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Export performance and Credit Constraints in China

Joachim Jarreau and
Sandra Poncet

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EXPORT PERFORMANCE AND CREDIT CONSTRAINTS IN CHINA

NON-TECHNICAL SUMMARY

In this paper, we investigate how the export performance of firms in China is influenced by credit constraints. In China's movement of rapid development and successful transition from a planned system to a market-driven economy over the past 30 years, its financial system has been widely viewed as lagging behind. Abundant research has shown it to be deficient and ineffective in its role of allocating capital across the economy. Among the dysfunctions diagnosed is the remaining State control over most of the banking sector, which may lead to distortions in the allocation of bank credit; and the underdevelopment of financial markets, which fails to provide firms with alternative sources of finance. Yet the country has achieved remarkable growth rates (close to 10% yearly) and its export sector has grown at an even faster rate (around 25% yearly) over the past 15 years. China's case thus appears to challenge the widely accepted view, confirmed by recent advances in theoretical modeling and empirical studies, that a well-functioning financial sector is a necessary and inextricable component of the growth process in general, and of export development in particular (Manova, 2008a).

We rely on recent developments in the theory and empirics of the finance and trade interactions to analyze the China's finance-trade conundrum. Theoretical modeling predicts that the efficiency of the financial sector has a higher impact on growth and export performance in industries intrinsically more dependent on external finance. This heterogeneity in sector-level dependence on finance provides a robust methodology to detect credit constraints and measure their evolution, as first proposed by Rajan and Zingales (1998). Recent trade models allowing for credit constraints predict that if financial development promotes a growth biased toward financially vulnerable industries, then this impact should be even more apparent on export growth, because access to export markets is more demanding in terms of external finance, due to the presence of fixed costs of entry. Improved financial system should affect the export structure, with the most dependent sectors being disadvantaged in environments with high distortions, but benefiting relatively more from improvements in financial system efficiency. We apply this methodology to the export patterns of Chinese provinces, using a panel of bilateral exports at the province level for 191 countries and 27 2-digit ISIC sectors in 1997-2007 by firm type in China. Our dataset hence allows us to estimate the magnitude of credit constraints and how they are mitigated by financial development separately for private, state and foreign-owned firms.

We find that the foreign-owned firms have better export performance than private domestic firms, and that this advantage is systematically greater in sectors at higher levels of financial dependence. This suggests that financial system imperfections severely restrict private firms' ability to engage in international trade while boosting that of foreign firms as they can tap internal funding from their parent company to circumvent the problem. Our analysis further provides three kinds of results. First, looking at the evolution over time, we find evidence that the gap between firm types in access to credit has significantly shrunk over the 10-year period, a sign of improved credit market conditions faced by private firms. Second, we use proxies of financial development in the context of China to investigate whether the reduction of state interventionism in the banking sector can explain this evolution. Hence, we directly estimate the impact of the reduction of financial distortions on export patterns separately by firm type. We build on the empirical literature relating finance development and trade in a cross-country

setting which show that financially developed economies export relatively more in financially dependent sectors. We ask whether the disadvantage suffered by private firms has decreased systematically more in provinces characterized with a lower level of state interventionism in finance. We confirm that the reduction of state interventionism in finance has contributed importantly to the decline of the constraining role of private firms' export participation played by financial frictions. Third, we move from firm-type export flows to aggregate flows to estimate how financial distortions have affected China's aggregate export performance. It is indeed conceivable that financial distortions' magnification of foreign affiliates exports (advantaged in sectors at higher levels of financial dependence) fully compensate for the restrictions on private firms. We show that over our sample period FDI did not compensate for domestic financial system imperfections. We find that the over-performance in exports by non-constrained firms -foreign and joint-venture firms - did not compensate for the constraints on domestic firms. Hence, FDI was no substitute for financial development to solve the impeding impact of credit constraints on China's exports.

ABSTRACT

We investigate how the export performance of firms in China is influenced by credit constraints. Using panel data from Chinese customs for 1997-2007, we show that credit constraints restrict international trade flows and affect the sectoral composition of firms' activity. We confirm that credit constraints provide an advantage to Foreign-owned firms and joint ventures over private domestic firms as their export performance is systematically greater in sectors with higher levels of financial vulnerability measured in a variety of ways. We however find that financial sector liberalization has partially reduced these distortions in exports over the period.

JEL Classification: F10, F14, F23, F36, G32

Keywords: Export performance, credit constraints, financial liberalization, FDI

PERFORMANCE EXPORTATRICE ET CONTRAINTES DE CRÉDIT EN CHINE

RÉSUMÉ NON TECHNIQUE

Dans cet article, nous examinons comment la performance d'exportation des entreprises en Chine est influencée par les contraintes de crédit. Au regard de rythme rapide de développement de l'économie chinoise et de sa transition réussie d'un système planifié à une économie de marché au cours des 30 dernières années, le système financier chinois apparaît comme en retard. De nombreux travaux de recherche soulignent ses distorsions et son inefficacité à répartir les capitaux dans l'économie. A l'origine de ces dysfonctionnements se trouvent le contrôle de l'Etat sur le secteur bancaire qui induit une allocation perverse du crédit bancaire, et le sous-développement des marchés financiers, dans l'incapacité de fournir aux entreprises des sources alternatives de financement. Malgré la défaillance de son système financier, la Chine a connu des taux de croissance remarquable de son PIB (près de 10% par an) et de ses exportations (environ 25% par an) au cours des 15 dernières années. La situation chinoise apparaît donc infirmer la conception largement répandue et popularisée par des travaux théoriques et des études empiriques, que le bon fonctionnement du secteur financier est une composante nécessaire et indissociable du processus de croissance en général, et du développement des exportations, en particulier (Manova, 2008a).

Dans cet article, nous nous appuyons sur les développements récents théoriques et empiriques sur les interactions entre finance et commerce pour analyser l'énigme de la situation chinoise. La modélisation théorique prédit que l'efficacité du secteur financier a un impact plus important sur la croissance et la performance à l'exportation dans les industries intrinsèquement plus dépendantes des financements externes. A la suite du travail pionnier de Rajan et Zingales (1998), il est possible d'exploiter cette hétérogénéité de la dépendance sectorielle aux sources de financement pour développer une méthodologie robuste de détection des contraintes de crédit et de mesure de leur évolution. Les récents modèles de commerce international qui intègrent les contraintes de crédit prédisent que si le développement financier favorise une croissance biaisée vers les industries vulnérables financièrement, alors cet impact devrait être encore plus apparent sur la croissance des exportations, parce que l'accès aux marchés d'exportation est plus exigeant en termes de financement extérieur, en raison de la présence de coûts fixes d'entrée. Ainsi l'amélioration de l'efficacité du système financier devrait modifier la structure des exportations. Ainsi les secteurs les plus dépendants défavorisés en présence de fortes distorsions devraient bénéficier relativement plus des améliorations. Nous appliquons cette méthode pour étudier la composition des exportations des provinces chinoises. Nous utilisons des données en panel sur les exportations bilatérales au niveau des provinces vers 191 pays et 27 secteurs par type d'entreprise entre 1997 et 2007. Notre base de données permet donc d'estimer l'ampleur des contraintes de crédit et comment elles ont été atténuées par le processus de libéralisation chinois séparément pour les entreprises privées, étatiques et à capitaux étrangers.

Nous trouvons que les entreprises à capitaux étrangers sont plus performantes à l'exportation que les entreprises nationales privées, et que cet avantage est systématiquement renforcé dans les secteurs à forte vulnérabilité financière. Ceci suggère que les imperfections du marché financier restreignent sévèrement la capacité des entreprises privées à s'engager dans le commerce international par rapport aux entreprises

étrangères possiblement car ces dernières peuvent bénéficier d'un financement interne de leur société mère pour contourner le problème.

Notre analyse nous fournit trois types de résultats. Tout d'abord, lorsqu'on examine l'évolution au fil du temps, nous constatons que l'écart entre les types d'entreprises dans l'accès au crédit s'est considérablement amoindri au cours de notre période d'étude, signe de l'amélioration des conditions du marché du crédit rencontrées par les entreprises privées. Deuxièmement, nous avons recours à des mesures de la libéralisation financière en Chine afin de déterminer si la réduction de l'interventionnisme étatique dans le secteur bancaire peut expliquer cette évolution. Par conséquent, nous estimons directement l'impact de la réduction des distorsions à l'exportation séparément par type d'entreprise. Nous nous appuyons sur la littérature empirique reliant développement financier et commerce dans un cadre international qui montre que les pays financièrement développés exportent relativement plus dans les secteurs vulnérables financièrement. Nous nous demandons si le désavantage subi par des entreprises privées a diminué systématiquement plus dans les provinces caractérisées par un niveau inférieur de l'interventionnisme étatique dans la finance. Nous confirmons que la réduction de l'interventionnisme étatique dans le système financier chinois a largement contribué à la diminution des contraintes pesant sur les exportations des entreprises domestiques privées. Troisièmement, nous menons des estimations non plus par type de firmes mais au niveau agrégé pour estimer si les distorsions financières ont affecté la performance globale des exportations chinoises. Il est en effet concevable que le renforcement des exportations étrangères induit par les distorsions financières compense entièrement l'impact restrictif sur les exportations des entreprises domestiques. Nous montrons que sur notre période d'étude, l'activité des entreprises étrangères n'a pas compensé l'effet négatif des imperfections du marché financier sur les entreprises domestiques. Nos résultats soulignent que la surperformance exportatrices des entreprises non contraintes (étrangères et joint ventures) n'a pas compensé la sous-performance des entreprises domestiques. Ainsi, les investissements directs étrangers ne se substituent pas à un processus de libéralisation financière pour résoudre l'effet d'entraves des contraintes de crédit sur les exportations en Chine.

RÉSUMÉ COURT

Nous étudions comment la performance d'exportation des entreprises en Chine est influencée par les contraintes de crédit. En utilisant des données en panel issues des douanes chinoises entre 1997 et 2007, nous montrons que les contraintes de crédit limitent les flux de commerce international et modifient la composition sectorielle de l'activité internationale des entreprises. Nous confirmons que les contraintes de crédit procurent un avantage aux entreprises à capitaux étrangers par rapport aux entreprises privées nationales dans la mesure où leur performance à l'exportation est systématiquement supérieure dans les secteurs à forte vulnérabilité financière mesurée de différentes manières. Nous observons cependant que la libéralisation du secteur financier a partiellement réduit l'impact de ces distorsions sur les exportations au cours de la période.

Classification JEL : F10, F14, F23, F36, G32

Mots clés : Performance à l'exportation, contraintes de crédit, libéralisation financière, Investissements directs étrangers.

EXPORT PERFORMANCE AND CREDIT CONSTRAINTS IN CHINAJoachim Jarreau*
Sandra Poncet†**1. INTRODUCTION**

China's financial system has been widely viewed as lagging behind the country's rapid development and successful transition from a planned system to a market-driven economy over the past 30 years. Abundant research has shown it to be deficient and ineffective in its role of allocating capital across the economy (Boyreau-Debray (2003), Dollar and Wei (2007), Li et al. (2008) among others). Among the dysfunctions diagnosed is the remaining state control over most of the banking sector, which leads to interferences and distortions in the allocation of bank credit; and the underdevelopment of financial markets, which fails to provide firms with alternative sources of finance.

Yet the country has achieved remarkable growth rates (close to 10% yearly) and its export sector has grown at an even faster rate (around 25% yearly) over the past 15 years. China's case thus appears to challenge the widely accepted view, confirmed by recent advances in theoretical modeling and empirical studies, that a well-functioning financial sector is a necessary and inextricable component of the growth process in general (Levine, 2005), and of export development in particular (Manova, 2008a). Several studies on China have indeed established a negative impact of distortions in the financial sector on growth (Boyreau-Debray (2003), Guariglia and Poncet (2008)), which implies that China's growth rates should have been even higher than those observed, had it benefited from a more open and market-oriented system of capital allocation. A different view is that alternative mechanisms, such as informal finance, have mitigated the impact of the deficient financial system (Cull et al. 2005). Another compensating mechanism has been recently suggested by Manova, Wei and Zhang (2010), who found that access to credit varied greatly across firm types in China, with foreign-owned firms much less credit-constrained than private domestic firms. They hence argue that FDI can make up for domestic financial system imperfections and alleviate their impact on trade.¹

In this paper, we rely on recent developments in the theory and empirics of the finance and trade interactions to analyze China's finance-trade conundrum. Theoretical modeling predicts that the efficiency of the financial sector has a higher impact on growth and export performance in industries intrinsically more dependent on external finance. This heterogeneity in sector-level dependence on finance provides a robust methodology to detect credit constraints and

*Université Paris I and CEPII; (joachim.jarreau@gmail.com)

†Sandra Poncet Paris School of Economics, Université Paris I and CEPII, 9 rue George Pitard, 75015 Paris. (sandra.poncet@univ-paris1.fr).

¹This claim that FDI may be used to alleviate the costs associated with the inefficient banking sector is also found in Guariglia and Poncet (2008) and Héricourt and Poncet (2010).

measure their evolution, as first proposed by Rajan and Zingales (1998). The incorporation of financial frictions in a heterogeneous-firm trade model à la Melitz (2003) allows to formalize the intuition that, if financial development promotes a growth biased toward financially dependent industries,² then this impact should be even more apparent on export growth, because access to export markets is more demanding in terms of external finance, due to the presence of fixed costs of entry (Chaney, 2005; Manova, 2008b). Models by Chaney (2005) and Manova (2008b) predict that the efficiency of the financial system should affect the export structure, with the most dependent sectors being disadvantaged in environments with high distortions, but benefiting relatively more from improvements in financial system efficiency. Such patterns of exports have been found empirically in cross-country regressions by Manova (2008b) and Berthou (2010) among others. We apply this methodology to the export patterns of Chinese provinces, using a panel of bilateral exports at the province level for 191 countries and 27 2-digit ISIC sectors in 1997-2007 by ownership type (private, state and foreign firms) in China. Our dataset hence allows us to estimate the magnitude of credit constraints, and how they are mitigated by financial liberalization. In addition, we allow for the possibility that the severity of credit constraints differs across firms according to their ownership status, and consider how the impact on aggregate exports is modified in this case.

We confirm the results of Manova et al. (2009), who find, relying on data for the year 2005, that foreign firms have an advantage over private and state-owned domestic firms in sectors with higher levels of financial vulnerability. We find that in 1997, all things equal, the ratio of foreign firms to private firms exports is higher at the fourth quartile of financial dependence than at the first quartile, by a factor 4.55. This suggests that financial system imperfections restrict private firms' ability to enter export markets, while foreign firms are able to circumvent these problems, possibly through the use of internal funding from parent companies.

We extend this analysis in several dimensions. First, looking at the evolution of credit constraints over time, we find evidence that the gap between firm types in access to credit has significantly shrunk over a 10-year period (1997-2007), a sign of improved credit market conditions faced by private firms. Second, we investigate whether liberalization in the banking sector can explain this evolution. We thus estimate the impact of financial liberalization on export patterns separately by firm type. We build on the empirical literature relating finance development and trade in a cross-country setting (Manova, 2008b; Berthou 2010; Beck 2002, 2003; Hur et al., 2006; Svaleryd and Vlachos, 2005) which shows that financially developed economies export relatively more in financially vulnerable sectors. We ask whether financial constraints faced by private firms have decreased in provinces where State control over the banking sector has decreased. Using different measures of the degree of market driven financing in the economy based on the share of non-State-owned banks, we confirm that the reduction of state interventionism in finance has contributed importantly to lifting constraints on private firms' export activity. Third, we move from firm-type export flows to aggregate flows to estimate how the share of public-sector banking which we hold as a proxy for financial distortions has affected China's aggregate export performance. It is conceivable (as been suggested by

²In the following we refer interchangeably to financially dependent or financially vulnerable sectors as in Manova et al. (2009).

Manova et al. (2009)) that overall the export performance of less constrained foreign firms could compensate for the restrictions on constrained private firms. We show that over our sample period FDI did not compensate for domestic financial system imperfections, in the sense that the export activity of less constrained firms, such as foreign firms, did not fully offset missing exports on the part of credit-constrained firms. Hence, FDI was no substitute for financial liberalization to solve the impeding impact of credit constraints on China's exports. Overall, State intervention in the banking sector has significantly distorted the structure of China's exports toward the least finance-intensive industries.

The rest of this article is structured as follows. In the following section we present our data and our indicators of financial development. In Section 3 we provide some descriptive statistics on the structure of Chinese exports across provinces and firm types. In section 4, we present our empirical approach and our results. Section 5 concludes.

2. DATA AND INDICATORS

The key data used in this paper are our measures of financial liberalization in Chinese provinces; sector-level financial vulnerability; as well as disaggregated export flows by province. Our sample consists of a panel of 30 provinces in mainland China with annual data for the period 1997-2007.

2.1. Measures of financial liberalization

Growing evidence identifies state control over financial intermediation as one important source of distortions in capital allocation in China (Dollar and Wei, 2007, Boyreau-Debray and Wei, 2005). This explains why the existing research on the links between finance and growth in China has led to contrasting results because of the difficulty to disentangle between the effect of financial deepening and that of the distorting nature of the state-ruled banking sector (Guariglia and Poncet, 2008). Indeed, in the context of China, traditionally used indicators of financial development, which measure banking sector size (such as the ratio of loans to GDP) are typically found to have no, or even a negative, impact on growth (Boyreau-Debray, 2003; Chen, 2006). By contrast indicators that measure the role of distortions induced by state interventionism in the financial sector (such as the share of state-owned commercial banks in total bank credits/deposits or the ratio of state-owned commercial banks' credits/deposits to GDP) are found to be positively associated to GDP growth (Guariglia and Poncet, 2008).

In this study, we rely on two China-specific indicators measuring the degree of liberalization in the banking sector at the province level. We provide here a short background on the evolution of China's financial system to help understand the meaning of these indicators.

Before 1979, China's financial system consisted of a single bank - the People's Bank of China (PBOC), a central government owned and controlled bank under the Ministry of Finance, which served as both the central bank and a commercial bank. Almost all financial transactions were handled by it according to the "cash plan" and "credit plan" (Allen et al., 2008). After 1979, the PBOC became a separate entity, while three newly created state-owned banks took over some of

its commercial banking businesses: the Bank of China (BOC), the People's Construction Bank of China (PCBC), and the Agricultural Bank of China (ABC). A fourth State-owned bank, the Industrial and Commercial Bank of China (ICBC), was created in 1984 and took over the rest of the commercial transactions of the PBOC. These four banks have been widely documented to have non-market driven credit allocation decisions behaviors. This can include discriminatory lending (e.g. against private firms), excessive lending to state-controlled firms leading to soft budget constraints, etc. Some of these banks serve to channel funds toward projects which can be more politically-oriented than profit-oriented; this has the consequence of diverting funds from other possible uses, thus creating credit constraints for firms with profitable projects but insufficient political support for them. The literature finds these big 4 State banks to be much less efficient (Yao et al., 2007; Shih et al., 2007; Chen et al., 2005). Lin and Zhang (2009) compare 60 Chinese banks (state owned, joint stocks, city commercials and joint ventures) from 1997 to 2004. The big four stand out to be less profitable, less efficient and have worse asset quality than the others. For these reasons, we believe that measures of the market share of these four main State-controlled banks can be used as a measure of distortions in credit allocation; they are likely to be associated with heavier credit constraints for some firms. More precisely, we expect high State-owned banks shares to be associated with higher constraints for private-owned firms, based on abundant evidence of discriminatory lending policies against private firms by State-owned banks. Note, however, the possibility that the Chinese financial system continues to favor State-owned enterprises (SOEs) despite liberalization. Dollar and Wei (2007) find that although low efficiency SOEs represent a declining share of national output (40% in 2005 down from 53% in 1995) their borrowing account for more than half of the total lending from the banking system. This can be due to the fact that private firms, although more productive, are still considered by Chinese banks as riskier than their public peers, possibly due to their short credit history, or to a lower chance of being bailed out by the government. Concerning State-owned firms, conventional wisdom in China economics has it that these firms often benefit from "soft budget constraints" on the part of State-owned banks, due to the fact that lending by State banks is still determined by policy reasons, rather than by commercial motives (see e.g. Park and Sehrt (2001)). This would lead us to expect that credit constraints faced by State-owned firms should become more severe as the liberalization of the banking sector progresses. However, our results do not confirm this intuition, suggesting the presence of constraints on State firms even in State-dominated financial environments. We will discuss these issues in detail in the results section.

In the empirical section, we apprehend the relative importance of finance devoid of state interventionism with the share of banks other than the four state-owned commercial banks (non 4-SOCBs) in total bank lending (non 4-SOCBs share in credit) or in total bank deposits (non 4-SOCBs share in deposits). These statistics are published in the Almanac of China Finance and Banking until 2004. As reported in Table 8 in the Appendix, in 1990, the four state-owned commercial banks dominated the financial sector: they accounted for around 85 percent of the country's deposits. Liberalization and reform efforts, notably in relation to the WTO accession, have greatly reduced this predominance and increased the share of banks other than the four SOCBs in deposits and credits, to nearly 40% in 2000 and 50% in 2004. Table 9 in the Appendix indicates that the situation is however very diverse across China. While some

provinces such as the North-Eastern provinces of Liaoning and Shandong have cut the share of the 4-SOCBs below 50% as soon as year 2000, some other provinces (such as the far-west provinces of Qinghai and Ningxia) still have state-dominated finance systems.

2.2. Measures of sector level reliance on external finance

We employ three different measures of a sector's financial vulnerability, which have been commonly used in the literature on the role of credit constraints for trade and growth. These variables are meant to reflect technological characteristics of each sector which are exogenous to the financial environment of the firm from the perspective of individual firms, and determine the degree of reliance of each sector's firms on external finance. While firms in all industries may face liquidity constraints, there are systematic differences across sectors in the relative importance of up-front costs and the lag between the time production expenses are incurred and revenues are realized. We capture these differences with a measure of sectors' external finance dependence (*financial dependence*), constructed as the share of capital expenditures not financed with cash flows from operations. For robustness, we also use an indicator of firms' liquidity needs (*liquidity needs*). This measure developed by Raddatz (2006) is the ratio of inventories over annual sales. It thus captures another dimension of a firm's dependence on access to external financing: the time lag between investments and the realization of corresponding revenues. As a third indicator, we follow Manova et al. (2009) who use the share of R&D spending in total sales (*R & D*), since research and development expenses typically occur at the beginning of a production process before a product can be manufactured and successfully marketed.

These indicators have been computed by Kroszner et al. (2006), using data on all publicly traded U.S.-based companies from Compustat's annual industrial files; the value of the indicator in each sector is obtained as the median value among all firms in each 2-digit ISIC sector.³ As is standard in the literature, we borrow these measures from these authors. As explained in Manova et al. (2009), the use of US data is not only motivated by the lack of data for most other countries, including China, it has several advantages. As put forward by Rajan and Zingales (1997), the United States have one of the most advanced and sophisticated financial systems, so that the values for US firms reflect the technology-specific component of external finance needs, or what can be called the finance content of an industry. It is likely that measuring these indices in the Chinese context would lead to different values, reflecting the fact that firms organize production differently in a credit-constrained environment. Thus, such measures would be endogenous to financial development in China, whereas measures based on US firms data can be seen as exogenous in this respect. In order to ensure that our measures of financial vulnerability are not simply reflecting sectors' factors intensity our regressions include sector-level proxies for physical and human capital intensity from Braun (2003). Summary statistics of the various sector level indicators are presented in Table 10 in the Appendix. Sectors are ranked in increasing order of their financial dependence. Tobacco stands out with the lowest reliance on external financing and plastic products for the highest. Interestingly as indicated in the last column, the share of foreign exports for the latter sector is 2.5 times higher than for the former, in

³ISIC (International Standard Industrial Classification) is a classification system for manufacturing sectors.

coherence with the Manova et al. (2009) argument that financial imperfections grant an export performance premium to foreign firms relative to domestic firms.

2.3. Trade Data sources

The main data source is a database collected by the Chinese Customs. It contains Chinese export flows aggregated by province, year, product and destination country, over the 1997-2007 period.⁴ The dataset also provides information on the ownership structure of the firm, which makes it possible to distinguish between state-owned enterprises (SOEs)⁵, private domestic firms, fully foreign-owned firms, and joint ventures (with foreign ownership under 100%).

3. FIRST GLANCE AT THE STRUCTURE OF CHINESE EXPORTS

There is tremendous systematic variation in export patterns across sectors at different levels of financial vulnerability and across provinces at different levels of state interference in finance. This section presents some simple correlations in the data which bode well for the empirical analysis to follow.

Figure 1 orders sectors by their external finance dependence and plots the export value of China for the two extreme years of our trade data (1997 and 2007). Interestingly, the period 1997-2007 has seen a faster growth of exports in the most financially vulnerable industries.

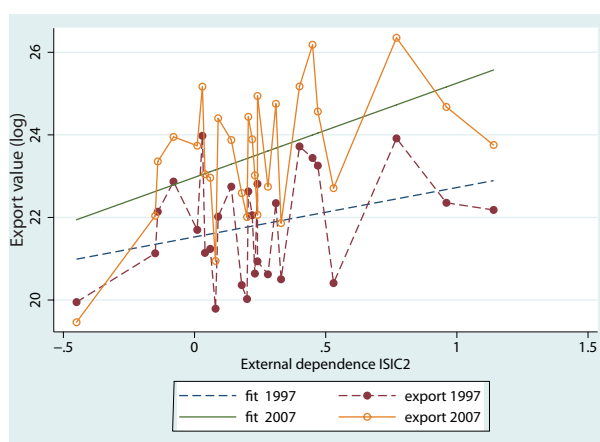


Figure 1 – Time evolution: Export value and external finance dependence (1997 and 2007).
Source: China's customs.

In light of Manova (2008b)'s prediction that in presence of credit constraints, improvements in financial system efficiency should benefit relatively more to the most finance-dependent

⁴The original data is identified by a 8-digit code. As there were major reclassifications in the international HS 6-digit classifications in 1996 and 2002, we convert them to the same HS 6-digit classifications used in 1992 to avoid problems related to reclassification of codes. In order to avoid classifying a product as a new variety just because there has been a new product code or previous codes were split, we drop product lines that changed classification at the 6-digit level over the period due to nomenclature changes.

⁵We define SOEs as including collectively-owned firms.

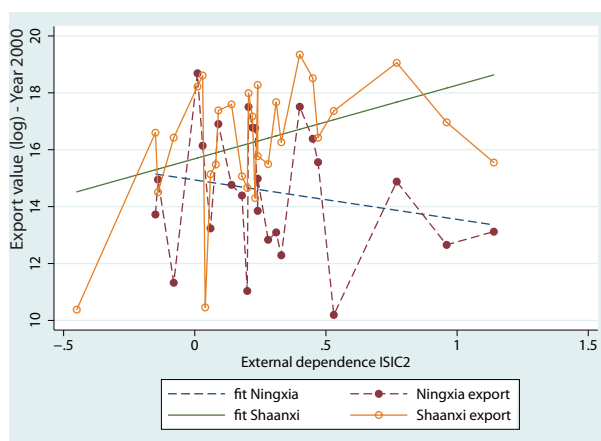


Figure 2 – Spatial heterogeneity: Export value and external finance dependence in Shaanxi and Ningxia in 2000. Though having similar GDPs per capita and shares in China’s exports, Shaanxi is much more financially developed than Ningxia. Source: China’s customs.

sectors, this suggests that financial liberalization in China over this period has reduced credit constraints. Similar results are obtained when looking at variation across provinces. Figure 2 compares the export structure of the two provinces of Shaanxi and Ningxia in 2000. These two provinces, as indicated in Table 9 in the Appendix, have rather similar levels of GDP per capita and contributions in China’s total exports; but they differ in the relative importance of SOCBs in their banking sectors, with the 4-SOCBs share of deposits at 65% in Shaanxi versus 25% in Ningxia, in 2000. Shaanxi has higher export sales overall than Ningxia, and its advantage is much more pronounced in sectors more dependent on external finance. This suggests that provinces more advanced in banking liberalization tend to specialize in dependent sectors in their exports.

Our empirical approach will not only exploit variation across time and provinces but also variation across firm types as in Manova et al. (2009). In China, the lion’s share of Chinese trade is conducted by firms with partial or full foreign ownership. As displayed in Table 8 in the Appendix, they account for 59% of the exports in 2004.

For clarity in the following graphs, foreign affiliates and joint ventures are combined into a unique category referred as foreign. Figure 3 indicates that beyond this average performance, foreign-owned firms capture a systematically bigger share of Chinese exports in industries at higher levels of financial vulnerability compared to domestic firms (State-owned and private together).

Figure 4 focuses on Shandong, the province with the highest share of non 4-SOBCs in finance in 2000. It shows that a pattern of specialization by financial dependence exists not only across provinces, but also among different firm types within a province: the distribution of foreign and state-owned firms’ exports is more concentrated in high dependence industries than that of private firms. Interestingly, at least in the case of Shandong, the gap between the three firm types has significantly shrunk for the final year of our sample in 2004 as illustrated in Figure 5, suggesting inequalities in access to credit between firm types have diminished.

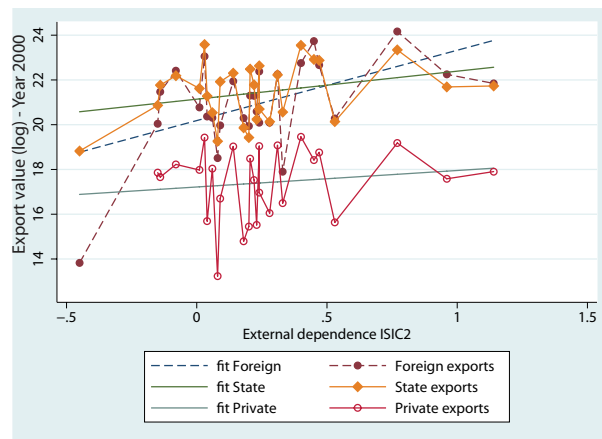


Figure 3 – Firm type heterogeneity: Export value and external finance dependence (Private, Foreign+JV and State) in 2000. Source: China’s customs.

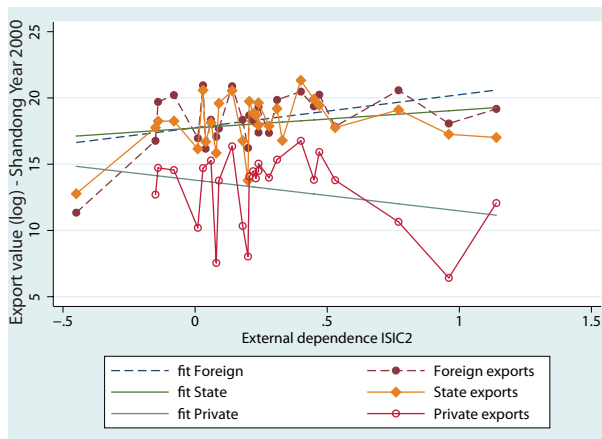


Figure 4 – Firm type heterogeneity in Shandong in 2000: Export value and external finance dependence (Private, Foreign+JV and State). Source: China’s customs.

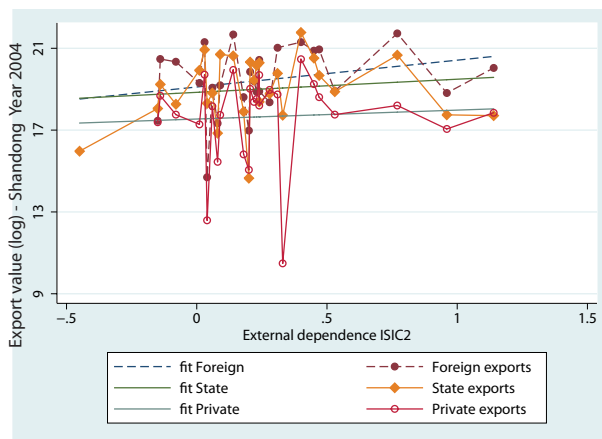


Figure 5 – Firm type heterogeneity in Shandong in 2004: Export value and external finance dependence (Private, Foreign+JV and State). Source: China’s customs.

Overall these summary statistics suggest that the structure of exports in China has been distorted by financial system imperfections; that these distortions vary in severity across provinces and across firm types; and that they have been reduced over the period under study (1997-2007). They suggest that China's financial distortions disproportionately hinder the export activity of private domestic firms that can only borrow in the local financial sector. Conversely, they favor foreign firms and to a lesser extent state-owned firms, suggesting that foreign ownership secures funds from the parent company and state ownership facilitates financing from domestic banks (whether state-owned or not). An important question which arises and our analysis addresses is if differences between firm types have compensated the impact of financial constraints, in the sense that the presence of less constrained foreign firms could have supplied the missing exports by domestic firms in the most finance-intensive sectors.

4. EMPIRICS

Our empirical strategy follows three steps. First, we test if credit constraints vary across firm types, and how they have evolved over the period. Second, we measure the impact of the reduction in the state interference in finance on the constraints faced by the different types of exporting firms. Finally, we ask how the share of public sector-banking has impacted aggregate exports, notably we look at whether the export performance premium they grant to foreign firms fully compensates for the disadvantage given to the private firms.

4.1. Impact of firm ownership on credit constraints

We identify the presence of credit constraints in China through the study of how the finance content of exports varies by firm ownership type. After controlling for determinants of specialization at the province level, we test if firms of different types specialize in sectors characterized by different financial vulnerability. Such a structure of specialization would provide indirect evidence that credit constraints vary across firm types. As argued above and in Manova et al. (2009), we expect the impact of credit constraints to be mitigated by foreign and state ownership. This expectation derives from the systematic finding by firm-level studies that private Chinese firms are credit constrained while state-owned firms and foreign-owned firms in China are not (Guariglia et al., 2010; Héricourt and Poncet, 2009). One possible factor behind this could be that foreign affiliates have access to internal capital from their parent company. Concerning state ownership, state-owned enterprises are thought to be more immune to credit constraints than private firms since they enjoy preferential treatment and access to external finance from the domestic banking system (Dollar and Wei, 2007; Boyreau-Debray and Wei, 2005).

We estimate the following equation:

$$\ln \text{Exports}_{ijkt}^F = \alpha_F D_F * \text{FinVuln}_k + \eta^F + \theta_{ijt} + \theta_k + \epsilon_{ijkt}^F \quad (1)$$

Where Exports_{ijkt}^F are the free-on-board export sales of firm type F in industry k for export destination j in year t for province i . Firm types include Private, State-owned firms, Foreign

and Joint-ventures. Binary indicator variables, D^F , take the value of 1 for firm type F and 0 otherwise. Our regressions include province-country-year fixed effects θ_{ijt} and industry fixed effects θ_k . Firm-type effects α_F and η_F are measured with respect to a reference group, which we choose to be private firms. In presence of industry fixed effects that control for systematic differences in firm exports across sectors and firm-type dummies that account for differences in average export performance between firms of different ownership type that are invariant across sectors, the main effect of financial vulnerability (lower worldwide sales in more financially vulnerable sectors) can not be observed. Hence, we focus on the comparison between firm type groups.

Column 1 of Table 1 displays the regressions results using external finance dependence to proxy sector-level financial vulnerability. In column 2, we expand the specification to include the interactions of the three firm ownership dummies with sectors' physical and human capital intensity as provided by Braun (2003). The remaining columns reproduce these two specifications relying on two alternative measures of sectors' financial vulnerability. Columns 3 and 4 use liquidity needs while columns 5 and 6 are based on the share of R&D spending in total sales ($R \& D$).

The potential limiting effect on exports of credit constraints is identified from the variation across firm types.

The main coefficients of interest are hence those on the three interaction terms α_F . As in Manova et al. (2009), if credit constraints indeed have a distortionary effect on exports against more financially vulnerable sectors, this should be especially true for private firms and less so for foreign-owned, JV and state-owned firms. Thus compared to the private firms, the sensitivity of their exports to financial vulnerability should be higher.

The positive coefficients observed on financial vulnerability for JV and fully-foreign firms are consistent with this prediction. The results suggest a pattern in which firms with different ownership types self-select into sectors characterized by different levels of financial constraints: namely, foreign firms and joint-ventures are significantly more specialized in "finance-intensive" industries, in comparison with private firms. The position of State-owned firms is less clear-cut: when financial vulnerability is measured with financial dependence or $R \& D$, they appear to be the group with the lowest finance content of exports. When liquidity needs are used however (columns 3 and 4), they appear statistically similar to foreign and joint-venture firms.

Findings that joint ventures and foreign affiliates export systematically more than private domestic firms in industries that employ less physical capital and more skilled workers is robust to the inclusion of interactive terms between firm ownership dummies and sectors' physical and human capital intensity. The coefficient estimates for the three interaction terms between financial vulnerability and firm type remain unchanged, indicating that the aforementioned effects of credit constraints are not explained by differences in relative factor endowments.

We see these results as evidence of credit constraints faced by exporting firms in China, with the severity of the constraints varying with the ownership structure of firms. Foreign firms and

Table 1 – Effect of credit constraints on export value (province/country/ISIC/year)

Indicator of fin. vulnerability	financial dependence		liquidity needs		R & D	
	(1)	(2)	(3)	(4)	(5)	(6)
State-owned × Fin. vulnerability	-0.129 ^a (0.019)	-0.205 ^a (0.021)	1.312 ^a (0.177)	1.872 ^a (0.198)	1.770 ^a (0.315)	-1.234 ^a (0.368)
JV-owned × Fin. vulnerability	0.382 ^a (0.034)	0.361 ^a (0.038)	1.616 ^a (0.270)	1.709 ^a (0.297)	12.223 ^a (0.547)	11.647 ^a (0.595)
Foreign-owned × Fin. vulnerability	0.752 ^a (0.040)	0.899 ^a (0.043)	2.657 ^a (0.302)	1.550 ^a (0.339)	12.701 ^a (0.629)	14.241 ^a (0.664)
State-owned	0.789 ^a (0.019)	0.305 ^a (0.036)	0.521 ^a (0.039)	-0.090 ^c (0.054)	0.712 ^a (0.020)	0.293 ^a (0.037)
JV-owned	-0.178 ^a (0.021)	-0.510 ^a (0.050)	-0.330 ^a (0.049)	-0.877 ^a (0.082)	-0.306 ^a (0.022)	-0.339 ^a (0.052)
Foreign-owned	-0.607 ^a (0.028)	-0.413 ^a (0.063)	-0.813 ^a (0.052)	-0.772 ^a (0.089)	-0.615 ^a (0.027)	-0.198 ^a (0.065)
State-owned × Human cap. intensity		0.686 ^a (0.040)		0.573 ^a (0.040)		0.699 ^a (0.046)
JV-owned × Human cap. intensity		0.686 ^a (0.058)		0.697 ^a (0.059)		0.130 ^b (0.063)
Foreign-owned × Human cap. intensity		0.363 ^a (0.069)		0.513 ^a (0.071)		-0.246 ^a (0.074)
State-owned × Physical cap. intensity		-2.041 ^a (0.339)		-0.310 (0.376)		-2.698 ^a (0.320)
JV-owned × Physical cap. intensity		-4.711 ^a (0.622)		-1.877 ^a (0.639)		-1.192 ^b (0.552)
Foreign-owned × Physical cap. intensity		-9.297 ^a (0.658)		-5.175 ^a (0.671)		-3.602 ^a (0.582)
Observations	1185431	1185431	1185431	1185431	1185431	1185431
R ²	0.195	0.196	0.193	0.194	0.195	0.196
Province-country-year fixed effects	yes	yes	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes	yes	yes

Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province/country level. ^a, ^b and ^c indicate significance at the 1%, 5% and 10% confidence level.

to a lesser extent joint-ventures have easier access to external finance, which provides them with an advantage in the most finance-dependent sectors. On the contrary, among domestic firms, the selection of exporters is made sharper by the credit constraints faced by these firms (translating into higher costs of credit); thus, a smaller fraction of domestic firms survives in those sectors. This effect may be reinforced by competition effects, in the sense that domestic firms may be further crowded out from finance-intensive sectors, by the competitive advantage enjoyed by foreign firms in those sectors. At this point we are not able to discriminate between the two effects.

These results have evolved over time. Tables 2 and 3 look at this evolution. In Table 2 we run Equation 1 on every year of our sample, using our benchmark indicator of sector finance intensity (*External dependence*). A declining trend in the differences of finance specialization across firm types appears very clearly. The specific advantage of foreign firms and joint-ventures, relative to private firms (the reference group) in the most finance-intensive sectors is divided by more than 4 between 1997 and 2007. To illustrate this: taking the values of external dependence at the first and third quartiles of total exports of China in 1997 (corresponding to the sectors of ‘Apparel’ and ‘Machinery’ respectively), we obtain 0.03 and 0.45 respectively (Table 10 in the Appendix). Using coefficients from columns 1 and 11 in Table 2, this means that in 1997, all things equal, the ratio of foreign firms to private firms exports is higher at third quartile of financial dependence than at the first quartile, by a factor 4.55 [$\exp((0.45 - 0.03) * 3.61)$]. In 2007, this value is down to 1.42 [$\exp((0.45 - 0.03) * 0.84)$]. The parallel decline of the coefficient for the three firm types - Foreign, Joint ventures, and State-owned - suggests that it is mainly private firms which have shifted their export structure. Since 1999, private firms export in relatively more financially vulnerable sectors than State firms since the export ratio of private firms over state firms rises with sector-level financial dependence.

These results are consistent with those found by Manova et al. (2009) with firm-level data in 2005. We show however, that the pattern of credit constraints across firm types has significantly evolved over the 10-year period. It suggests that access to credit has significantly improved for the firms which were initially most constrained (private domestic firms), reducing specific advantages enjoyed by firms with partial or whole foreign ownership.

Table 2 – Time variation of effects of credit constraints on export value

Explained variable	Export value										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
State-owned × Fin. vulnerability	2.198 ^a (0.494)	0.239 (0.237)	-0.108 (0.150)	-0.094 (0.119)	-0.153 ^c (0.090)	0.160 ^a (0.060)	-0.057 (0.048)	-0.265 ^a (0.038)	-0.235 ^a (0.036)	-0.332 ^a (0.035)	-0.396 ^a (0.034)
JV-owned × Fin. vulnerability	2.992 ^a (0.489)	0.937 ^a (0.242)	0.405 ^b (0.159)	0.441 ^a (0.129)	0.299 ^a (0.098)	0.596 ^a (0.072)	0.549 ^a (0.061)	0.329 ^a (0.058)	0.314 ^a (0.057)	0.272 ^a (0.054)	0.223 ^a (0.053)
Foreign-owned × Fin. vulnerability	3.612 ^a (0.500)	1.585 ^a (0.247)	0.996 ^a (0.171)	1.044 ^a (0.140)	0.884 ^a (0.111)	1.109 ^a (0.084)	0.916 ^a (0.073)	0.776 ^a (0.064)	0.807 ^a (0.059)	0.790 ^a (0.055)	0.840 ^a (0.052)
State-owned	4.222 ^a (0.710)	3.556 ^a (0.371)	2.469 ^a (0.185)	1.887 ^a (0.146)	1.440 ^a (0.112)	0.657 ^a (0.079)	0.390 ^a (0.070)	-0.255 ^a (0.058)	-0.574 ^a (0.054)	-0.940 ^a (0.052)	-1.391 ^a (0.054)
JV-owned	3.433 ^a (0.711)	2.675 ^a (0.375)	1.471 ^a (0.196)	0.922 ^a (0.153)	0.588 ^a (0.123)	-0.109 (0.095)	-0.219 ^b (0.085)	-0.993 ^a (0.077)	-1.239 ^a (0.074)	-1.612 ^a (0.073)	-1.868 ^a (0.072)
Foreign-owned	3.279 ^a (0.714)	2.669 ^a (0.378)	1.559 ^a (0.204)	0.939 ^a (0.165)	0.656 ^a (0.135)	-0.124 (0.108)	-0.305 ^a (0.096)	-0.738 ^a (0.086)	-0.966 ^a (0.080)	-1.216 ^a (0.077)	-1.299 ^a (0.073)
Controls	Physical and Human capital intensity of sector interacted with firm type										
Observations	58595	64605	71208	788 47	86466	100600	116791	136029	147775	159013	165502
R ²	0.228	0.234	0.253	0.2 40	0.242	0.231	0.223	0.209	0.203	0.203	0.207
Province-country-year Fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Explained variable is the log exported value (province/country/ISIC/year) by firm-type in 1997-2007. Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province/country level. ^a, ^b and ^c indicate significance at the 1%, 5% and 10% confidence level.

We also confirm the fact that State firms appear as credit constrained relatively to foreign-owned firms throughout the period (except in 1997), with their position in finance-intensive sectors deteriorating over the period, relatively to private-owned firms. This runs counter to the expectation that these firms should benefit from easier access to finance. As suggested by Manova et al. (2009), this result may reflect the fact that Chinese state-owned firms use their resources less efficiently, however this does not satisfactorily explain their relative disadvantage in finance-intensive sectors. We will confirm in the following section that distortions in the financial system, in the form of State banks dominance, do not necessarily provide an advantage to these firms in finance-intensive sectors.

Table 3 confirms that the time evolution highlighted above is consistently found with the three indicators of financial vulnerability. The interactive terms between financial vulnerability and firm type is further interacted with a trend (equal 1 for 1997, 2 for 1998 and so on). The negative coefficients attracted by these trend interactions corroborate the declining advantage of all firm types relative to private firms over the period.

4.2. Impact of banking liberalization on credit constraints

In the previous section, we have identified the presence of credit constraints faced by exporting firms in China, with the severity of these constraints varying with firm ownership. We now ask if recent developments in the capital allocation system in China, in particular, reductions in the degree of State intervention in this sector, have had an impact on these constraints.

Since firms of different ownerships are apparently facing different credit access, we expect the impact of financial liberalization to affect those groups differently. We test if an increasing share of non 4-State-owned banks in a province's total credits or deposits is associated with a rebalancing of exports toward finance-intensive sectors, in either of the four firm type groups (Private, State-owned, Foreign-owned, and Joint ventures). As before, we look at sector-level bilateral (province-country) export values by firm types, considering private firms as the reference group and using interactive terms for the other three groups to measure how they differ. We use the following specification:

$$\begin{aligned} \ln Exports_{ijkt}^F &= \alpha_F D_F \times FinVuln_k + \beta FinDev_{it} \times FinVuln_k + \beta_F D_F \times FinDev_{it} \times FinVuln_k \\ &+ \gamma_F D_F \times FinDev_{it} + \zeta_F^1 D_F k_{it} \times K_k + \zeta_F^2 D_F h_{it} \times H_k + \eta^F + \theta_{ijt} + \theta_k + \epsilon_{ijkt}^F \end{aligned} \quad (2)$$

where $Exports_{ijkt}^F$ is the export value from province i to country j in sector k at year t , by firm type F ; $FinDev_{it}$ corresponds to the province i 's financial development, which we proxy for using the share of non 4-SOCBs in total bank activity (apprehended alternatively by credits or deposits). $FinVuln_k$ is one of our three indices of financial vulnerability at sector level k . We account for differences in endowments with $k_{it} \times K_k$ and $h_{it} \times H_k$. They correspond to the interactions of measures of physical/human capital intensity at sector level with province-level endowments of each factor. Provincial endowment in human capital h_{it} is measured by the average number of schooling years while that in physical capital k_{it} is proxied by the per capita stock of capital accumulated based on investment using the permanent inventory method. We

Table 3 – Time variation of effects of credit constraints on export value

Indicator of fin. vulnerability	financial dependence		liquidity		R & D	
	(1)	(2)	(3)	(4)	(5)	(6)
State-owned × Fin. vulnerability	4.306 ^a (0.088)	4.240 ^a (0.087)	16.512 ^a (0.312)	17.421 ^a (0.344)	66.097 ^a (1.489)	63.111 ^a (1.468)
JV-owned × Fin. vulnerability	4.522 ^a (0.105)	4.515 ^a (0.106)	15.611 ^a (0.433)	16.020 ^a (0.451)	71.336 ^a (1.710)	70.686 ^a (1.676)
Foreign-owned × Fin. vulnerability	4.643 ^a (0.110)	4.790 ^a (0.112)	15.784 ^a (0.463)	14.881 ^a (0.487)	68.213 ^a (1.855)	69.521 ^a (1.848)
Fin.vulnerability × trend	0.490 ^a (0.010)	0.492 ^a (0.010)	1.352 ^a (0.039)	1.360 ^a (0.038)	6.870 ^a (0.160)	6.881 ^a (0.161)
JV-owned × Fin.vulnerability × trend	-0.471 ^a (0.012)	-0.474 ^a (0.012)	-1.750 ^a (0.042)	-1.770 ^a (0.042)	-6.739 ^a (0.193)	-6.756 ^a (0.194)
State-owned × Fin.vulnerability × trend	-0.516 ^a (0.011)	-0.518 ^a (0.011)	-1.963 ^a (0.041)	-1.981 ^a (0.041)	-7.552 ^a (0.182)	-7.582 ^a (0.183)
Foreign-owned × Fin.vulnerability × trend	-0.436 ^a (0.012)	-0.437 ^a (0.012)	-1.600 ^a (0.041)	-1.609 ^a (0.041)	-6.237 ^a (0.202)	-6.224 ^a (0.203)
JV-owned	-0.213 ^a (0.021)	-0.584 ^a (0.051)	-0.147 ^a (0.050)	-0.832 ^a (0.082)	-0.328 ^a (0.022)	-0.394 ^a (0.052)
State-owned	0.759 ^a (0.020)	0.243 ^a (0.036)	0.747 ^a (0.042)	-0.015 (0.056)	0.697 ^a (0.021)	0.248 ^a (0.037)
Foreign-owned	-0.642 ^a (0.028)	-0.475 ^a (0.062)	-0.668 ^a (0.053)	-0.725 ^a (0.089)	-0.638 ^a (0.027)	-0.244 ^a (0.064)
Controls ^α	no	yes	no	yes	no	yes
Observations	1185431	1185431	1185431	11854 31	1185431	1185431
R ²	0.202	0.204	0.207	0.2 08	0.201	0.202
Province-country-year Fixed effects	yes	yes	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes	yes	yes

Explained variable is the log exported value (province/country/ISIC/year) by firm-type in 1997-2007. Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province/country level. ^a, ^b and ^c indicate significance at the 1%, 5% and 10% confidence level. ^α Controls are interactions of physical and Human capital intensity of sector with firm type.

allow firm type exports to differ in sector finance vulnerability (α_F), as we observed to be the case in Tables (1) to (3); and we also allow financial liberalization to affect firm types exports differently (γ_F). This way, any variable correlated with banking liberalization, which could impact the balance of export activity across firm types, will be captured by these controls, but should not affect our coefficients of interest β and β_F , unless its effect runs through a financial channel. We thus adapt the methodology first used in Rajan and Zingales (1998), which consists in filtering the impact of financial liberalization by the sector-level index $FinVuln_k$, in order to isolate its direct finance-related causal effect.

Tables 4 and 5 display results from estimations of Equation 2, using the non 4-SOCBs share in credits and in deposits respectively. We observe, consistently across our three indicators of financial vulnerability, that the impact of financial liberalization on exports vary importantly across firm types. It is measured by β for private firms and $\beta + \beta_F$ for the three other firm types. Findings of a positive and significant β indicates that the State withdrawal from the banking functioning reduces significantly credit constraints for private firms, as evidenced by the fact that it causes these firms' exports to grow significantly more in sectors where finance is most needed. The negative coefficients (β_F) attracted by the interactive terms between financial development and financial vulnerability for state, foreign and joint-venture firms indicate that this mitigating effect of financial liberalization on credit constraints is less present for firms with state ownership and even more truly with foreign ownership. For these firms, credit access is much less affected by changes in the domestic banking structure.

In most cases, the constraint-reducing impact of liberalization is significantly lower for State-owned firms, indicating that private firms are the first beneficiaries of a reduced market share of SOCBs in finance.⁶ Still, we identify a clear positive impact for State-owned firms as well.

This confirms the existence of credit constraints among State-owned firms, in line with our previous results despite the general belief that those firms benefit from soft budget constraints. It seems likely that these results mask heterogeneity among firms - with some State-owned firms benefiting from easy finance - and in time, with successive episodes of State banks bailouts and restructuring over the period likely to have modified the easiness of State firms' access to finance.

These results are robust when including control variables for factor endowments to vary by firm type (columns 2, 4 and 6 in Tables 4 and 5), so that we rule out the possibility that our estimates reflect a mere pattern of firm types specialization by factor (capital/human capital) intensity, which would be correlated with financial characteristics.⁷

To give an idea of the magnitude of the impacts measured here, we consider a 20% increase

⁶In unreported results, we find similar effects of financial liberalization on the number of products (at HS-6 level) exported within a sector by each type of firms; showing that the impact of reduced constraints on sector-level export value runs partly through the extensive margin, allowing more firms to enter export markets in finance-intensive industries.

⁷In unreported results, we test the robustness of our results to the exclusion of the top three exporting provinces (Guangdong, Fujian and Shanghai). Our results are only qualitatively affected. Our main message also remains if we restrict our sample to coastal provinces, non coastal provinces, western or non western provinces and if we exclude autonomous regions (Xinjiang, Inner Mongolia, Ningxia and Guangxi.)

Table 4 – Finance impact of credit constraints (non 4-SOCBs share in credits)

Indicator of fin. vulnerability	financial dependence		liquidity needs		R & D	
	(1)	(2)	(3)	(4)	(5)	(6)
Province Fin. Devt × Sector Fin. vulnerability (β)	1.688 ^a	1.680 ^a	11.465 ^a	11.516 ^a	13.301 ^a	13.083 ^a
	(0.177)	(0.178)	(1.476)	(1.482)	(2.974)	(2.967)
State-owned × Fin. Devt × Fin. vulnerability	-0.050	-0.047	-6.939 ^a	-6.815 ^a	-0.226	0.274
	(0.174)	(0.174)	(1.424)	(1.417)	(2.969)	(2.961)
JV-owned × Fin. Devt × Fin. vulnerability	-0.818 ^a	-0.829 ^a	-13.427 ^a	-13.435 ^a	-9.498 ^a	-9.882 ^a
	(0.236)	(0.235)	(1.815)	(1.803)	(3.660)	(3.660)
Foreign-owned × Fin. Devt × Fin. vulnerability	-1.114 ^a	-1.068 ^a	-12.881 ^a	-13.048 ^a	-13.984 ^a	-13.522 ^a
	(0.270)	(0.268)	(2.168)	(2.173)	(4.588)	(4.569)
State-owned × Fin. vulnerability	0.024	-0.080	-4.398 ^a	-2.426 ^b	1.963	1.181
	(0.137)	(0.139)	(1.152)	(1.151)	(2.326)	(2.342)
JV-owned × Fin. vulnerability	-0.177	-0.179	-9.597 ^a	-8.540 ^a	3.786	4.551
	(0.185)	(0.186)	(1.455)	(1.448)	(2.890)	(2.861)
Foreign-owned × Fin. vulnerability	-0.080	0.116	-8.427 ^a	-8.801 ^a	0.379	2.563
	(0.215)	(0.218)	(1.763)	(1.792)	(3.659)	(3.652)
State-owned	1.629 ^a	1.277 ^a	2.394 ^a	1.528 ^a	1.571 ^a	1.230 ^a
	(0.146)	(0.146)	(0.251)	(0.260)	(0.147)	(0.147)
JV-owned	0.531 ^a	0.556 ^a	2.172 ^a	1.722 ^a	0.406 ^b	0.463 ^a
	(0.158)	(0.162)	(0.289)	(0.310)	(0.161)	(0.163)
Foreign-owned	-0.086	0.285	1.395 ^a	1.456 ^a	-0.103	0.207
	(0.193)	(0.209)	(0.333)	(0.365)	(0.194)	(0.206)
State-owned × Fin. Devt	0.240	0.256	1.422 ^a	1.367 ^a	0.196	0.171
	(0.186)	(0.194)	(0.309)	(0.317)	(0.188)	(0.195)
JV-owned × Fin. Devt	0.153	0.163	2.258 ^a	2.216 ^a	0.095	0.015
	(0.198)	(0.208)	(0.358)	(0.367)	(0.203)	(0.211)
Foreign-owned × Fin. Devt	-0.044	-0.020	1.874 ^a	1.897 ^a	-0.114	-0.171
	(0.250)	(0.261)	(0.423)	(0.436)	(0.250)	(0.259)
K/L * physical cap. intensity	-0.602	-0.124	0.150	-0.080	-0.116	0.146
	(0.451)	(0.443)	(0.449)	(0.459)	(0.445)	(0.442)
H/L * human cap. intensity	1.009 ^a	1.313 ^a	1.031 ^a	1.335 ^a	0.918 ^a	1.037 ^a
	(0.343)	(0.377)	(0.339)	(0.374)	(0.346)	(0.382)
Controls ^α	no	yes	no	yes	no	yes
Observations	713141	713141	713141	713141	713141	713141
R ²	0.217	0.218	0.214	0.214	0.216	0.217
Province-country-year	yes	yes	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes	yes	yes

Explained variable is the log exported value (province/country/ISIC/year) by firm type in 1997-2004. Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province/country level. ^a, ^b and ^c indicate significance at the 1%, 5% and 10% confidence level. ^α Controls are interactions of physical and Human capital intensity of sector with firm type.

Table 5 – Finance impact of credit constraints (non 4-SOCBs share in deposits):

Indicator of fin. vulnerability	financial dependence		liquidity needs		R & D	
	(1)	(2)	(3)	(4)	(5)	(6)
Province Fin. Devt × Sector Fin. vulnerability	1.636 ^a (0.148)	1.618 ^a (0.148)	12.198 ^a (1.251)	12.179 ^a (1.255)	18.299 ^a (2.487)	18.093 ^a (2.489)
State-owned × Fin. Devt × Fin. vulnerability	-0.213 (0.147)	-0.204 (0.147)	-3.964 ^a (1.157)	-3.817 ^a (1.157)	-7.415 ^a (2.547)	-7.081 ^a (2.549)
JV-owned × Fin. Devt × Fin. vulnerability	-0.906 ^a (0.180)	-0.900 ^a (0.180)	-9.334 ^a (1.494)	-9.323 ^a (1.489)	-14.018 ^a (3.266)	-14.082 ^a (3.259)
Foreign-owned × Fin. Devt × Fin. vulnerability	-0.387 (0.255)	-0.294 (0.253)	-5.986 ^a (2.103)	-6.263 ^a (2.101)	-9.459 ^b (4.082)	-8.684 ^b (4.067)
State-owned × Fin. vulnerability	-0.114 (0.124)	-0.204 (0.126)	-1.923 ^c (1.004)	-0.096 (1.027)	-4.104 ^c (2.124)	-5.080 ^b (2.157)
JV-owned × Fin. vulnerability	-0.320 ^b (0.146)	-0.303 ^b (0.147)	-6.759 ^a (1.266)	-5.913 ^a (1.275)	-0.679 (2.650)	0.034 (2.649)
Foreign-owned × Fin. vulnerability	0.441 ^b (0.214)	0.688 ^a (0.216)	-3.335 ^c (1.764)	-4.014 ^b (1.802)	3.287 (3.443)	5.530 (3.469)
State-owned	1.590 ^a (0.123)	1.247 ^a (0.121)	1.895 ^a (0.222)	1.072 ^a (0.236)	1.606 ^a (0.124)	1.284 ^a (0.122)
JV-owned	1.085 ^a (0.133)	1.111 ^a (0.136)	2.184 ^a (0.257)	1.787 ^a (0.270)	0.987 ^a (0.133)	1.073 ^a (0.135)
Foreign-owned	0.484 ^a (0.178)	0.870 ^a (0.189)	1.250 ^a (0.327)	1.384 ^a (0.354)	0.579 ^a (0.171)	0.936 ^a (0.182)
State-owned × Fin. Devt	0.218 (0.141)	0.228 (0.145)	0.846 ^a (0.249)	0.794 ^a (0.255)	0.263 ^c (0.142)	0.251 ^c (0.148)
JV-owned × Fin. Devt	0.798 ^a (0.151)	0.826 ^a (0.155)	2.158 ^a (0.295)	2.141 ^a (0.298)	0.783 ^a (0.151)	0.763 ^a (0.155)
Foreign-owned × Fin. Devt	0.631 ^a (0.213)	0.667 ^a (0.216)	1.587 ^a (0.391)	1.653 ^a (0.394)	0.709 ^a (0.204)	0.718 ^a (0.208)
K/L * physical cap. intensity	-0.967 ^b (0.460)	-0.366 (0.449)	0.183 (0.452)	0.069 (0.461)	-0.404 (0.451)	-0.028 (0.446)
H/L * human cap. intensity	1.078 ^a (0.345)	1.428 ^a (0.378)	0.979 ^a (0.339)	1.341 ^a (0.373)	0.961 ^a (0.347)	1.146 ^a (0.382)
Controls ^α	no	yes	no	yes	no	yes
Observations	707076	707076	707076	707076	707076	707076
R ²	0.216	0.218	0.214	0.215	0.215	0.216
Province-country-year	yes	yes	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes	yes	yes

Explained variable is the log exported value (province/country/ISIC/year) by firm type in 1997-2004. Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province/country level. ^a, ^b and ^c indicate significance at the 1%, 5% and 10% confidence level. ^α Controls are interactions of physical and Human capital intensity of sector with firm type.

in the share of banks other than the four SOCBs in credits (corresponding approximately to a one standard deviation increase, as shown in Table 11 in the Appendix). As a consequence of this liberalization, exports by all firm types grow relatively more in financially dependent sectors; this results in a rebalancing of exports across industries. Measuring, as before, external dependence at the first and third quartiles of the distribution of Chinese exports in 1997, we find values of 0.03 and 0.45 (for ‘Apparel’ and ‘Machinery’, respectively). All things equal, a liberalization of the scale considered here (+20%) results in a growth differential of 14.1%⁸ (for private firms at the third quartile of dependence, relative to the first quartile). Foreign firms also see their exports grow relatively more in dependent sectors, but the growth differential is of only 5.1%⁹. Over the period, this brings the distribution of private firms’ exports closer to that of foreign firms, as observed in the previous section.

4.3. Impact at the aggregate level

In the previous sections we found that some firms operating in China were liquidity-constrained; and that financial liberalization, in the form of a reduction of State-owned banks market share, had the effect of reducing these constraints. A natural question arising at this point is that of the overall impact of financial liberalization on China’s total export structure. On one hand, we would expect a reduction of constraints faced by domestic firms to show in aggregate export structure, augmenting exports in finance-intensive sectors. However we can also think that the presence of some non-constrained firms -foreign and joint-venture firms - compensates the constraints on domestic firms, in the sense that these firms are able to export in sectors with high needs in finance, compensating the low presence of domestic firms in these sectors. This would mean that exports by foreign and joint-venture firms act as a substitute to financial development.

To test this hypothesis, we use the following specification:

$$\begin{aligned} \ln Exports_{ijkt} = & \alpha FinDevt_{it} \times FinVuln_k + \beta ForeignShare_{it} \times FinVuln_k \\ & + \zeta_1 k_{it} \times K_k + \zeta_2 h_{it} \times H_k + \gamma_{ijt} + \delta_k + \epsilon_{ijkt} \end{aligned} \quad (3)$$

Now the dependent variable is the log of province i ’s total export value to country j for sector k and year t . As before, $FinDevt_{it}$ is our measure of financial liberalization, proxied by non 4-SOBCs shares in finance. We estimate its effect on China’s export by filtering it by an indicator of financial vulnerability $FinVuln_k$. We account for the foreign export activity with $ForeignShare_{it}$, the share of foreign-owned and joint venture firms in total exports of province i at year t .

If we think that the distribution of firm type shares in provinces’ exports is independent of financial development, then we would expect the coefficient α to measure the average effect

⁸This figure is computed as $0.2 \times \beta \times 0.42$ based on $\beta = 1.68$ as in Column 2 of Table 4.

⁹This figure is computed as $0.2 \times (\beta + \beta_F) \times 0.42$ based on $\beta = 1.68$ and $\beta_F = -1.068$ as in Column 2 of Table 4.

of financial development on export structures of different firm types. It should hence be the average of the liberalization impacts for each firm type weighted by firm types export shares. These separate effects have been estimated in the previous regressions of Equation 2 as β for private firms and $\beta+\beta_F$ for state-owned, JV and Foreign firms.

However, if the hypothesis does not hold, then a composition effect adds in; the sign of which is given by the sign of the correlation between the share of firms most specialized in dependent sectors, and financial development. For example, if foreign firms are more present when the share of public-sector banking is high, then they can offset the direct effect of financial distortions on other firms. In this case, we need to introduce the term $\beta ForeignShare_{it} \times FinVuln_k$ to control for this effect; if we omit it, the estimate on α will be biased.¹⁰

Tables 6 and 7 display the results for estimations of Equation 3, using our two proxies of financial liberalization respectively. Columns 1, 3 and 5 of each table shows that a reduction of state interference in the financial system has a significant and positive impact on the structure of total exports, spurring higher export growth in finance-dependent industries than in others.

Columns 2, 4 and 6 show that the presence of firms with foreign ownership in the export sector has an impact qualitatively similar to that of financial development. More precisely, column 2 of Table 6 indicates that an increase of the foreign share of exports by 10% (what the average Chinese province experienced between 1996 and 2004 as indicated in Table 8 in the Appendix) has roughly the same effect on export structure as a 20% decrease in State-owned bank market share: in both cases, it gives to a finance-intensive sector such as Machinery a growth premium of 9.1% ($= 2.117 \times 0.1 \times (0.45 - 0.3)$) over the sector of Apparel. In this sense, we can say that the presence of foreign-owned firms plays the role of a substitute to financial development.

However, does this mean that foreign exporters in China have effectively played the role of substitutes, making the effect of a weak financial system invisible in aggregate exports? Looking at the impact of introducing the foreign export share in the regression suggests the opposite. The coefficient on financial development becomes lower, which reflects a positive correlation between foreign share and financial development: export activity by firms with foreign ownership has generally been relatively higher in provinces where financial development was also higher.¹¹ For this reason, we can conclude that foreign presence has played only a limited role in compensating the effects of distortions in the financial system in China.

¹⁰We can decompose the coefficient α in the form:

$$\alpha = \frac{\partial^2 \ln X_{ijkt}}{\partial FinVuln_k \partial FinDev_{it}} = \sum_F \frac{X_{ijkt}^F}{X_{ijkt}} \times \frac{\partial^2 \ln X_{ijkt}^F}{\partial FinVuln_k \partial FinDev_{it}} + \overbrace{\sum_F \frac{\partial \frac{X_{ijkt}^F}{X_{ijkt}}}{\partial FinDev_{it}} \times \frac{\partial \ln X_{ijkt}^F}{\partial FinVuln_k}}^{\omega}$$

where $FinVuln_k$ is for sector vulnerability, $FinDev_{it}$ for Financial Development at province level, X_{ijkt} denotes total exports (at the province-country level) and X_{ijkt}^F exports by firm type F . Note that $\frac{\partial^2 \ln X_{ijkt}^F}{\partial FinVuln_k \partial FinDev_{it}}$ corresponds to β and β_F in Equation 2 and the second term ω corresponds to the composition effect mentioned in the text.

¹¹This pattern probably reflects that, even though foreign firms were not directly affected by credit constraints, a low level of state intervention in finance still has a positive impact on location choices by foreign firms.

Table 6 – Aggregate impact: the dual role of financial development and foreign presence (non 4-SOCBs share in credits)

Indicator of fin. vulnerability	financial dependence		liquidity needs		R & D	
	(1)	(2)	(3)	(4)	(5)	(6)
Province Fin. Devt × Sector Fin. vulnerability	1.609 ^a (0.102)	1.099 ^a (0.097)	3.616 ^a (0.831)	1.125 (0.835)	12.433 ^a (1.518)	6.907 ^a (1.463)
Province Foreign export share × fin. vulnerability		2.117 ^a (0.105)		12.329 ^a (0.919)		24.888 ^a (1.578)
K/L * physical cap. intensity	0.168 (0.473)	-0.913 ^c (0.484)	0.616 (0.478)	2.602 ^a (0.498)	0.471 (0.473)	0.538 (0.472)
H/L * human cap. intensity	0.231 (0.353)	0.086 (0.349)	0.309 (0.353)	0.196 (0.354)	0.165 (0.358)	-0.320 (0.360)
Observations	394180	394180	394180	3941 80	394180	394180
R ²	0.237	0.242	0.235	0.2 38	0.236	0.238
Province-country-year	yes	yes	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes	yes	yes

Explained variable is the log of total exported value (province/country/ISIC/year) in 1997-2004. Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province/country level. ^a, ^b and ^c indicate significance at the 1%, 5% and 10% confidence level.

Table 7 – Aggregate impact: the dual role of financial development and foreign presence (non 4-SOCBs share in deposits): exported value (province/country/ISIC/year)

Indicator of fin. vulnerability	financial dependence		liquidity needs		R & D	
	(1)	(2)	(3)	(4)	(5)	(6)
Province Fin. Devt × Sector Fin. vulnerability	1.388 ^a (0.086)	0.597 ^a (0.092)	7.106 ^a (0.727)	3.063 ^a (0.788)	12.108 ^a (1.298)	2.942 ^b (1.350)
Province Foreign export share × fin. vulnerability		2.060 ^a (0.111)		10.866 ^a (0.972)		24.736 ^a (1.650)
K/L * physical cap. intensity	-0.161 (0.478)	-1.141 ^b (0.486)	0.550 (0.475)	2.254 ^a (0.498)	0.159 (0.474)	0.251 (0.474)
H/L * human cap. intensity	0.279 (0.354)	0.139 (0.351)	0.282 (0.354)	0.191 (0.355)	0.199 (0.359)	-0.259 (0.360)
Observations	391061	391061	391061	391061	391061	391061
R ²	0.237	0.241	0.236	0.238	0.236	0.238
Province-country-year	yes	yes	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes	yes	yes

Explained variable is the log of total exported value (province/country/ISIC/year) in 1997-2004. Heteroskedasticity-robust standard errors are reported in parentheses. Standard errors are clustered at the province/country level. ^a, ^b and ^c indicate significance at the 1%, 5% and 10% confidence level.

5. CONCLUSION

We investigate how the export performance of Chinese firms in China is influenced by credit constraints. Using panel data from Chinese customs for 1997-2007, we show that credit constraints restrict international trade flows and affect the sectoral composition of firms' activity. We confirm that credit constraints provide an advantage to Foreign-owned firms and joint ventures over private domestic firms as their export performance is systematically greater in sectors with higher levels of financial vulnerability measured in a variety of ways. We however find that these distortions were lessened but not reverted over the period in conjunction with improved functioning of the financial sector. When looking at the aggregate level, we find that the over-performance in exports by non-constrained firms -foreign and joint-venture firms - did not compensate the underperformance of constrained domestic firms. Hence, FDI was no substitute for financial liberalization to solve the impeding impact of credit constraints on China's exports.

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Table 8 – Summary statistics: evolution over time

year	Share non Big 4 State-Owned Banks ^β		Share of Foreign entities ^γ in exports
	in deposits	in credits	
1990	0.16	0.14	
1995	0.47	0.47	
1996	0.46	0.46	
1997	0.43	0.44	0.44
1998	0.43	0.43	0.47
1999	0.40	0.40	0.48
2000	0.38	0.44	0.51
2001	0.41	0.45	0.53
2002	0.43	0.46	0.55
2003	0.44	0.47	0.57
2004	0.45	0.49	0.59

Source: ^β Non Big 4 State-Owned Banks correspond to banks other than the four main State-Owned Banks (the Bank of China, the People's Construction Bank of China, the Agricultural Bank of China and the Industrial and Commercial Bank of China). ^γ Foreign entities are defined here as firms with partial or full foreign ownership. Source: Almanacs of China's Finance and Banking and China's customs.

7. APPENDIX

Table 9 – Summary statistics: cross-province heterogeneity

province	GDP per capita 2000	Share non SOCB in deposits 2000	Share non SOCB in credits 2000	Foreign exports share 1997-2007	Share in China's exports 1997-2007
Beijing	17936	0.25	0.49	0.40	0.037
Tianjin	16375	0.29	0.30	0.84	0.032
Hebei	7625	0.39	0.43	0.39	0.012
Shanxi	5061	0.33	0.48	0.16	0.004
Inner Mongolia	5905	0.24	0.38	0.20	0.002
Liaoning	11017	0.49	0.53	0.61	0.031
Jilin	6791	0.33	0.47	0.38	0.003
Heilongjiang	8545	0.29	0.47	0.10	0.007
Shanghai	27187	0.43	0.39	0.66	0.115
Jiangsu	11713	0.40	0.41	0.73	0.148
Zhejiang	13410	0.47	0.48	0.35	0.097
Anhui	4840	0.37	0.45	0.26	0.007
Fujian	11496	0.41	0.40	0.61	0.048
Jiangxi	4828	0.33	0.35	0.26	0.004
Shandong	9518	0.51	0.54	0.55	0.060
Henan	5415	0.41	0.52	0.19	0.006
Hubei	7175	0.36	0.45	0.31	0.006
Hunan	5626	0.37	0.49	0.16	0.005
Guangdong	12911	0.42	0.47	0.62	0.340
Guangxi	4315	0.29	0.32	0.23	0.004
Hainan	6814	0.40	0.33	0.42	0.002
Chongqing	5142	0.38	0.47	0.13	0.003
Sichuan	4770	0.34	0.44	0.18	0.007
Guizhou	2645	0.30	0.29	0.16	0.001
Yunnan	4610	0.28	0.31	0.09	0.004
Shaanxi	4558	0.35	0.35	0.14	0.004
Gansu	3846	0.26	0.37	0.16	0.001
Qinghai	5103	0.15	0.26	0.03	0.001
Ningxia	4791	0.25	0.23	0.15	0.001
Xinjiang	7388	0.31	0.39	0.03	0.006

Source: China's statistical yearbooks, Almanacs of China's Finance and Banking and China's customs.

Table 10 – Summary statistics: sector-level characteristics

Name of sector	ISIC	Hum. cap. intensity	Phys. cap. intensity	External dependence	Cumul. share 1997	Cumul. share 2007	Liquidity needs	R & D intensity	Foreign share
Tobacco	314	1.3539	0.0181	-0.45	0.003	0.000	0.25	0	0.20
Pottery	361	0.8041	0.0546	-0.15	0.012	0.003	0.17	0.02	0.24
Leather	323	0.6869	0.0324	-0.14	0.036	0.015	0.27	0.01	0.42
Footwear	324	0.5328	0.0181	-0.08	0.087	0.037	0.23	0.01	0.60
Non-ferrous metal	372	1.0982	0.1012	0.01	0.102	0.054	0.17	0.01	0.20
Apparel	322	0.5017	0.0189	0.03	0.256	0.126	0.21	0	0.33
Refineries	353	1.6558	0.1955	0.04	0.265	0.135	0.07	0	0.07
Non-metal products	369	0.9522	0.0684	0.06	0.275	0.143	0.14	0.01	0.36
Beverages	313	1.1345	0.062	0.08	0.277	0.144	0.11	0	0.20
Iron and steel	371	1.251	0.1017	0.09	0.299	0.177	0.16	0.01	0.10
Food products	311	0.8117	0.0616	0.14	0.343	0.197	0.1	0.01	0.39
Paper products	341	1.1392	0.1315	0.18	0.347	0.202	0.12	0.01	0.45
Printing & publishing	342	0.9339	0.0515	0.2	0.350	0.205	0.08	0.01	0.64
Other chemicals	352	1.2089	0.0597	0.22	0.413	0.260	0.15	0.02	0.31
Rubber products	355	0.9854	0.0656	0.23	0.418	0.268	0.14	0.02	0.59
Furniture	332	0.6984	0.039	0.24	0.425	0.326	0.15	0.01	0.34
Metal products	381	0.9144	0.0531	0.24	0.473	0.329	0.18	0.01	0.35
Wood products	331	0.7409	0.0653	0.28	0.478	0.336	0.12	0.01	0.39
Transport equipment	384	1.3221	0.0714	0.31	0.509	0.383	0.19	0.02	0.41
Petroleum and coal	354	1.1531	0.0741	0.33	0.513	0.386	0.12	0.01	0.08
Textiles	321	0.6881	0.0726	0.4	0.632	0.458	0.17	0.01	0.30
Machinery	382	1.1187	0.0582	0.45	0.721	0.657	0.22	0.02	0.66
Other manufacturing	390	0.7553	0.0393	0.47	0.796	0.697	0.22	0.02	0.44
Glass and products	362	1.0121	0.0899	0.53	0.800	0.703	0.15	0.02	0.49
Electrical machinery	383	1.0636	0.0765	0.77	0.944	0.938	0.2	0.07	0.65
Professional equipt	385	1.2341	0.0525	0.96	0.975	0.982	0.21	0.09	0.56
Plastic products	356	0.8274	0.0883	1.14	1.000	1.000	0.13	0.02	0.53

Source: Rajan and Zingales (1998), Braun (2003) and Krosner et al. (2007).

Table 11 – Summary statistics: key variables

Variables	Mean	Standard deviation	Min	Max
Share of non 4-SOCBs in credits	0.375	0.097	0.088	0.603
Share of non 4-SOCBs in deposits	0.410	0.087	0.159	0.621
Export value (in billion US \$)	9.66	22.7	0.0764	190
Foreign share in export value	0.293	0.215	0.0098	0.88

Summary statistics are computed based on 240 observations (30 provinces over the years 1997-2004). Source: China's statistical yearbooks and China's customs. Foreign share computes the share of exports performed by fully foreign and JV firms.

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