become active in 2004. Cities that prior to 2003 had experienced a higher exposure to domestic global banks witnessed a faster turnover in land transactions, measured both by the number of transactions and the amount of land traded. Importantly, the city-level total value of loans secured by industrial land and the local industrial land prices climbed the most in cities that had experienced a high pre-cycle exposure to domestic global banks.

This upward tilting trend in cities that had experienced a high exposure to domestic global banks continued until 2007. In 2008, when the global financial cycle started to enter the tightening period, industrial land transactions and industrial land prices started to fall sharply in cities that had experienced high domestic global bank exposure during the pre-cycle period. The sharp expansion and contraction in these cities that occurred at the beginning of the cycle is consistent with the amplifier effect of high domestic bank-channeled foreign credit on the collateralizable asset accumulation behavior of firms.

In Figure D2, we provide a sharper comparison of local industrial land prices and commercial mortgage issuance behavior by local firms between cities that had experienced either a high or low exposure to BOC. We normalize the industrial land price and commercial mortgage volume of the subsequent years by the industrial land price in 2003 and the number of total commercial mortgage issuance by local firms in 2003 respectively. In both panel (a) and panel (b), the darker gray dotted line plots the corresponding variable for cities within the top 25th percentile of pre-cycle BOC exposure, while the lighter gray dotted line plots the corresponding variables for cities within the lower 25-th percentile of pre-cycle BOC exposure.³⁴ For both variables, we find that in the years leading up to the start of the global financial cycle (in 2003), there was no significant difference in the trends of industrial land prices and commercial mortgage issuance by cities. Starting in 2003, cities that had experienced a high pre-cycle exposure to the BOC started to experience faster growth in industrial land prices and higher growth in the annual commercial mortgage issuance. Moreover, when the cycle suddenly reversed in 2008-2009, cities that had experienced a high pre-cycle exposure to BOC underwent a more severe decline in industrial land prices and commercial mortgage issuance dynamism.

³⁴Each dot in the figure corresponds to the weighted average of the indexed industrial land price and commercial mortgage issuance (indexed using 2003 as base year) of cities, weighted by the city's real GDP in 2003.

8. Conclusion

The growing degree of the inter-connectedness between emerging market economies and the global financial market has caught the attention of policy makers around the world. A major transformation in this process is the increasingly important role played by domestic banks in the transmission of cross-border capital to EMEs. For these economies, having a larger share of foreign credit transmitted by domestic banks in EMEs can be a mixed blessing.

This paper proposes and empirically identifies a novel channel through which the replacement of foreign banks by domestic banks in the transmission of cross-border capital to EMEs impacts these economies. The replacement of foreign banks by domestic lenders from EMEs in the cross-border credit transmission marks a completion of the contracting space because it allows credit agreements to be written against domestic hard assets as collateral. Increased flexibility in the contracting of the cross-border credit agreement can help the economy acquire a more efficient allocation of credit during the easing phase, but it can induce domestic industrial firms to overreach on credit by acquiring domestic collateral, which dampens asset prices and impairs domestic credit intermediation, particularly during the tightening phase.

We leverage a unique within-country cross-city heterogeneity of domestic global bank distribution in China and disaggregate data at different scopes to identify this channel over a single global financing cycle (2003-2009). Our cross-city analysis reveals that cities that obtain a higher de facto percentage of foreign credit channeled by domestic banks demonstrated during the 2003-2009 global financial cycle a higher real economic volatility. These cities experienced a faster real GDP growth, a faster growth of employment in industrial sectors, a faster industrial firm TFP growth, and a faster overall domestic credit growth during the 2003-2007 episode. Yet these cities also experienced a more severe slowdown in their real GDP, industrial employment, and firm TFP growth during the 2008-2009 tightening period.

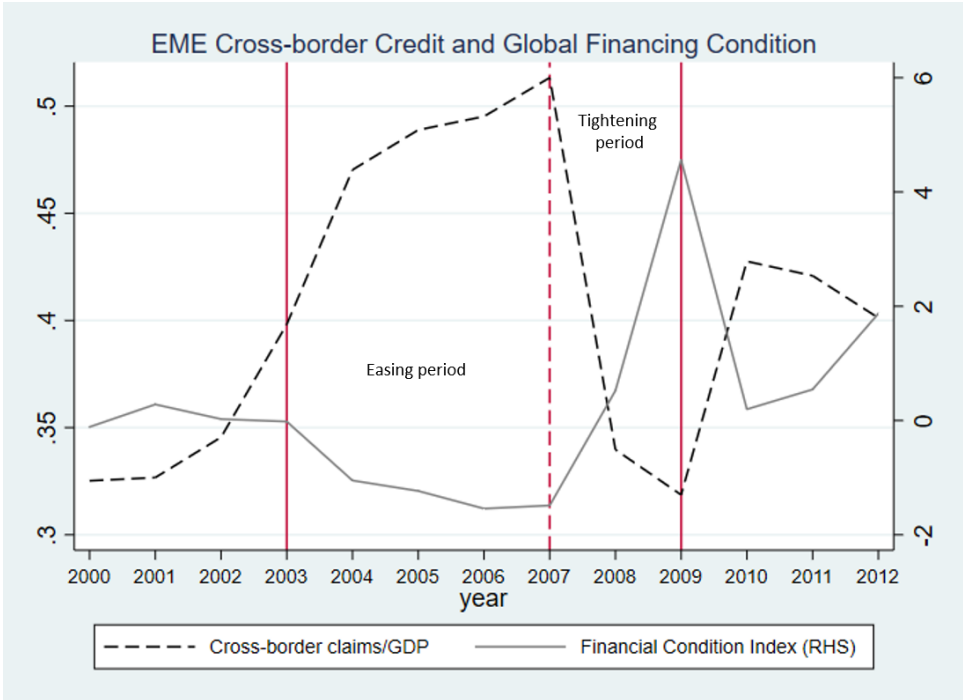
We find that beneath the excess volatility in the local real economy is a more affected domestic credit intermediation. In particular, we examine the lending relationships of banks that lack access to the international financing market. We find that lending relationships in cities that went through a higher industrial land price volatility also displayed drastic expansion and shrinkage in the total amount of credit issuance during the global financial cycle. Moreover, this expansion and shrinkage in the borrowing amount was especially severe for firms that used land and properties for commercial and industrial usage to obtain financing.

Finally, we turn to behavior on the firm end. In particular, we investigate changes in firms' tangible asset holdings during the easing phase of the credit cycle. My key finding suggests that holding the total volume of foreign credit to a city controlled, firms located in cities that received higher domestic bank-channeled foreign credit significantly

increased their asset tangibility (measured by PPE/Total assets), made higher cumulative fixed assets investments, and became more highly leveraged, as indicated by their total debt. Such asset structure distorting behavior during the easy phase of the global financing cycle had an impact on the local real economy during the tightening periods. This occurred because the behavior exerted an extra downward pressure on the price of domestic tangible assets.

Appendix A. Institutional Background

Fig. A2. Global Financing Cycle 2003-2009



Notes: The above figure shows the global financial cycle of 2003-2009. The grey line shows the Financial Condition Index constructed by IMF, and the right-hand side shows the evolution of weighted average of cross-border claims/GDP from BIS.



Fig. A3. Share of Foreign Credit in Total Credit in China: 2000-2012

Notes: The above figure shows the evolution of foreign-currency lending balance as a share of total lending of China's financial institutions from 2000 to 2012. The figure is compiled by data from Almanac of China's Banking and Finance.

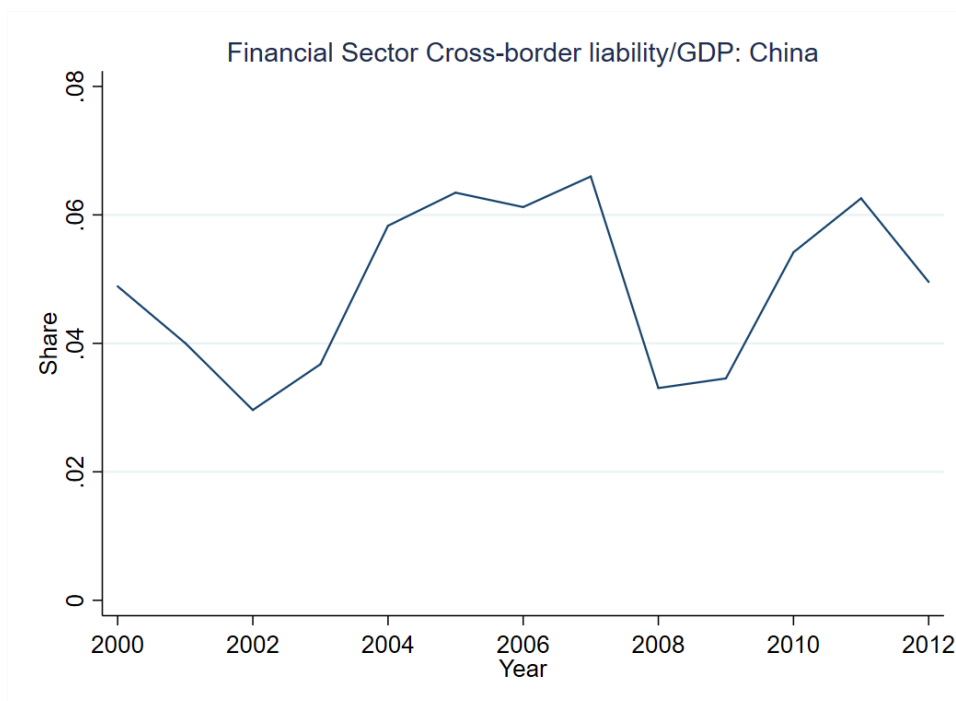


Fig. A4. Share of cross-border liability of financial sector: China 2000-2012

Notes: The above figure shows the evolution of total cross-border liabilities of China's financial sector as a share of GDP. The cross-border liabilities of financial sector is from the Locational Banking Statistics, which report the claims of China's banking sector held by all BIS reporting foreign banks.

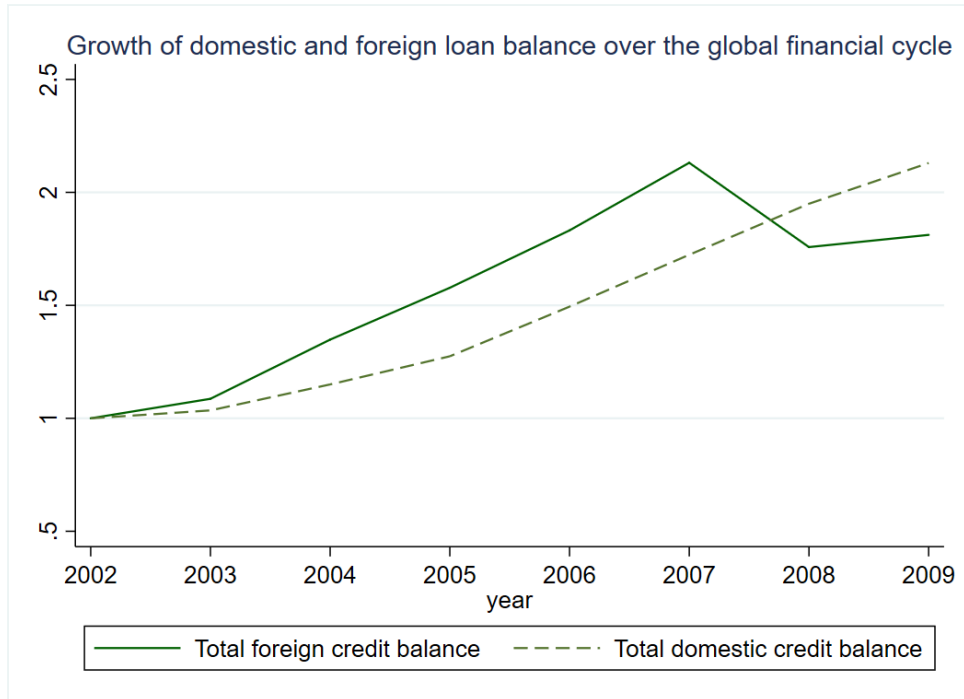


Fig. A5. Growth of domestic credit balance and foreign credit balance

Notes: The above figure shows the growth of Bank of China's total foreign-currency lending balance and total RMB balance lending evolution from 2002-2009. The base year is 2002. The figure is compiled from data offered in Almanac of China's Banking and Finance.

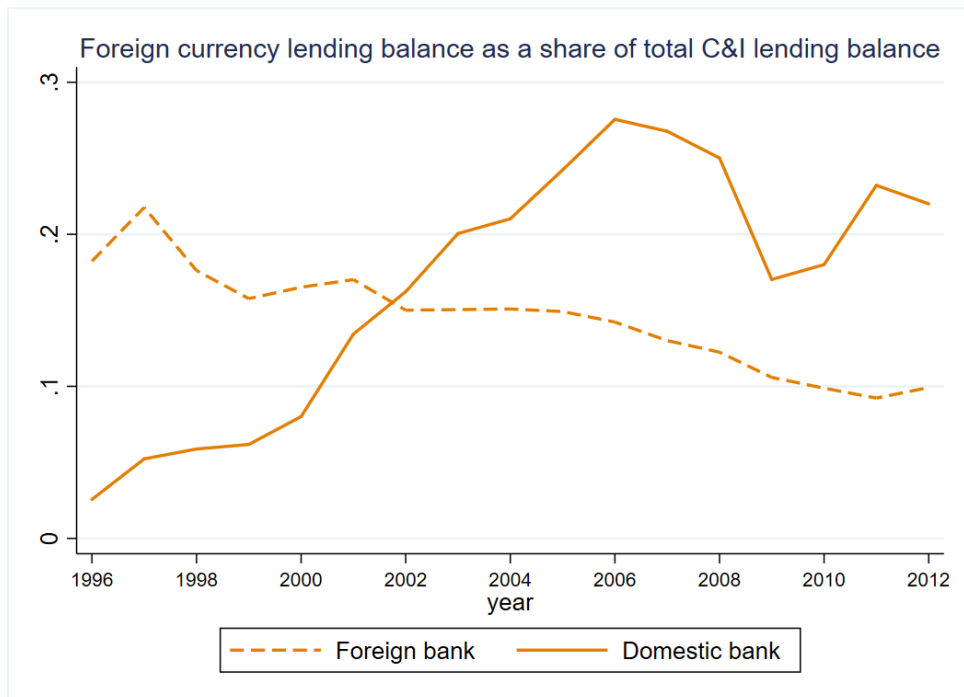
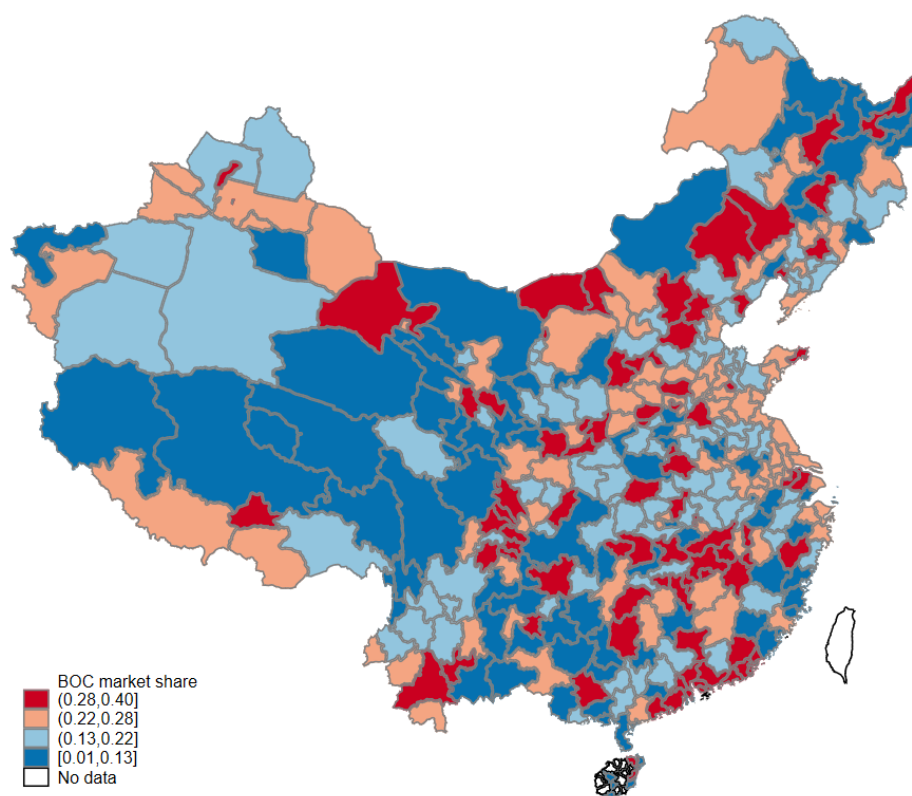


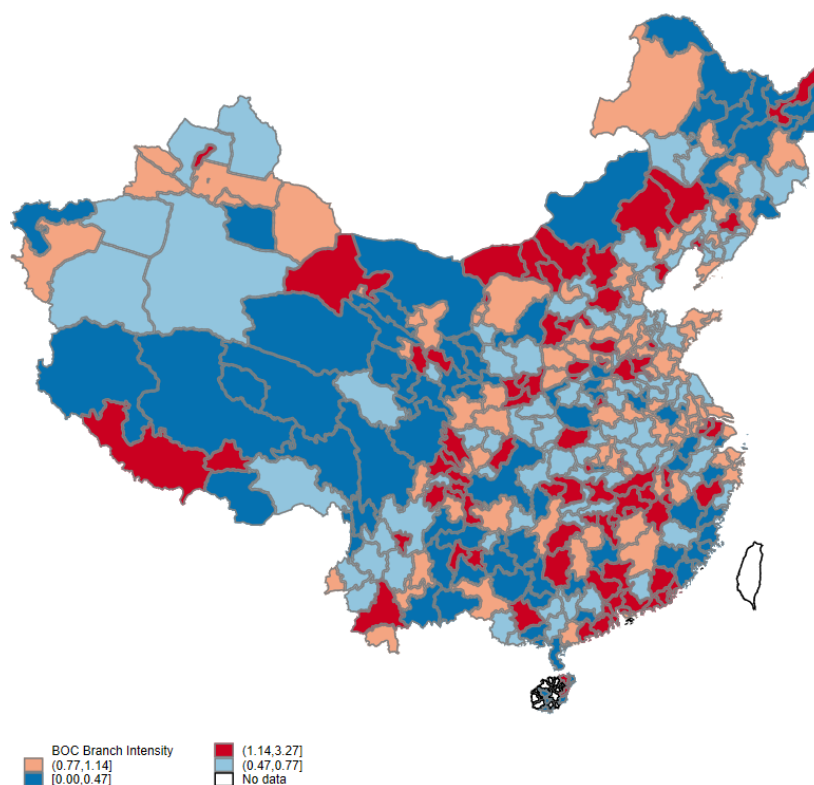
Fig. A6. Share of Domestic banks' foreign currency lending in China

Notes: The above figure shows evolution of foreign banks' total lending balance and domestic banks' foreign-currency lending balance as a share of total C&I lending balance in China. The nominator is the total lending balance of foreign banks and the total foreign-currency lending balance of domestic banks. The denominator is the total C&I lending balance of financial institutions in China.

Fig. A7. BOC Distribution in China



(a)



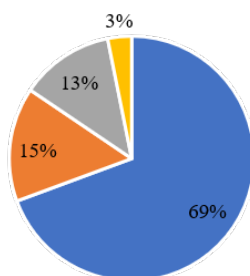
(b)

Notes: The above figure shows the industry decomposition of foreign banks' lending balance to Chinese borrowers. Panel (a) shows Bank of China's lending balance market share at prefecture-level cities in 2002. The areas are shaded total BOC lending balance as a share of local bank lending balances. And panel (b) shows Bank of China's branching distribution at prefecture-level cities in 2002. The areas are shaded by the total number of BOC branches per 10 local commercial bank branches.

Fig. A8. Foreign banks' lending by industry in China

Foreign funded banks' lending decomposition

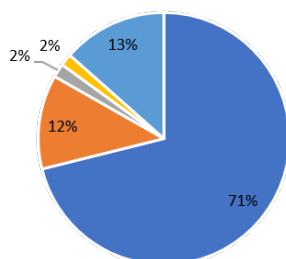
- Industrial and commercial sector
- Real Estate
- Wholesale and utilities
- Personal consumption and services



(a)

Foreign funded banks' lending decomposition

- Industrial and commercial sector
- Real Estate
- Wholesale and utilities
- Personal consumption and services
- Transportation



(b)

Notes: The above figure shows the industry decomposition of foreign banks' lending balance to Chinese borrowers. Panel (a) is extracted from PBOC's annual news report, and panel (b) is compiled using cross-border syndicated lending from 2000-2009 using data from Dealscan. In both figures, the darkest blue shaded area represents the share of foreign bank lending to industrial and commercial sectors.

Appendix B. Real impact on local economy

Table B1. Summary Statistics of City-level characteristics

	Mean	Sd.	25-th	50-th	75-th
Population	1091.87	6616.13	239.32	369.57	592.05
Unemployment rate	0.07	0.04	0.05	0.06	0.08
Agriculture labor share	0.05	0.07	0.01	0.03	0.06
Industrial labor share	0.25	0.12	0.17	0.24	0.32
Construction labor share	0.07	0.04	0.04	0.06	0.08
Real estate labor share	0.01	0.01	0.00	0.01	0.01
Financial labor share	0.03	0.01	0.03	0.03	0.04
Commercial labor share	0.06	0.02	0.05	0.06	0.07
Land resource	36736.48	214471.03	6581.57	10610.96	18095.79
Arable land p/c	1.35	1.22	0.67	0.97	1.47
Transport capacity	18881.60	117017.78	2879.28	4898.52	9671.65
GDP	1079.15	5972.06	195.89	315.85	702.53
GDP p/c	15716.24	56549.32	6543.59	9849.91	14819.72
GDP growth	0.13	0.49	0.08	0.14	0.18
Ave. wage	12775.00	3936.50	10254.40	11921.82	13994.47
Agriculture value to GDP	18.59	9.58	10.63	17.76	26.23
Industrial value to GDP	45.22	10.15	37.84	45.86	51.93
Service value to GDP	36.18	6.52	32.79	35.83	39.52
no. Industrial firms	1711.85	10771.25	177.48	362.10	747.06
Value added domestic firm	0.57	0.28	0.35	0.53	0.72
Value added foreign firm	0.07	0.12	0.01	0.03	0.06
Fixed investment/GDP	0.32	0.11	0.24	0.30	0.36
FDI/GDP	0.03	0.03	0.00	0.01	0.03
no. FDI contracts	349.51	2283.84	12.21	30.86	115.43
No. of cities	316				

The above table shows the summary statistics of city-level characteristic variables during 2003-2007. The data are collected from City Statistical Yearbook of China from 2003-2007, CEIC and city-level statistical yearbook. Population is reported in 10,000 people, unemployment rate is calculated as the total number of people reported as unemployed scaled by total number of people in labor force. Agricultural, manufacturing, construction, real Estate and construction and commercial labor share are the total number of workers working in these sectors divided by total labor force. Land resource is the total area of land in square meters. Arable Land per capita is reported in acre/person. Transport capacity is the total number of passengers reported in 10,000 persons. GDP is the real GDP reported in 10,000 RMB, GDP per capita is reported in RMB per person and Real GDP growth is the average annual growth rate between 2003-2007, reported in percentage. Agriculture, industrial and service value to GDP are the sectors output value added scaled by GDP. no. industrial firms is the total number of industrial firms, value added domestic firms is the total of domestic non-state-owned firms' total value added scaled by total industrial sector value added, value added foreign firms is the share of total industrial sector value added made by foreign owned firms. Fixed investment/GDP is the total value of fixed investment scaled by GDP. FDI/GDP is the total value of actual FDI scaled by GDP. no. FDI contracts is the total number of FDI signed during the year.

Table B2. Summary Statistics of Firm-level characteristics

	N	Mean	Sd.	p(25)	p(50)	p(75)
Total assets	2406888	9.58	1.38	8.65	9.44	10.38
Age	2406888	8.06	8.69	3	6	10
Employees	2406888	204.26	712.84	50	95	188
Current debt outstanding	2406888	0.71	0.29	0.05	0.53	0.75
Long-term debt outstanding	2406888	0.11	0.87	0.02	0.08	0.14
Tangibility	2406888	0.53	0.67	0.16	0.31	0.52
Value-added	2406888	8.61	1.39	7.71	8.49	9.42
Cash flow	2126382	7.10	2.02	5.79	7.10	8.48
ROA	2406888	0.11	2.47	0.01	0.04	0.14
R&D expenses	998338	0.002	0.086	0	0.025	0.032
Investment rate	2406888	0.07	0.18	0	0.011	0.051
Labor productivity	2406888	3.95	1.14	4.21	3.89	4.65
Wage bill	2406888	7.08	1.22	7.08	7.22	7.83
TFP	2406888	0.01	0.25	0.002	0.008	0.09
TFP Growth	2406888	0.01	0.36	0.001	0.004	0.057

This table summarizes the main firm-level variables utilized in the empirical analysis. The data comes from NBS Annual Industrial Survey (AIS). Total assets is the log of total assets, and the variable total assets is reported in 1000 RMB. Age is the firm age, which is calculated as the current year minus the year when the firm registered. Employees is the total number of employees working in the firm. Current debt and Long-term debt are total current debt outstanding and total long-term debt outstanding scaled by lagged total assets. Tangibility is defined as total fixed assets (property, plants and equipment) scaled by total assets. ROA is defined as operating profit scaled by total assets, value added and cash flow are the log of industrial value added and cash flow of the firm respectively. Wage bill is the log of total payroll payable. Labor productivity is defined as the log of value added per worker.

Table B3. Summary Statistics of City-Lending

	Mean	Sd.	25-th	Median	75-th
Panel A: City-level summary					
Deposits	872.59	1384.63	206.40	425.90	725.30
Loans (RMB+Foreign currency)	597.58	823.27	129.00	267.50	503.00
Loans (RMB)	573.95	1024.90	118.00	223.50	461.00
C& I loan balance (RMB)	135.50	294.12	24.71	58.12	144.43
C& I loan share	0.27	0.42	0.16	0.24	0.32
Agricultural loan balance (RMB)	41.89	48.79	12.41	30.52	49.08
Agricultural loan share	0.14	0.09	0.07	0.13	0.19
Panel B: Firm-level aggregation					
C& I borrowing (RMB+Foreign currency)	177.27	348.49	27.27	70.19	89.57
Δ C& I borrowing (RMB+Foreign currency)	88.37	92.37	32.32	79.23	101.58
Panel C: Domestic channeled foreign credit					
Domestic channeled foreign credit (%)	0.52	0.38	0.12	0.39	0.58
Observations	316				

This table summarizes the ingredients utilized in the construction of the measure of domestic banks channeled foreign credit as a share of total foreign credit. Panel A provides the city-level summary statistics extracted from *China Statistical Yearbook for Regional Economy* and *China City Statistical Yearbook*. The table summarizes the 316 cities' average balances of deposits or loans during the 2003-2007 episode. Deposits are the total year-end deposits at the local banks, Loans (RMB+Foreign currency) are the total RMB-denominated and foreign currency-denominated loan balances outstanding at the local banks in the city. Loans (RMB) are the total RMB-denominated loan balances. C&I loan balance (RMB) is the total commercial and industrial loan balances on local banks' balance sheets that are denominated in RMB. Agricultural loan balance is the total RMB-denominated agricultural loan balance at the end of the year. Panel (B) provides the summary statistics the aggregated borrowing from the firms' side. C& I borrowing (RMB+Foreign currency) is the book value of total debt outstanding aggregating all firms in the city at the end of 2007. And Δ C& I borrowing (RMB+ Foreign currency) is the net increase in total book value of debt from 2003-2007, aggregating all firms' balance sheet in a city. Panel (C) presents the summary statistics of the share of domestic bank-channeled foreign credit at city level according to the calculation based on 5.1.

Table B4. Real impact of domestic bank channeled foreign credit

	Δ GDP		Δ Emp		Δ TFP	
	(1)	(2)	(3)	(4)	(5)	(6)
Domestic channeled foreign credit	0.287** (0.0953)	0.260** (0.0872)	0.576*** (0.639)	0.557*** (0.627)	0.246** (0.0831)	0.208** (0.0695)
Foreign credit/Total credit	0.573** (0.0189)	0.569* (0.0253)	0.365* (0.143)	0.173* (0.0703)	0.480** (0.154)	0.461* (0.198)
Observations	316	316	316	316	316	316
R^2	0.458	0.439	0.378	0.434	0.410	0.432
Province FE	✓	✓	✓	✓	✓	✓
City-level Controls	-	✓	-	✓	-	✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: the table presents the results of regression in equation 3 for the easing period between 2003 and 2007. Δ GDP is $\ln(\text{GDP}_{04-07}) - \ln(\text{GDP}_{00-03})$, which is the differences between average real GDP post the cycle during the easing phase of the cycle and the pre-cycle average GDP. Δ Emp is $\ln(\text{Emp}_{04-07}) - \ln(\text{Emp}_{00-03})$, where "emp" is the total number of employees in working industrial sector firms. Δ TFP growth is defined as $\text{TFP growth}_{04-07} - \text{TFP growth}_{00-03}$. TFP growth is the average TFP growth of firms in a given city during the specified episode. City -level control variables include the total foreign credit to the city scaled by the city's total credit, agricultural labor share, industrial sector labor share, financial sector labor share, real estate sector labor share, average labor wage, unemployment rate, total fixed asset investment scaled by GDP, total population, total land resource and total foreign-owned firms' value-added scaled by total value-added by all firms.

Table B5. Real impact of domestic bank channeled foreign credit: Tightening period

	Δ GDP		Δ Emp		Δ TFP	
	(1)	(2)	(3)	(4)	(5)	(6)
Domestic channeled foreign credit	-0.255*** (0.0679)	-0.220** (0.0718)	-0.147** (0.0486)	-0.112** (0.0356)	-0.278** (0.0933)	-0.247** (0.0827)
Foreign credit/Total credit	-0.456* (0.221)	-0.536* (0.223)	-0.174* (0.0857)	0.196* (0.0918)	-0.253* (0.104)	-0.264* (0.0.108)
Observations	240	223	240	223	240	223
R^2	0.456	0.436	0.369	0.419	0.395	0.417
Province FE	✓	✓	✓	✓	✓	✓
City-level Controls	-	✓	-	✓	-	✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: the table presents the results of regression in equation 3 for the tightening period between 2008 and 2009. Δ GDP is $\ln(\text{GDP}_{08-09}) - \ln(\text{GDP}_{04-07})$, which is the differences between average real GDP post the cycle during the easing phase of the cycle and the pre-cycle average GDP. Δ Emp is $\ln(\text{Emp}_{08-09}) - \ln(\text{Emp}_{04-07})$, where "emp" is the total number of employees in working industrial sector firms. Δ TFP growth is defined as $\text{TFP growth}_{08-09} - \text{TFP growth}_{04-07}$. City-level control variables include the total foreign credit to the city scaled by the city's total credit, agricultural labor share, industrial sector labor share, financial sector labor share, real estate sector labor share, average labor wage, unemployment rate, total fixed asset investment scaled by GDP, total population, total land resource and total foreign-owned firms' value-added scaled by total value-added by all firms.

Table B6. First Stage

Dependent Variable: Domestic channeled foreign credit		
	(1)	(2)
BOC-market share (IV-1)	2.274*** (0.641)	
BOC-branching (IV-2)		0.631*** (0.182)
Foreign credit/Total credit	2.823 (3.686)	0.723 (0.670)
Agriculture labor share	0.00659 (0.535)	-0.000557 (0.0973)
Manufacturing labor share	0.223 (0.293)	0.0349 (0.0533)
Financial labor share	4.724 (3.251)	1.391* (0.591)
Real estate labor share	-3.992 (4.634)	-0.450 (0.842)
Ave. labor wage	0.00390 (0.00791)	0.000657 (0.00144)
Unemployment rate	-0.332 (0.718)	-0.0522 (0.130)
Fixed investment/GDP	-0.331 (0.211)	-0.0670 (0.0383)
$\frac{\text{Foreign-owned value added}}{\text{Total value-added}}$	-136.6* (60.93)	-26.49* (11.08)
Transportation capacity	-0.0555 (0.0563)	-0.0126 (0.0102)
Population	0.0400 (0.0713)	0.0169 (0.0130)
Land	-0.0772 (0.0440)	-0.0106 (0.00800)
Observations	316	316
R^2	0.108	0.134

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table presents the first-stage regressions.

Table B7. Real impact of domestic bank channeled foreign credit: 2SLS

	Δ GDP		Δ Emp		Δ TFP	
	IV-1	IV-2	IV-1	IV-2	IV-1	IV-2
Domestic Channeled Foreign credit	0.179** (0.0598)	0.193*** (0.0566)	0.413** (0.0780)	0.408** (0.0753)	0.189*** (0.0547)	0.158** (0.0516)
Foreign credit/Total credit	0.197** (0.0659)	0.155* (0.0665)	0.146* (0.0654)	0.168** (0.0549)	0.175** (0.0589)	0.161* (0.0605)
Observations	316	316	316	316	316	316
R^2	0.571	0.584	0.409	0.418	0.452	0.489
Province FE	✓	✓	✓	✓	✓	✓
City-level Controls	✓	✓	✓	✓	✓	✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: the table presents the results of 2SLS regression specified in equation 4 for the easing period between 2003 and 2007. Δ GDP is $\ln(\text{GDP}_{04-07}) - \ln(\text{GDP}_{00-03})$, which is the differences between average real GDP post the cycle during the easing phase of the cycle and the pre-cycle average GDP. Δ Emp is $\ln(\text{Emp}_{04-07}) - \ln(\text{Emp}_{00-03})$, where "emp" is the total number of employees in working industrial sector firms. Δ TFP growth is defined as $\text{TFP growth}_{04-07} - \text{TFP growth}_{00-03}$. TFP growth is the average TFP growth of firms in a given city during the specified episode. City -level control variables include the total foreign credit to the city scaled by the city's total credit, agricultural labor share, industrial sector labor share, financial sector labor share, real estate sector labor share, average labor wage, unemployment rate, total fixed asset investment scaled by GDP, total population, total land resource and total foreign-owned firms' value-added scaled by total value-added by all firms.

Table B8. Real impact of domestic bank channeled foreign credit: Tightening period 2SLS

	Δ GDP		Δ Emp		Δ TFP	
	IV-1	IV-2	IV-1	IV-2	IV-1	IV-2
Domestic Channeled Foreign credit	-0.213** (0.0696)	-0.199** (0.0668)	-0.232*** (0.0594)	-0.201*** (0.0548)	-0.189** (0.0634)	-0.178** (0.0585)
Foreign credit/Total credit	-0.183** (0.0602)	-0.208** (0.0686)	-0.142* (0.0672)	-0.194* (0.0683)	-0.185** (0.0606)	-0.146* (0.0712)
Observations	316	316	316	316	316	316
R^2	0.491	0.514	0.377	0.383	0.426	0.463
Province FE	✓	✓	✓	✓	✓	✓
City-level Controls	✓	✓	✓	✓	✓	✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: the table presents the results of 2SLS-regression in equation 4 for the tightening period between 2008 and 2009. Δ GDP is $\ln(\text{GDP}_{08-09}) - \ln(\text{GDP}_{04-07})$, which is the differences between average real GDP post the cycle during the easing phase of the cycle and the pre-cycle average GDP. Δ Emp is $\ln(\text{Emp}_{08-09}) - \ln(\text{Emp}_{04-07})$, where "emp" is the total number of employees in working industrial sector firms. Δ TFP growth is defined as $\text{TFP growth}_{08-09} - \text{TFP growth}_{04-07}$. City-level control variables include the total foreign credit to the city scaled by the city's total credit, agricultural labor share, industrial sector labor share, financial sector labor share, real estate sector labor share, average labor wage, unemployment rate, total fixed asset investment scaled by GDP, total population, total land resource and total foreign-owned firms' value-added scaled by total value-added by all firms.

Table B9. Firms' TFP Growth and Domestic Channeled Foreign Credit

	Dependent Variable: ΔTFP					
	Easing phase			Tightening phase		
	OLS	IV-1	IV-2	OLS	IV-1	IV-2
Domestic channeled foreign credit	0.0361** (0.0121)	0.0210*** (0.00594)	0.0365** (0.0121)	-0.0171** (0.00576)	-0.0132** (0.00443)	-0.0188*** (0.0505)
Foreign credit/Total credit	0.0588*** (0.0115)	0.0704** (0.0235)	0.0754** (0.0242)	-0.0354* (0.0144)	-0.0382** (0.0129)	-0.0403** (0.0134)
Observations	168633	158714	168494	158714	158714	158714
R^2	0.114	0.115	0.125	0.103	0.112	0.117
Province FE	✓	✓	✓	✓	✓	✓
Baseline Controls	✓	✓	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓
City controls	✓	✓	✓	✓	✓	✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table presents regression analysis of firm asset tangibility adjustment behavior shown in equation 7. The left-hand side variable is the change in asset tangibility between 2004 and 2007 at firm level, and is calculated as $\frac{PPE_{2007}}{Assets_{2006}} - \frac{PPE_{2004}}{Assets_{2003}}$. The main explanatory variable on the right-hand side is the fraction of total foreign-currency denominated loans to local firms made by local domestic banks at the city level. Provincial fixed effects is controlled in column (1), column (2) add baseline controls which include GDP per capita, foreign-owned industrial firms output/GDP, industrial sector labor share, financial sector labor share and total construction land areas. Industry fixed effects are added in column (3), and region fixed effects are added in column (4). Finally, in the column (5), we explicitly control further for the city's export exposure by including the local industrial firms' total export value/GDP and fraction of industrial firms that are exporters.

Table B10. Firms' Employment Growth and Domestic Channeled Foreign Credit

	Dependent Variable: ΔEmp					
	Easing phase			Tightening phase		
	OLS	IV-1	IV-2	OLS	IV-1	IV-2
Domestic channeled foreign credit	0.174** (0.0584)	0.112** (0.0371)	0.125*** (0.0353)	-0.103** (0.0343)	-0.122** (0.0392)	-0.142** (0.0454)
Foreign credit/Total credit	0.0132** (0.00441)	0.0194* (0.00822)	0.0121*** (0.00323)	-0.0143* (0.00653)	-0.0238* (0.0155)	-0.0252* (0.0103)
Observations	169247	159249	169103	159249	159249	159249
R^2	0.142	0.159	0.162	0.099	0.133	0.146
Province FE	✓	✓	✓	✓	✓	✓
Baseline Controls	✓	✓	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓
City controls	✓	✓	✓	✓	✓	✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table presents regression analysis of firm asset tangibility adjustment behavior shown in equation 7. The left-hand side variable is the change in asset tangibility between 2004 and 2007 at firm level, and is calculated as $\frac{\text{PPE}_{2007}}{\text{Assets}_{2006}} - \frac{\text{PPE}_{2004}}{\text{Assets}_{2003}}$. The main explanatory variable on the right-hand side is the fraction of total foreign-currency denominated loans to local firms made by local domestic banks at the city level. Provincial fixed effects is controlled in column (1), column (2) add baseline controls which include GDP per capita, foreign-owned industrial firms output/GDP, industrial sector labor share, financial sector labor share and total construction land areas. Industry fixed effects are added in column (3), and region fixed effects are added in column (4). Finally, in the column (5), we explicitly control further for the city's export exposure by including the local industrial firms' total export value/GDP and fraction of industrial firms that are exporters.

Table B11. Firms' Output Growth and Domestic Channeled Foreign Credit

	Dependent Variable: Δ Output value-added					
	Easing phase			Tightening phase		
	OLS	IV-1	IV-2	OLS	IV-1	IV-2
Domestic channeled foreign credit	0.161** (0.0526)	0.145** (0.0458)	0.157** (0.0544)	-0.128* (0.0605)	-0.144** (0.0452)	-0.159** (0.0607)
Foreign credit/Total credit	0.222*** (0.0278)	0.191*** (0.0439)	0.133*** (0.0304)	-0.146** (0.0448)	-0.173*** (0.0442)	-0.135** (0.0413)
Observations	169307	159324	169164	159324	159466	159053
R^2	0.629	0.633	0.628	0.635	0.634	0.634
Province FE	✓	✓	✓	✓	✓	✓
Baseline Controls	✓	✓	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓
City controls	✓	✓	✓	✓	✓	✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table presents regression analysis of firm asset tangibility adjustment behavior shown in equation 7. The left-hand side variable is the change in asset tangibility between 2004 and 2007 at firm level, and is calculated as $\frac{PPE_{2007}}{Assets_{2006}} - \frac{PPE_{2004}}{Assets_{2003}}$. The main explanatory variable on the right-hand side is the fraction of total foreign-currency denominated loans to local firms made by local domestic banks at the city level. Provincial fixed effects is controlled in column (1), column (2) add baseline controls which include GDP per capita, foreign-owned industrial firms output/GDP, industrial sector labor share, financial sector labor share and total construction land areas. Industry fixed effects are added in column (3), and region fixed effects are added in column (4). Finally, in the column (5), we explicitly control further for the city's export exposure by including the local industrial firms' total export value/GDP and fraction of industrial firms that are exporters.

Appendix C. Allocation of credit and domestic credit intermediation

Table C1. Allocation of Credit: Incumbent Firms

	Debt growth ₀₄₋₀₇								
	OLS	IV-1	IV-2	OLS	IV-1	IV-2	OLS	IV-1	IV-2
DCFC	0.0108 (0.0272)	0.0117 (0.0233)	0.0114 (0.0277)	0.0329 (0.0215)	0.0323 (0.0215)	0.0362 (0.0223)	0.0286* (0.0111)	0.0237* (0.0109)	0.0252* (0.0105)
DCFC × 1[High-tangibility]	0.361*** (0.121)	0.364** (0.119)	0.366*** (0.103)						
1[High Tangibility]	-0.0145* (0.00782)	-0.0236* (0.0103)	-0.0210* (0.00789)						
DCFC × 1[Young firm]				0.145*** (0.0294)	0.141*** (0.0325)	0.155*** (0.0314)			
1[Young firm]				-0.0992 (0.0144)	-0.0951 (0.0144)	-0.0790 (0.0144)			
DCFC × 1[High ROA]							0.106*** (0.0358)	0.108*** (0.0332)	0.0956** (0.0321)
1[High ROA]							-0.0300*** (0.00878)	-0.0303*** (0.00878)	-0.0282** (0.00878)
Foreign credit/Total credit	0.0714 (0.0517)	0.0767 (0.0572)	0.115* (0.0532)	0.121* (0.0517)	0.122* (0.0572)	0.111* (0.0532)	0.109* (0.0517)	0.0958 (0.0622)	0.114* (0.0513)
Observations	169596	169596	169596	169596	169596	169596	169596	169596	169596
R ²	0.010	0.010	0.011	0.011	0.011	0.012	0.011	0.011	0.011
Province FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Baseline Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Industry FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
City controls	✓	✓	✓	✓	✓	✓	✓	✓	✓

Standard errors in parentheses

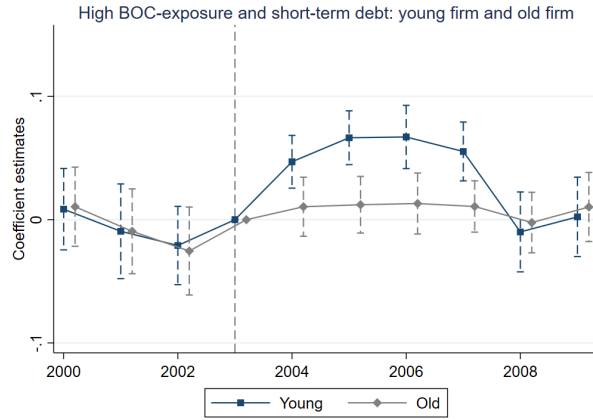
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table shows feature of the Firm-level debt growth and how it correlates with city-level domestic bank channeled foreign credit:

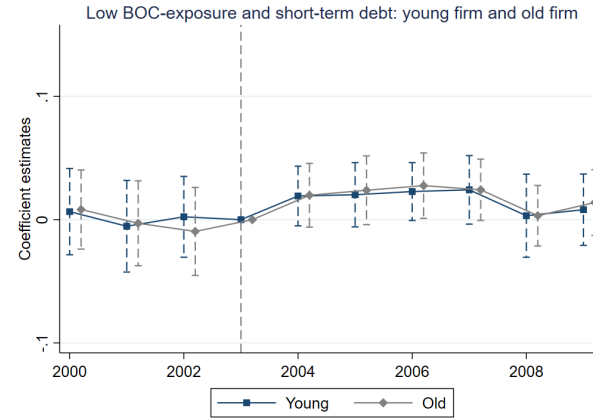
$$\Delta D_{i,j,c} = \alpha + \gamma_j + \beta_0 \text{DCFC}_c + \beta_1 \text{DCFC}_c \times 1[\text{Char}] + \theta X_{i,c} + \epsilon_{i,j,c} \quad (11)$$

$\Delta D_{i,j,c}$ is the *within-firm* incremental in leverage ratio post the financial cycle compared with its pre-cycle level. DCFC_c is abbreviated for domestic channeled foreign credit of city c during 2003-2007. $1[\text{Char}]$ is an indicator variable specifying the features of the firm, it could be $1[\text{High-tangibility}]$, $1[\text{Young firm}]$, $1[\text{High pre-ROA}]$. IV-1 is the instrumental variable using BOC's pre-cycle loan market share in the city; and IV-2 is the instrumental using the BOC's pre-cycle branching intensity in the city.

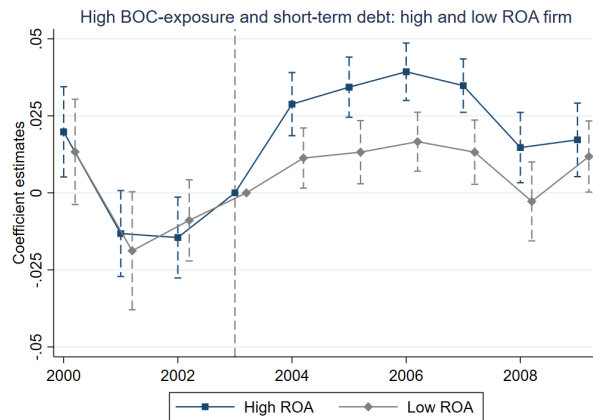
Fig. C1. BOC exposure and Firm Credit Growth



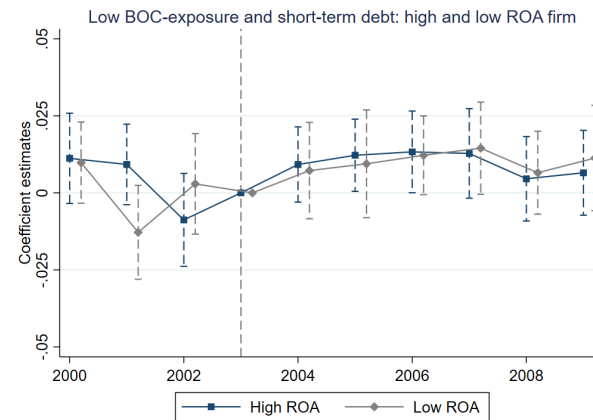
(a) High BOC exposure and firm debt growth



(b) Low BOC exposure and firm debt growth



(c) High BOC exposure and firm debt growth



(d) High BOC exposure and firm debt growth

Table C2. Domestic channeled foreign credit and new firm

	Δ New firms		
	OLS	IV-1	IV-2
Domestic channeled foreign credit	0.404* (0.151)	0.712** (0.228)	0.549** (0.181)
Foreign credit/Total credit	2.746* (1.149)	2.108* (0.852)	2.544* (1.006)
Observations	316	316	316
R^2	0.759	0.794	0.800
Province FE	✓	✓	✓
City-level Controls	✓	✓	✓

Standard errors in parentheses

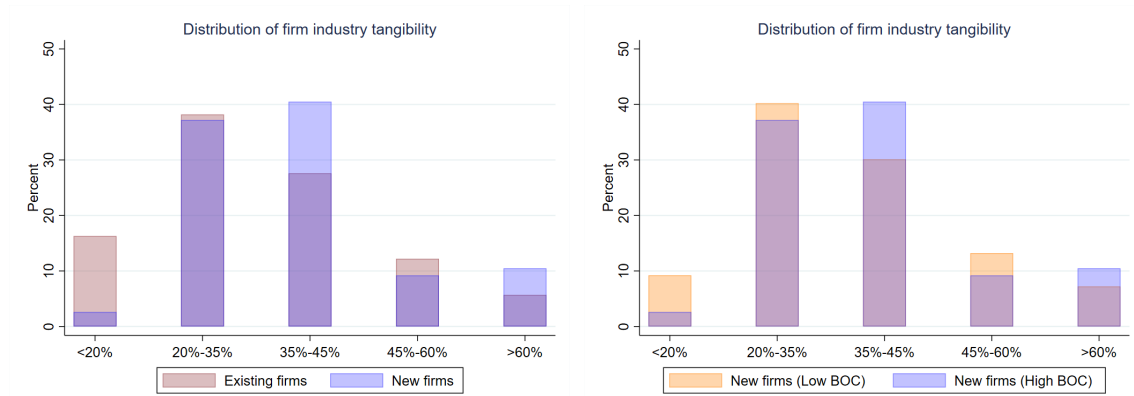
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table shows the average within-firm debt growth for firms that were newly established across different cities. Δ New firms is the difference in the natural log of total number of firms in the city in 2007 and 2003. Column (1) is the OLS regression results and Column (2) and (3) are 2SLS regression results. IV-1 is the instrumental variable using BOC's pre-cycle loan market share in the city; and IV-2 is the instrumental using the BOC's pre-cycle branching intensity in the city. City -level control variables include the total foreign credit to the city scaled by the city's total credit, agricultural labor share, industrial sector labor share, financial sector labor share, real estate sector labor share, average labor wage, unemployment rate, total fixed asset investment scaled by GDP, total population, total land resource and total foreign-owned firms' value-added scaled by total value-added by all firms.

Table C3. Distribution of new firms' industrial tangibility across cities

Firm category	Mean	S.d	25-th	Median	75-th
New firms	0.385	0.204	0.216	0.343	0.521
New firms & High BOC exposure	0.414	0.212	0.233	0.393	0.565
Existing firms	0.359	0.126	0.188	0.309	0.451

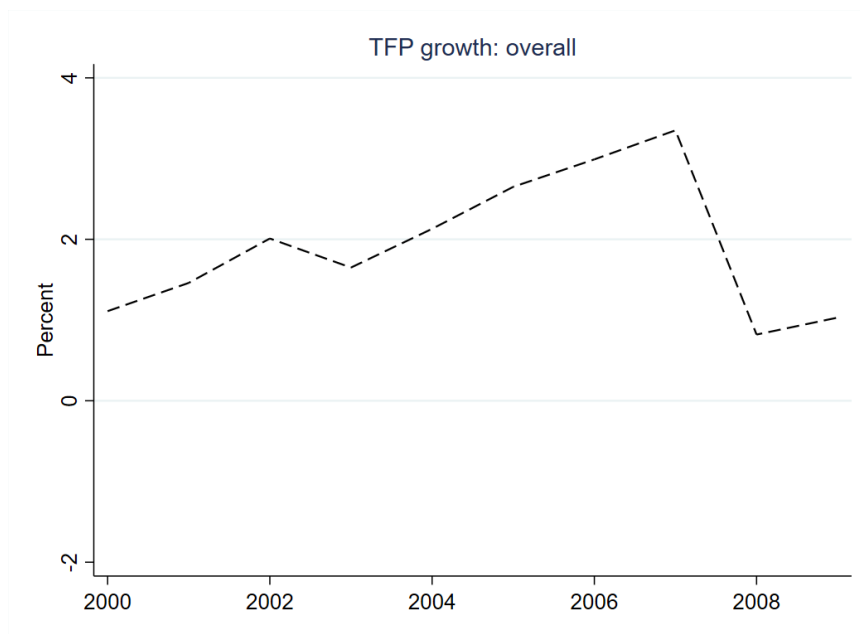
Fig. C2. Firm industry distribution and BOC exposure



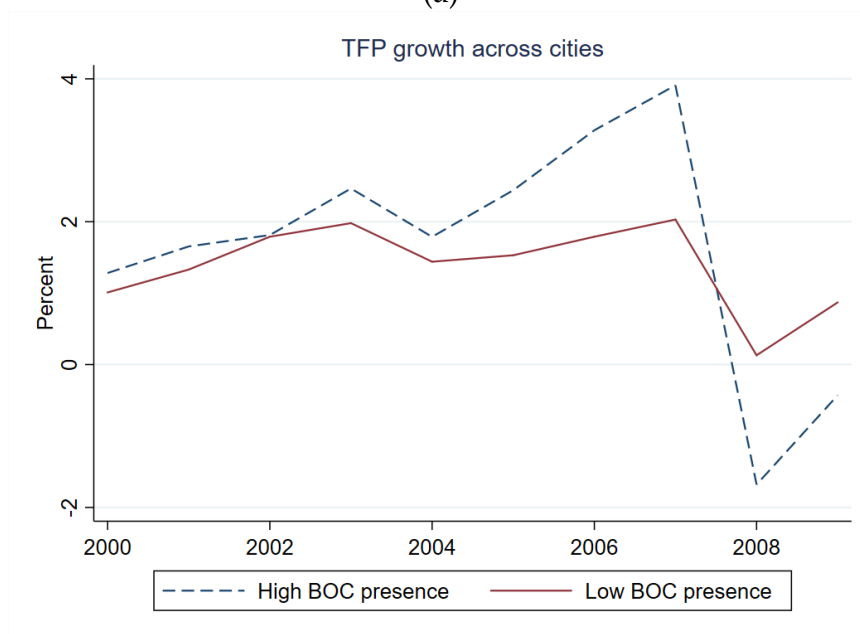
(a) New firm tangibility distribution

(b) New firm tangibility distribution and BOC exposure

Fig. C3. Distribution of Bank of China Lending Balance Market Share



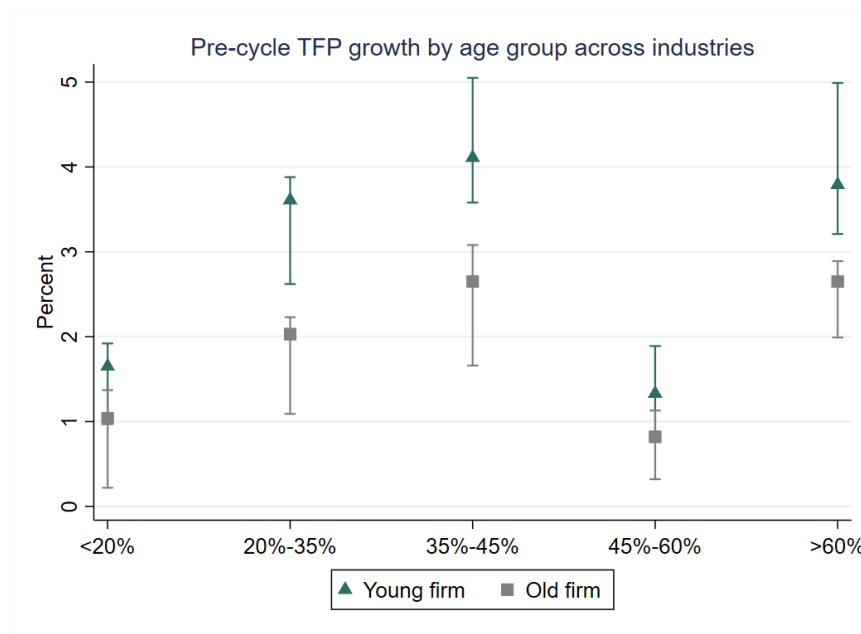
(a)



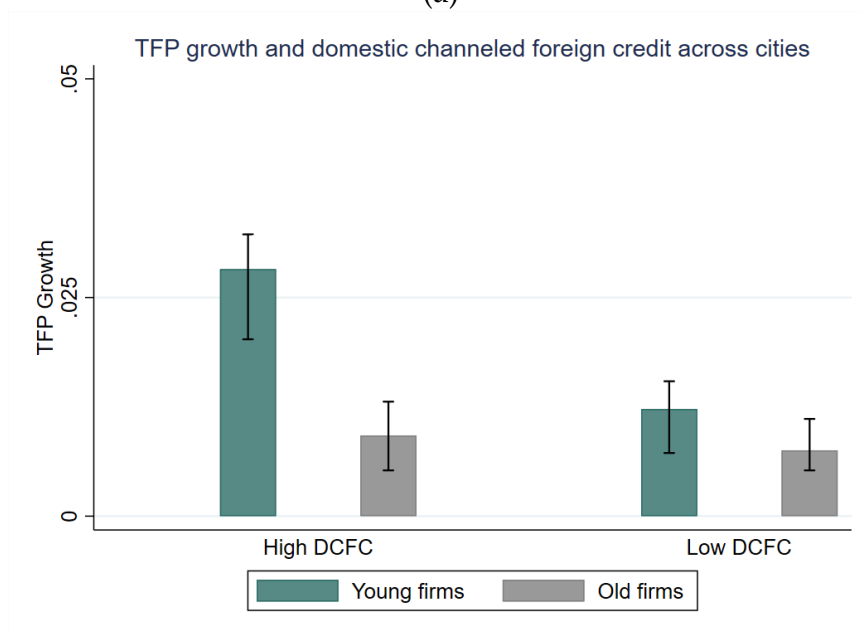
(b)

Notes: The figure compares firm-level TFP growth during 2003-2007 in cities with high and low domestic channeled foreign credit during the 2003-2007 period.

Fig. C4. Distribution of Bank of China Lending Balance Market Share



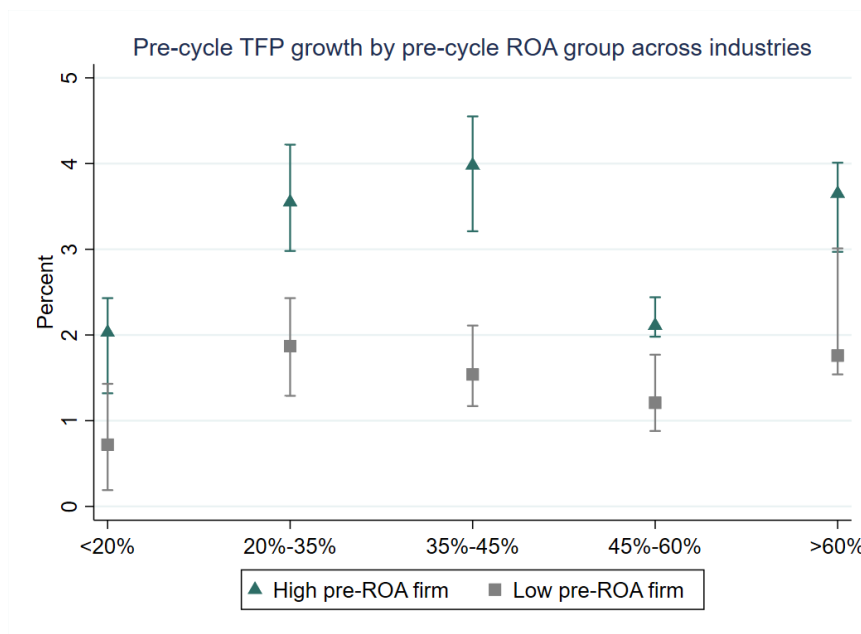
(a)



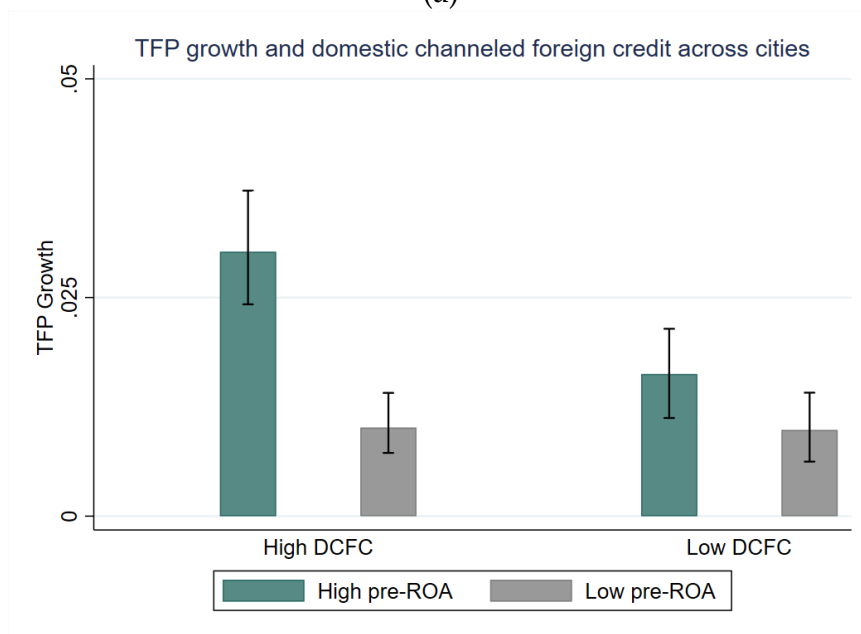
(b)

Notes: The figure compares firm-level TFP growth during 2003-2007 in cities with high and low domestic channeled foreign credit during the 2003-2007 period.

Fig. C5. Distribution of Bank of China Lending Balance Market Share



(a)



(b)

Notes: The figure compares firm-level TFP growth during 2003-2007 in cities with high and low domestic channeled foreign credit during the 2003-2007 period.

Table C4. Domestic channeled foreign credit and new firm debt growth across cities

	Debt growth		
	OLS	IV-1	IV-2
Domestic channeled foreign credit	0.268** (0.0896)	0.365*** (0.0878)	0.339** (0.0927)
Foreign credit/Total credit	0.217** (0.0709)	0.143* (0.0588)	0.146* (0.0618)
Observations	37418	37418	37418
R^2	0.094	0.123	0.122
Province FE	✓	✓	✓
City-level Controls	✓	✓	✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table shows the average within-firm debt growth for firms that were newly established across different cities. IV-1 is the instrumental variable using BOC's pre-cycle loan market share in the city; and IV-2 is the instrumental using the BOC's pre-cycle branching intensity in the city. City -level control variables include the total foreign credit to the city scaled by the city's total credit, agricultural labor share, industrial sector labor share, financial sector labor share, real estate sector labor share, average labor wage, unemployment rate, total fixed asset investment scaled by GDP, total population, total land resource and total foreign-owned firms' value-added scaled by total value-added by all firms.

Table C5. Summary Statistics of domestic relationship lending and collateral

Panel A: Firm-bank pair			
Total #. of firms	3287		
Total #. of banks	672		
Ave. # of firms/year (2003-2012)	1617		
% of firms located in high CL price volatility cities	31.9%		
% of lending (/year) secured by fixed-value assets	72.8%		
	mean	s.d.	median
#. of years relationship within each bank-firm pair	4.58	2.83	4
#. of banks within each firm-year	5.27	4.23	6
#. of banks each firm has relationship	5.89	6.13	4
Ln(Total borrowing amount)(CNY)	18.59	2.37	18.42
Panel B: Collateral Type			
	Mean	Sd.	Median
Property, Land, Pland and Factory	0.82	0.48	1.00
Security holdings	0.06	0.24	0.00
Account receivables, Earning and Cash flow	0.10	0.30	0.00
Machine and Equipment	0.08	0.27	0.00
More than two of the above categories	0.22	0.42	0.00

Table C6. Summary City Level Land Prices and Transactions

	# of cities	Mean	Std. Dev	25th	Median	75th
Industrial land price	214	548.52	189.34	252.34	454.23	798.28
Commercial land price	214	655.13	156.29	335.28	389.38	933.26
Financing volume collateralized by land	301	186531.12	389151.22	82634.77	288232.27	492342.76
# of industrial land transactions	289	113.54	89.23	22.15	42.45	89.32
# of pieces of industrial land purchases	289	84.78	79.27	9.28	31.49	56.78
Commercial mortgage issuance	251	34.39	45.33	3.39	14.52	59.89

Notes: The above table presents the summary statistics of city-level industrial land prices and transaction dynamics from 2002-2009. Financing volume collateralized by land is the total amount (in 10000 RMB) of loans that's collateralized by land in a city in a given year. # of industrial land transactions is the total number of sums of land transactions and # of pieces of land purchases are the total number of industrial land transacted during a year. Commercial mortgage issuance is the total number of sums of commercial mortgage transactions issued by local industrial firms.

Table C7. Real impact of domestic bank channeled foreign credit: easing period

	Ln[1+amount]			
	(1)	(2)	(3)	(4)
1[Easing]	0.185*** (0.0129)	0.0521*** (0.0104)	0.0631*** (0.00923)	0.0212*** (0.0134)
1[Easing] × 1[Land]		0.111*** (0.0230)		0.0747*** (0.0219)
1[Easing] × 1[Land] × 1[High commercial land price volatility city]				0.167*** (0.034)
1[Land]		0.0979** (0.0341)		0.0984** (0.0341)
1[Easing] × 1[High commercial land price volatility city]			0.113*** (0.0240)	
1[High commercial land price volatility city]			0.340 (0.0480)	
Observations	23233	23233	23233	23233
Adjusted R^2	0.796	0.801	0.798	0.803
Firm FE	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The above table presents the regression results in equation 6. The dependent variable is the natural log of total loan amount of loans lent by a domestic local bank to its local relationship lender. 1[Easing] is an indicator variable that equals to 1 for years 2003-2007, 1[Fixed-value secured] is an indicator variable that equals to 1 if the loan is secured by fixed assets. 1[High commercial land price volatility city] is an indicator variable that equals to 1 if the city's industrial land price decreased by more than 20% during the 2008-2009 compared with 2007.

Table C8. Real impact of domestic bank channeled foreign credit: easing period

	Ln[1+amount]			
	(1)	(2)	(3)	(4)
1[Tightening]	-0.371*** (0.0308)	-0.499*** (0.0321)	-0.155*** (0.0219)	-0.0923*** (0.0182)
1[Tightening] × 1[Land]		-0.108** (0.0368)		-0.103** (0.0382)
1[Tightening] × 1[Land] × 1[High commercial land price volatility city]				-0.364*** (0.0317)
1[Land]		0.0590** (0.0224)		0.0589* (0.0322)
1[Tightening] × 1[High commercial land price volatility city]			-0.237*** (0.0332)	
1[High commercial land price volatility city]			-0.105 (0.164)	
Observations	23233	23233	23233	23233
Adjusted R^2	0.797	0.802	0.798	0.811
Firm FE	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The above table presents the regression results in equation 6. The dependent variable is the natural log of total loan amount of loans lent by a domestic local bank to its local relationship lender. 1[Tightening] is an indicator variable that equals to 1 for years 2008-2009, 1[Fixed-value secured] is an indicator variable that equals to 1 if the loan is secured by fixed assets. 1[High commercial land price volatility city] is an indicator variable that equals to 1 if the city's industrial land price decreased by more than 20% during the 2008-2009 compared with 2007.

Table C9. Real impact of domestic bank channeled foreign credit

	Ln[1+amount]			
	(1)	(2)	(3)	(4)
1[Easing]	0.134*** (0.0189)	0.0235*** (0.00501)	0.0442*** (0.00826)	0.0109*** (0.00202)
1[Easing]×1[Land]		0.128*** (0.0208)		0.0323*** (0.00421)
1[Easing]×1[Land]× 1[High commercial land price volatility city]				0.114*** (0.0222)
1[Land]		0.145 (0.0933)		0.138 (0.143)
1[Easing]×1[High commercial land price volatility city]			0.0928*** (0.0172)	
1[High commercial land price volatility city]			0.109 (0.126)	
Observations	9946	9946	9946	9946
Adjusted R ²	0.818	0.821	0.826	0.833
Firm FE	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The above table presents the regression results in equation 6. The dependent variable is the natural log of total loan amount of loans lent by a domestic local bank to its local relationship lender. 1[Easing] is an indicator variable that equals to 1 for years 2003-2007, 1[Fixed-value secured] is an indicator variable that equals to 1 if the loan is secured by fixed assets. 1[High commercial land price volatility city] is an indicator variable that equals to 1 if the city's industrial land price decreased by more than 20% during the 2008-2009 compared with 2007.

Table C10. Real impact of domestic bank channeled foreign credit

	Ln[1+amount]			
	(1)	(2)	(3)	(4)
1[Tightening]	-0.405*** (0.0823)	-0.377*** (0.0802)	-0.163*** (0.0823)	-0.0982*** (0.0226)
1[Tightening] × 1[Land]		-0.0202 (0.0323)		-0.105*** (0.0235)
1[Tightening] × 1[Land] × 1[High commercial land price volatility city]				-0.353*** (0.0552)
1[Land]		0.186 (0.469)		0.169 (0.568)
1[Tightening] × 1[High commercial land price volatility city]			-0.413*** (0.0416)	
1[High commercial land price volatility city]			-0.203 (0.272)	
Observations	9946	9946	9946	9946
Adjusted R ²	0.809	0.811	0.818	0.822
Firm FE	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The above table presents the regression results in equation 6. The dependent variable is the natural log of total loan amount of loans lent by a domestic local bank to its local relationship lender. 1[Tightening] is an indicator variable that equals to 1 for years 2008-2009, 1[Fixed-value secured] is an indicator variable that equals to 1 if the loan is secured by fixed assets. 1[High commercial land price volatility city] is an indicator variable that equals to 1 if the city's industrial land price decreased by more than 20% during the 2008-2009 compared with 2007.

Table C11. Real impact of domestic bank channeled foreign credit

	Ln[1+amount]			
	(1)	(2)	(3)	(4)
1[Easing]	0.149*** (0.0283)	0.0298*** (0.00612)	0.0388*** (0.00752)	0.0229*** (0.00308)
1[Easing] × 1[High-tangibility]		0.143*** (0.0198)		0.0212*** (0.00403)
1[Easing] × 1[High-tangibility] × 1[High commercial land price volatility city]				0.132*** (0.0234)
1[High-tangibility]		0.122 (0.106)		0.144 (0.152)
1[Easing] × 1[High commercial land price volatility city]			0.0733*** (0.0135)	
1[High commercial land price volatility city]			0.118 (0.137)	
Observations	9946	9946	9946	9946
Adjusted R^2	0.722	0.725	0.794	0.799
Firm FE	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The above table presents the regression results in equation 6. The dependent variable is the natural log of total loan amount of loans lent by a domestic local bank to its local relationship lender. 1[Easing] is an indicator variable that equals to 1 for years 2003-2007, 1[Fixed-value secured] is an indicator variable that equals to 1 if the loan is secured by fixed assets. 1[High commercial land price volatility city] is an indicator variable that equals to 1 if the city's industrial land price decreased by more than 20% during the 2008-2009 compared with 2007.

Table C12. Real impact of domestic bank channeled foreign credit

	Ln[1+amount]			
	(1)	(2)	(3)	(4)
1[Tightening]	-0.412*** (0.0593)	-0.381*** (0.0588)	-0.201*** (0.0502)	-0.121*** (0.0211)
1[Tightening] × 1[High-tangibility]		-0.0332 (0.0405)		-0.129*** (0.0321)
1[Tightening] × 1[High-tangibility] × 1[High commercial land price volatility city]				-0.369*** (0.0576)
1[High-tangibility]		0.202 (0.433)		0.177 (0.332)
1[Tightening] × 1[High commercial land price volatility city]			-0.422*** (0.0602)	
1[High commercial land price volatility city]			-0.344 (0.498)	
Observations	9946	9946	9946	9946
Adjusted R ²	0.689	0.692	0.732	0.745
Firm FE	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The above table presents the regression results in equation 6. The dependent variable is the natural log of total loan amount of loans lent by a domestic local bank to its local relationship lender. 1[Tightening] is an indicator variable that equals to 1 for years 2008-2009, 1[Fixed-value secured] is an indicator variable that equals to 1 if the loan is secured by fixed assets. 1[High commercial land price volatility city] is an indicator variable that equals to 1 if the city's industrial land price decreased by more than 20% during the 2008-2009 compared with 2007.

Appendix D. Firm Response during the cycle

Table D1. Firms' Response I

	$\Delta\text{Tangibility}_{04-07}$				
	(1)	(2)	(3)	(4)	(5)
% Domestic channeled foreign credit	0.0233*** (0.00617)	0.0229*** (0.00632)	0.0187*** (0.00522)	0.0192*** (0.00531)	0.0203*** (0.00503)
%Foreign credit/GDP	0.252*** (0.0502)	0.214*** (0.0423)	0.211*** (0.0402)	0.199*** (0.0398)	0.192*** (0.0359)
Observations	173118	173118	173118	173118	173118
R^2	0.0182	0.122	0.159	0.233	0.256
Province FE	✓	✓	✓	✓	✓
Baseline Controls		✓	✓	✓	✓
Industry FE			✓	✓	✓
Region FE				✓	✓
Export exposure					✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table presents regression analysis of firm asset tangibility adjustment behavior shown in equation 7. The left-hand side variable is the change in asset tangibility between 2004 and 2007 at firm level, and is calculated as $\frac{\text{PPE}_{2007}}{\text{Assets}_{2006}} - \frac{\text{PPE}_{2004}}{\text{Assets}_{2003}}$. The main explanatory variable on the right-hand side is the fraction of total foreign-currency denominated loans to local firms made by local domestic banks at the city level. Provincial fixed effects is controlled in column (1), column (2) add baseline controls which include GDP per capita, foreign-owned industrial firms output/GDP, industrial sector labor share, financial sector labor share and total construction land areas. Industry fixed effects are added in column (3), and region fixed effects are added in column (4). Finally, in the column (5), we explicitly control further for the city's export exposure by including the local industrial firms' total export value/GDP and fraction of industrial firms that are exporters.

Table D2. Firms' Response II

	$\Delta\text{Total Debt}_{04-07}$				
	(1)	(2)	(3)	(4)	(5)
% Domestic channeled foreign credit	0.0288** (0.00962)	0.0288*** (0.00822)	0.0402*** (0.0876)	0.0353** (0.0855)	0.0376*** (0.0823)
% Foreign credit/GDP	0.129** (0.0469)	0.133** (0.0483)	0.132** (0.0455)	0.163*** (0.0421)	0.154*** (0.0478)
Observations	173118	173118	173118	173118	173118
R^2	0.0499	0.103	0.154	0.188	0.233
Province FE	✓	✓	✓	✓	✓
Baseline Controls		✓	✓	✓	✓
Industry FE			✓	✓	✓
Region FE				✓	✓
Export exposure					✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table presents regression analysis of firm asset tangibility adjustment behavior shown in equation 7. The left-hand side variable is the change in total leverage between 2004 and 2007 at firm level, and is calculated as $\frac{\text{Total Debt}_{2007}}{\text{Assets}_{2006}} - \frac{\text{Total Debt}_{2004}}{\text{Assets}_{2003}}$. The main explanatory variable on the right-hand side is the fraction of total foreign-currency denominated loans to local firms made by local domestic banks at the city level. Provincial fixed effects is controlled in column (1), column (2) add baseline controls which include GDP per capita, foreign-owned industrial firms output/GDP, industrial sector labor share, financial sector labor share and total construction land areas. Industry fixed effects are added in column (3), and region fixed effects are added in column (4). Finally, in the column (5), we explicitly control further for the city's export exposure by including the local industrial firms' total export value/GDP and fraction of industrial firms that are exporters.

Table D3. Firms' Response III

	Δ Fixed Asset Investment ₀₄₋₀₇				
	(1)	(2)	(3)	(4)	(5)
% Domestic channeled foreign credit	0.0275*** (0.00622)	0.0289*** (0.00643)	0.0332*** (0.00651)	0.0343*** (0.00633)	0.0298*** (0.00653)
% Foreign credit/GDP	0.0508*** (0.0123)	0.0455*** (0.0114)	0.0429*** (0.0112)	0.0403*** (0.0102)	0.0412*** (0.0114)
Observations	173118	173118	173118	173118	173118
R ²	0.0823	0.113	0.175	0.211	0.232
Province FE	✓	✓	✓	✓	✓
Baseline Controls		✓	✓	✓	✓
Industry FE			✓	✓	✓
Region FE				✓	✓
Export exposure					✓

Standard errors in parentheses

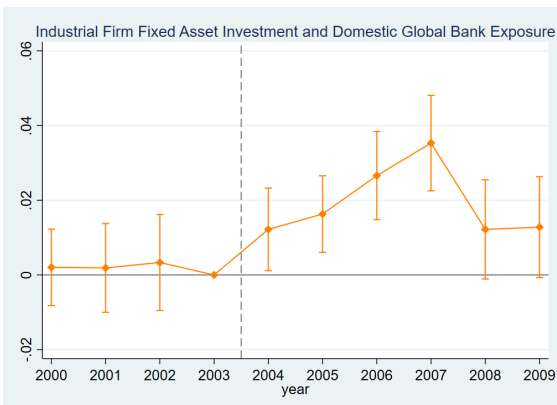
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The table presents regression analysis of firm asset tangibility adjustment behavior shown in equation 7. The left-hand side variable is the increase in total fixed-asset investment between 2004 and 2007 at firm level, and is calculated as $\frac{\text{Total fixed investment between 2004-2007}}{\text{Assets}_{2003}}$. The main explanatory variable on the right-hand side is the fraction of total foreign-currency denominated loans to local firms made by local domestic banks at the city level. Provincial fixed effects is controlled in column (1), column (2) add baseline controls which include GDP per capita, foreign-owned industrial firms output/GDP, industrial sector labor share, financial sector labor share and total construction land areas. Industry fixed effects are added in column (3), and region fixed effects are added in column (4). Finally, in the column (5), we explicitly control further for the city's export exposure by including the local industrial firms' total export value/GDP and fraction of industrial firms that are exporters.

Fig. D1. City-level Industrial Land Transaction Dynamics and Exposure to Domestic Global Bank



(a) Financing Collateralized by Land and Do- (b) Industrial Land Price and Domestic Global Bank Exposure



(c) NO. Sums of Industrial Land Transaction and Domestic Global Bank Exposure

Table D4. Local Commercial and Industrial Land Prices:tightening phase

	Δ Local Commercial property price		Δ Local Industrial land price	
	OLS	IV	OLS	IV
(Domestic share of local foreign credit)	-0.0303** (0.00802)	-0.0503*** (0.00877)	-0.0233** (0.00642)	-0.0362** (0.0125)
Foreign credit/Total credit	-0.00923* (0.00442)	-0.00762 (0.00653)	-0.0132 (0.0175)	-0.0105 (0.0154)
Observations	214	214	214	214
Adjusted R^2	0.115	0.113	0.0923	0.106
Province FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
City controls	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The above table presents the regression results of equation 9 in the tightening episode 2008-2009. The left-hand side variables are the changes in local commercial and industrial land prices during the tightening period and are defined as $\Delta(P_{2008-2009}^{land})_c$ are defined as $\frac{Ave.P_{2008-2009}^{land} - P_{2007}^{land}}{P_{2007}^{land}}$. The main explanatory variable is the share of foreign-currency denominated loans lent by local domestic banks during the 2003-2007 period. Column (1) and (3) are baseline regressions including province and city fixed effects and baseline controls including DP per capita, foreign-owned industrial firms output/GDP, industrial sector labor share, financial sector labor share and total construction land areas. Column (2) and (4) are 2SLS regressions using the city's pre-cycle BOC lending market share as instrumental variable.

Table D5. Local Commercial and Industrial Land Prices Easing phase

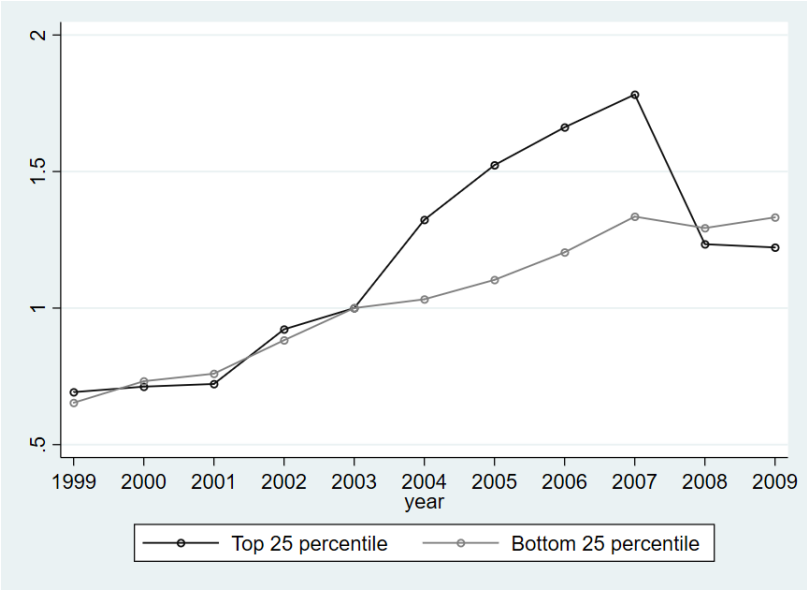
	Δ Local Commercial land price		Δ Local Industrial land price	
	OLS	IV	OLS	IV
(Domestic share of local foreign credit)	0.0676** (0.0288)	0.0529** (0.0166)	0.0458** (0.0166)	0.0449** (0.0161)
Foreign credit/Total credit	0.00729* (0.00323)	0.00664** (0.00262)	0.0221** (0.00742)	0.0187** (0.00659)
Observations	214	214	214	214
Adjusted R^2	0.0832	0.0917	0.0744	0.826
Province FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Baseline controls	Yes	Yes	Yes	Yes

Standard errors in parentheses

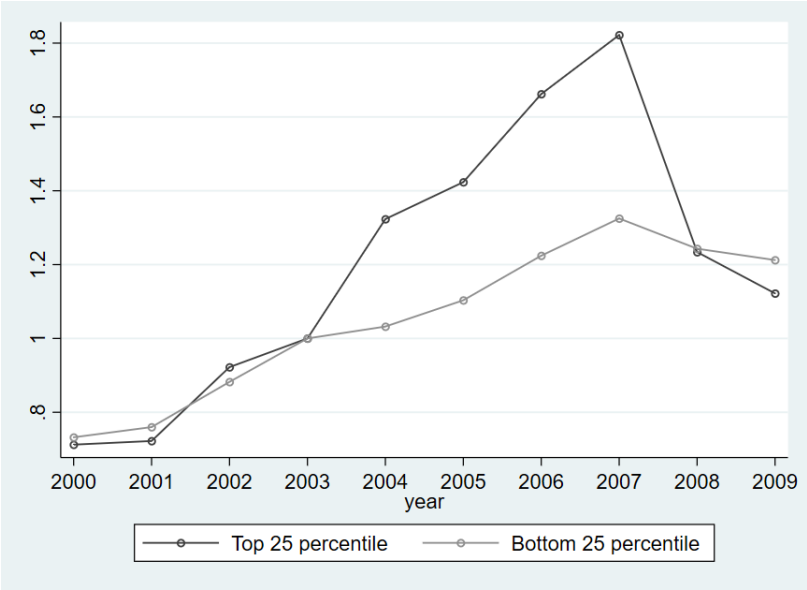
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: The above table presents the regression results of equation 9 in the easing episode 2003-2007. The left-hand side variables are the changes in local commercial and industrial land prices during the tightening period and are defined as $\Delta(P_{2003-2007}^{land})_c$ are defined as $\frac{P_{2007}^{land} - P_{2003}^{land}}{P_{2003}^{land}}$. The main explanatory variable is the share of foreign-currency denominated loans lent by local domestic banks during the 2003-2007 period. Column (1) and (3) are baseline regressions including province and city fixed effects and baseline controls including DP per capita, foreign-owned industrial firms output/GDP, industrial sector labor share, financial sector labor share and total construction land areas. Column (2) and (4) are 2SLS regressions using the city's pre-cycle BOC lending market share as instrumental variable.

Fig. D2. City-level Industrial Land Transaction Dynamics and Exposure to Domestic Global Bank

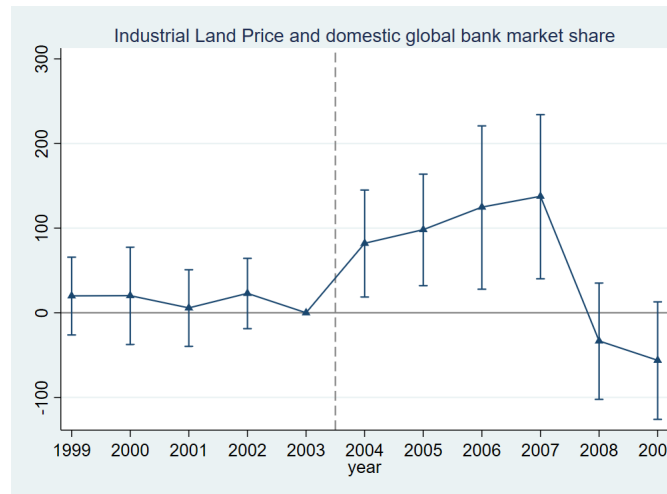
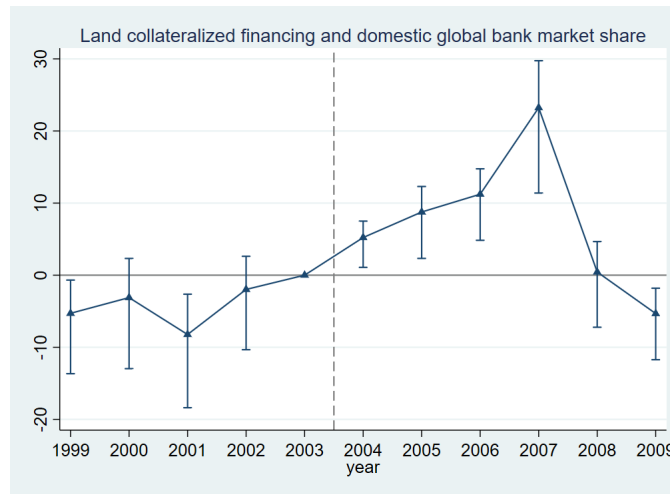


(a) Financing Collateralized by Land and Domestic Global Bank Exposure

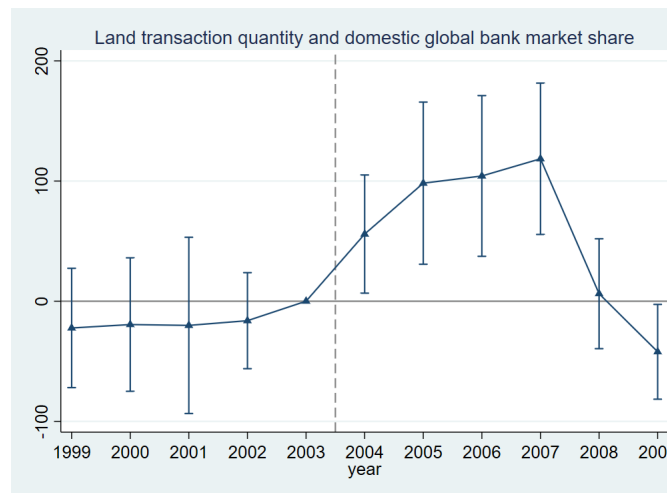
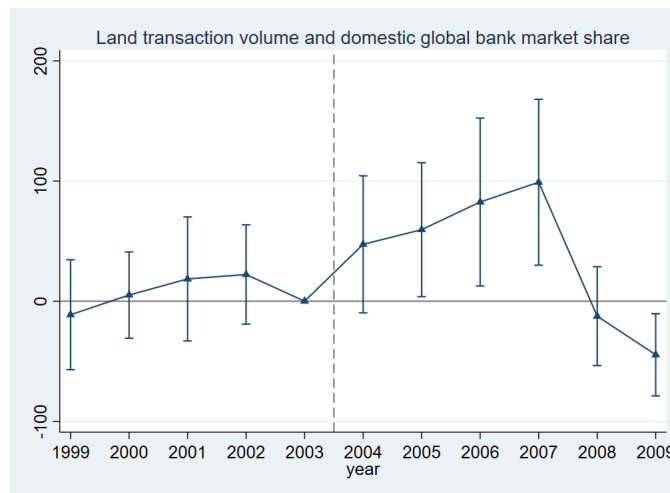


(b) Industrial Land Price and Domestic Global Bank Exposure

Fig. D3. City-level Industrial Land Transaction Dynamics and Exposure to Domestic Global Bank: Loan Market Share

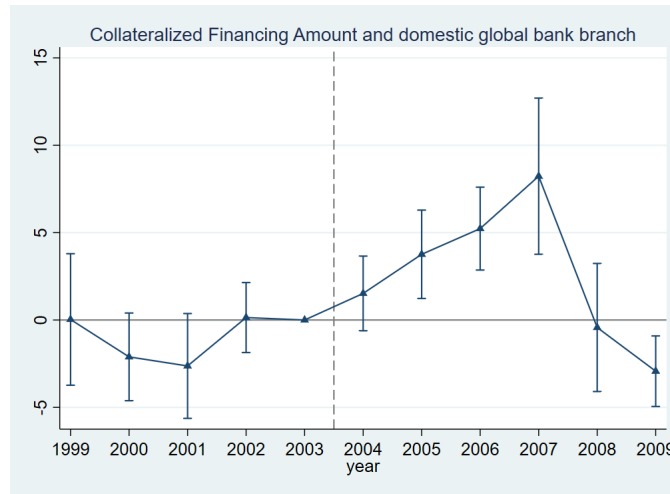


(a) Financing Collateralized by Land and Domestic Global Bank Exposure (b) Industrial Land Price and Domestic Global Bank Exposure

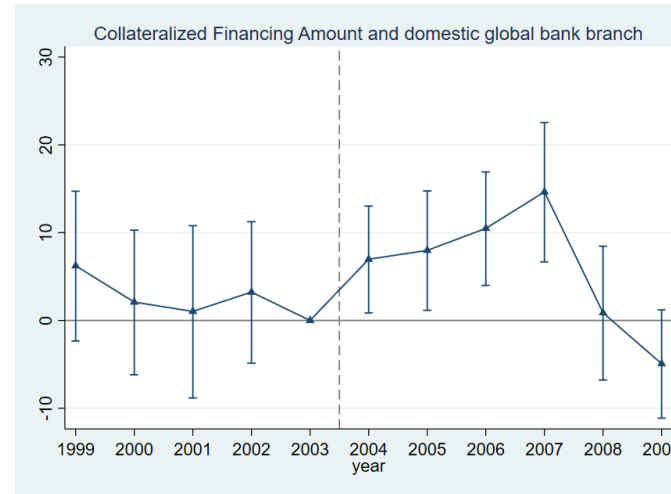


(c) NO. Sums of Industrial Land Transaction and Domestic Global Bank Exposure (d) NO. Pieces of Industrial Land Purchases and Domestic Global Bank Exposure

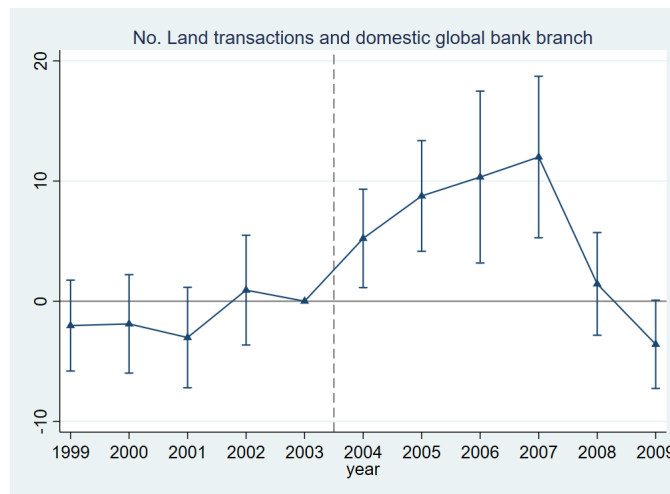
Fig. D4. City-level Industrial Land Transaction Dynamics and Exposure to Domestic Global Bank: BOC branching intensity



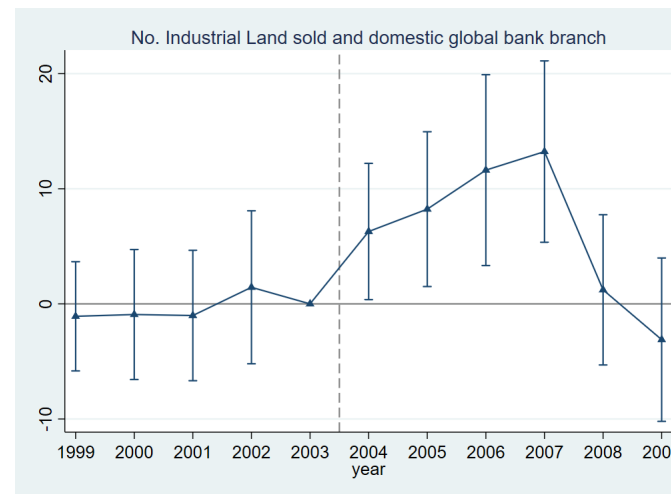
(a) Financing Collateralized by Land and Domestic Global Bank Exposure



(b) Industrial Land Price and Domestic Global Bank Exposure



(c) NO. Sums of Industrial Land Transaction and Domestic Global Bank Exposure



(d) NO. Pieces of Industrial Land Purchases and Domestic Global Bank Exposure

Appendix E. Additional Tables and Figures

Table E1. Comparing pre-cycle city-level characteristics

	Mean(High)	Mean(Low)	Diff.	Std. Error	Obs.
Population	419.33	409.33	-10.00	36.41	316
Unemployment rate	0.06	0.06	0.00	0.01	316
Agriculture labor share	0.04	0.06	0.02	0.01	316
Manufacturing labor share	0.28	0.24	-0.03	0.02	316
Construction labor share	0.07	0.06	-0.01*	0.01	316
Real estate labor share	0.01	0.01	0.00	0.00	316
Financial labor share	0.03	0.03	-0.00	0.00	316
Commercial labor share	0.08	0.08	0.00	0.00	316
Land resource	13257.41	14951.04	1693.63	1574.28	316
Arable land p/c	1.14	1.28	0.14	0.13	316
Agriculture value to GDP	17.92	22.07	4.15*	2.04	316
Industrial value to GDP	44.96	42.25	-0.70	1.38	316
Service value to GDP	37.12	35.68	-1.45	0.93	316
no. Industrial firms	632.44	670.57	38.13	47.93	316
Value added domestic firm	0.64	0.56	-0.07*	0.04	316
Value added foreign firm	0.08	0.04	-0.04	0.03	316
Fixed investment/GDP	0.27	0.26	-0.01	0.03	316
FDI/GDP	0.02	0.02	-0.01	0.01	316
no. FDI contracts	137.43	56.26	-81.17***	31.25	316
Transport capacity	5965.99	5160.05	-805.93	801.24	316

The above table shows the summary statistics at of city-level characteristic variables during 2003-2007. The data are collected from City Statistical Yearbook of China from 2003-2007, CEIC and city-level statistical yearbook. Real GDP is reported in 10,000 RMB, Arable Land per capita is reported in acre/person, city land area is reported in km^2 , construction sector labor force, financial sector labor force, industrial sector labor force and unemployed are reported in 10,000 persons; industrial output, industrial output (foreign-funded) and fixed asset investment are reported in 10,000 RMB. FDI contract value and actual FDI are reported in 10,000 USD. GDP per capita is reported in RMB per person and Real GDP growth is the average annual growth rate between 2003-2007, reported in percentage. Passenger transportation capacity is reported in 10,000 persons.

Table E2. Comparing pre-cycle firm characteristics

	Mean(High)	Mean(Low)	Diff.	Std. Error	Obs.
Total assets	9.7257	9.5822	-0.1435	0.9753	166270
Age	10.9163	11.2753	0.3590	0.4621	167279
Employees	309.7672	292.1175	-17.6498*	8.7385	167279
Current debt	0.5246	0.4998	-0.0248	0.0318	166270
Long-term debt	0.0669	0.0925	0.0256	0.0319	166270
ROA	0.0612	0.0666	0.0053	0.0060	166270
Value-added	8.6086	8.4585	-0.1502	0.2102	163134
Tangibility	0.3397	0.3679	0.0282	0.0214	166270
Cash flow	9.0176	8.8041	-0.2135*	0.1178	166030
Labor productivity	-2.7713	-2.6937	0.0777	0.0532	162917
Investment rate	0.0120	0.0131	0.0011	0.0008	166270
Wage bill	7.0547	6.8445	-0.2102**	0.0671	165987

The above table shows the summary statistics at of city-level characteristic variables during 2003-2007. The data are collected from City Statistical Yearbook of China from 2003-2007, CEIC and city-level statistical yearbook. Real GDP is reported in 10,000 RMB, Arable Land per capita is reported in acre/person, city land area is reported in km^2 , construction sector labor force, financial sector labor force, industrial sector labor force and unemployed are reported in 10,000 persons; industrial output, industrial output (foreign-funded) and fixed asset investment are reported in 10,000 RMB. FDI contract value and actual FDI are reported in 10,000 USD. GDP per capita is reported in RMB per person and Real GDP growth is the average annual growth rate between 2003-2007, reported in percentage. Passenger transportation capacity is reported in 10,000 persons.

Table E3. BOC Branch Intensity and Local characteristics

Panel A: Local Basic Economic Conditions					
	GDP growth	GDP/pc	Transportation capacity	Construction land	Arable land
	(1)	(2)	(3)	(4)	(5)
Branching	-0.392 (0.664)	3.979* (1.929)	-0.00635 (0.101)	11.643 (14.802)	-0.688 (0.396)
Observations	306	306	306	306	306
Province FE	✓	✓	✓	✓	✓
Panel B: Local Labor Conditions					
	Industrial	Financial	Real estate	Service	Unemployment
	(1)	(2)	(3)	(4)	(5)
Branching	0.0421 (0.0226)	0.00112 (0.00231)	0.00434 (0.00127)	0.00161 (0.00157)	0.00633 (0.0118)
Observations	306	306	306	306	306
Province FE	✓	✓	✓	✓	✓
Panel C: FDI and Export Exposure					
	FDI/GDP	% of exporter	%Foreign owned	Foreign-owned output/GDP	Export/GDP
	(1)	(2)	(3)	(4)	(5)
Branching	0.00239 (0.00131)	0.123 (0.0725)	0.0233 (0.0183)	0.00160* (0.000709)	0.00439 (0.00345)
Observations	306	306	306	306	306
Province FE	✓	✓	✓	✓	✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

This table presents the regression results of equation 4, where the right-hand side variable is BOC's branch intensity and the left-hand side variables are divided into three categories. In Panel (A), GDP growth is the real GDP growth rate, GDP/pc is the GDP per capita, Transportation capacity is the total volume of passengers the city's transportation system carried over a year, the the unit of observation is 0.1 million; Construction land is the total area (in square of kilometers) of construction stock in the city; the total arable land is the total area (in acres) of arable land in the outskirts of the city. Panel (B) shows the correlation between local labor market condition and pre-cycle BOC branching intensity. "Industrial", "Financial", "Real Estate" and "Service" refer to the share of labor force employed in the four sectors respectively, and unemployment is the unemployment rate. Panel (C) shows the correlation between the city's export and FDI exposure with the pre-cycle BOC exposure. FDI/GDP is the total dollar amount of FDI scaled by local GDP, % of exporter is the share of local industrial firms that are exporters; % foreign owned is the share of local industrial firms that have foreign ownership; Foreign-owned output/GDP and Export/GDP are the total value of output produced by foreign-owned industrial firms and exporting industrial firms scaled by GDP. All regressions are included with province-level fixed effects.

Table E4. BOC Market share and Local characteristics

Panel A: Local Basic Economic Conditions					
	GDP growth	GDP/pc	transportation_capacity	Construction land	Arable land
	(1)	(2)	(3)	(4)	(5)
Market share	0.817 (3.382)	30.28* (15.709)	0.592 (0.511)	12.672 (7.495)	-3.473 (1.907)
Observations	306	306	306	306	306
Province FE	✓	✓	✓	✓	✓
Panel B: Local Labor Conditions					
	Industrial	Financial	Real estate	Service	Unemployment
	(1)	(2)	(3)	(4)	(5)
Market share	0.0259 (0.175)	0.0100 (0.0117)	0.00233 (0.00649)	0.00287 (0.00365)	-0.0553 (0.0599)
Observations	306	306	306	306	306
Province FE	✓	✓	✓	✓	✓
Panel C: Local FDI and Export Exposure					
	FDI/GDP	% of exporter	%Foreign owned	Foreign-owned output/GDP	Export/GDP
	(1)	(2)	(3)	(4)	(5)
Market share	0.00527 (0.00670)	0.0785 (0.0397)	0.0145 (0.0144)	0.00585 (0.00363)	0.0455 (0.0403)
Observations	306	306	306	306	306
Province FE	✓	✓	✓	✓	✓

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

This table presents the regression results of equation 4, where the right-hand side variable is BOC's lending market share at the city level and the left-hand side variables are divided into three categories. In Panel (A), GDP growth is the real GDP growth rate, GDP/pc is the GDP per capita, Transportation capacity is the total volume of passengers the city's transportation system carried over a year, the the unit of observation is 0.1 million; Construction land is the total area (in square of kilometers) of construction stock in the city; the total arable land is the total area (in acres) of arable land in the outskirts of the city. Panel (B) shows the correlation between local labor market condition and pre-cycle BOC lending market share. "Industrial", "Financial", "Real Estate" and "Service" refer to the share of labor force employed in the four sectors respectively, and unemployment is the unemployment rate. Panel (C) shows the correlation between the city's export and FDI exposure with the pre-cycle BOC exposure. FDI/GDP is the total dollar amount of FDI scaled by local GDP, % of exporter is the share of local industrial firms that are exporters; % foreign owned is the share of local industrial firms that have foreign ownership; Foreign-owned output/GDP and Export/GDP are the total value of output produced by foreign-owned industrial firms and exporting industrial firms scaled by GDP. All regressions are included with province-level fixed effects.

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