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**Working Paper**

## The effects of focus versus diversification on bank performance: Evidence from Chinese banks

BOFIT Discussion Papers, No. 4/2010

**Provided in Cooperation with:**

Bank of Finland, Helsinki

*Suggested Citation:* Berger, Allen N.; Hasan, Iftekhar; Zhou, Mingming (2010) : The effects of focus versus diversification on bank performance: Evidence from Chinese banks, BOFIT Discussion Papers, No. 4/2010, ISBN 978-952-462-678-8, Bank of Finland, Institute for Economies in Transition (BOFIT), Helsinki,  
<https://nbn-resolving.de/urn:nbn:fi:bof-201408072010>

This Version is available at:

<https://hdl.handle.net/10419/212672>

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BOFIT Discussion Papers  
4 • 2010

Allen N. Berger, Iftexhar Hasan  
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Institute for Economies in Transition

BOFIT Discussion Papers  
Editor-in-Chief Aaron Mehrotra

BOFIT Discussion Papers 4/2010  
23.3.2010

Allen N. Berger, Iftekhar Hasan and Mingming Zhou: The effects of focus versus diversification on bank performance: Evidence from Chinese banks

ISBN 978-952- 462- 678-8  
ISSN 1456-5889  
(online)

Suomen Pankki  
Helsinki 2010

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All opinions expressed are those of the authors and do not necessarily reflect the views of the Bank of Finland.

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## The effects of focus versus diversification on bank performance: Evidence from Chinese banks

### Abstract

This paper investigates the effects of focus versus diversification on bank performance using data on Chinese banks during the 1996-2006 period. We construct a new measure, *economies of diversification*, and compare the results to those of the more conventional *focus indices*, which are based on the sum of squares of shares in different products or regions. Diversification is captured in four dimensions: loans, deposits, assets, and geography. We find that all four dimensions of diversification are associated with reduced profits and higher costs. These results are robust regardless of alternative measures of diversification and performance. Furthermore, we observe that banks with foreign ownership (both majority and minority ownership) and banks with conglomerate affiliation are associated with fewer diseconomies of diversification, suggesting that foreign ownership and conglomerate affiliation play an important mitigating role. This analysis may provide important implications for bank managers and regulators in China as well as in other emerging economies.

JEL classification: G21; G28; G34

Keywords: Diversification; focus; efficiency; Chinese banking

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The authors thank the anonymous referees and the participants at the Conference on Performance Measurement in the Financial Services Sector: Frontier Efficiency Methodologies and Other Innovative Techniques for helpful comments.

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Allen N. Berger, Iftekhar Hasan and Mingming Zhou

## The effects of focus versus diversification on bank performance: Evidence from Chinese banks

### Tiivistelmä

Tässä tutkimuksessa tarkastellaan, vaikuttavatko keskittyminen tiettyihin toimintoihin (focus) ja toiminnan monipuolistuminen (diversification) pankkien tuloksiin. Tutkimuksessa käytetään aineistona kiinalaispankkien tuloksia vuosilta 1996–2006. Työssä rakennetaan uusi mittari: *monipuolistumisen edut*. Saatuja tuloksia verrataan tavanomaisempiin keskittymisindekseihin, jotka perustuvat pankkien erilaisten tuotteiden ja alueiden osuuksien neliöiden summaan. Monipuolistuminen otetaan huomioon neljältä eri näkökannalta: lainat, talletukset, varallisuus ja maantiede (*maantiede kuulostaa oudolta tässä?*). Tulosten mukaan kaikkien neljän ulottuvuuden monipuolistuminen on yhteydessä voittojen vähenemiseen ja kulujen kasvuun. Tulokset ovat vahvoja myös käytettäessä erilaisia pankkien monipuolistumisen tai tuloksien mittareita. Osin ulkomaalaisomisteisille tai konserniin kuuluville pankeille monipuolistumisen kustannukset ovat pienemmät. Nämä tulokset voivat olla tärkeitä pankkien johdon ja valvojien kannalta Kiinassa ja muissa kehittyvissä talouksissa.

JEL luokitus: G21; G28; G34

Avainsanat: monipuolistuminen, keskittyminen, tehokkuus, kiinalaiset pankit

# 1 Introduction

Should banks diversify across different products and geographic regions, or should they specialize? The focus versus diversification literature is well established in corporate finance, although there is not a general consensus as to whether conglomerates tend to perform better or more poorly than focused firms. Moreover, the findings in the general corporate finance literature may or may not apply to the banking sector, because banks are different from other firms.<sup>1</sup> Sometimes banks also face conflicting regulation and supervision that create incentives to either focus or diversify. Branching, entry, and asset investment restrictions often encourage focus, while supervisors tend to encourage diversification to reduce risks.

Although there are some studies on the link between diversification and performance of banks, there is no consensus thus far, with evidence supporting both arguments. Proponents of diversification suggest that diversified banks can benefit from leveraging managerial skills and abilities across products and geographic regions (Iskandar-Datta and McLaughlin (2007)), gaining economies of scope through spreading fixed costs over products and regions (Drucker and Puri (2009)), and providing a financial supermarket to customers who demand multiple products.<sup>2</sup> On the other side, proponents of focus argue that diversified banks can suffer from diluting the comparative advantage of management by going beyond their existing expertise (Klein and Saidenberg (1998)), diversification-inducing competition (Winton (1999)), and increased agency costs resulting from value-decreasing activities of the managers who have lowered their personal risk (Amihud and Lev (1981), Deng and Elyasiani (2008), Laeven and Levine (2007)).<sup>3</sup>

Besides the inconclusive findings in the literature, the empirical evidence documented on banking diversification to date is primarily based on the U.S. market and other developed countries, with much less insight and discussion on the banking industry in emerging or transitional economies (Odesanmi and Wolfe (2007) may be one of the few exceptions). When considering the size and impact of some emerging markets such as China on the world economy, one might be surprised

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<sup>1</sup> Important differences between banks and firms in other industries are that banks are delegated monitors (Diamond, 1984) and proprietary information acquirers of the borrowers (Fama (1980, 1985), James (1987), Sharpe (1990), Rajan (1992)), and banks, by their very nature, are designed to diversify (Winton (1999), Acharya et al. (2006)).

<sup>2</sup> Diversified financial institutions may also reduce the expected costs of financial distress or bankruptcy by lowering risks through spreading operations across different products or economic environments (Boot and Schmeits (2000)). In addition, geographically diversified firms may obtain tax benefits by transferring income from high tax areas to low tax areas (Iskandar-Datta and McLaughlin (2007)).

<sup>3</sup> Furthermore, diversification of banking activities across international borders can lead to increased political risk, foreign exchange risk, and difficulties of dealing with different languages, laws, and cultures, which can destroy shareholder value (Miller and Parkhe (2002), Fauver et al. (2004), Deng and Elyasiani (2007)).



to notice that there is a big gap in the banking literature: there are no empirical studies documenting the effects of diversification strategies on performance of Chinese banks.

China boasts one of the biggest and fastest-growing emerging economies in the world, with an average of about 10% GDP growth per year in real terms over the last two decades, and is projected by some to become the world's largest economy in the coming decades. Chinese banks have been playing a big role in channeling the financial resources between the savings of households, government deposits and transfers, and the financing of the Chinese enterprises, as the Chinese stock market did not exist until 20 years ago and has been only serving limited number of companies which are favored by the government. At the same time, however, Chinese banks have been heavily influenced by policy makers. For example, although most of the national banks in China enjoy more freedom to spread their businesses and services across the nation, most of the regional and city commercial banks face strict geographical restrictions, and throughout the last few decades, the commercial banks have faced limited degrees of freedom in terms of the products and services they can offer.<sup>4</sup> But these strict regulations and limitations are becoming more relaxed, especially since China became a member of the World Trade Organization (WTO) in 2001. Given the changing regulations and their relative new experience to the business freedom and different options they have, banks in China may not necessarily know their optimal product and geographical strategies. This paper therefore brings evidence on the potential benefits of being focused versus diversified.

Based on the economies of diversification framework, we measure the differences in predicted profits and costs between diversified and hypothetical focused banks. Diversification is captured in four dimensions: loans, deposits, assets, and geography. We find that all the four dimensions of diversification decrease profits and increase costs for the Chinese banks after controlling for risks, and these results maintain regardless of different alternative measures of diversification and performance. Additionally, we find that foreign ownership and conglomerate affiliation play an important mitigating role in the diversification discount of the Chinese banks, in the sense that the banks with foreign ownership (either majority foreign or minority foreign) or conglomerate affiliation experience fewer diseconomies of diversification, i.e., suffer less loss of profits and less increase in costs when they diversify.

This paper contributes to the existing literature in the following ways. First, we provide a new measure of economies of diversification and apply it to the banking sector. Second, our paper

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<sup>4</sup> For example, the People's Republic of China (PROC) issued 'Regulations on Credit Cards Business' (effective on April 1, 1996), which applies to commercial banks, institutions and individuals which hold, use, or accept credit cards in China. In Chapter I of this regulation, the fifth clause says "Commercial banks, without the permission from PROC, cannot issue credit cards..."

fills the gap in the existing banking diversification-performance literature which is heavily focused on the developed markets. By presenting and discussing evidence of the diversification premium/discount in the Chinese banking industry, our paper provides important insights into one of the largest emerging and transitional economies. In this regard, this paper should not only provide practical implications for Chinese bank managers, but also lend some perspectives to the policy makers in China and other emerging economies as well, who set rules that encourage and/or discourage the diversification of banking. Finally, our paper presents evidence on the effects of foreign bank ownership and conglomerate affiliation on the benefits/costs of diversification, which may aid in the discussion of policies regarding foreign bank entry.

The remainder of this paper is organized as follows. Section 2 reviews some of the research literature on the effect of banking diversification on the performance. Section 3 gives background information on the Chinese banking industry. Section 4 shows our data on the Chinese banks and outlines our empirical methodology. Section 5 displays our empirical results, and Section 6 concludes.

## 2 Literature review

The issue of focus versus diversification is well documented in the corporate finance literature, although a general consensus has not been achieved. For example, while many studies provide evidence that conglomerates perform more poorly than specialized firms (e.g., Lang and Stulz (1994), Berger and Ofek (1995), Lamont and Polk (2002)), other studies support the opposite conclusion. For example, Villalonga (2004) uses the Business Information Tracking Series (BITS) and finds diversification premium for a sample that yields a discount based on the segment data used in previous studies, which supports the argument that the diversification discount found by earlier studies is an artifact of segment data. Some international studies also present heterogeneities of diversification effects on performance across different countries and institutional settings. For example, Khanna and Yafeh (2005) examine the hypothesis that business groups facilitate mutual insurance among affiliated firms and find substantial evidence of risk sharing by Japanese, Korean, and Thai groups, but little evidence of it elsewhere in the world. More recently, Khanna and Yafeh (2007) present evidence about reasons for formation, prevalence, and evolution of diversified business groups in different environments, and they argue that business groups are responses to different

economic conditions and that, from a welfare standpoint, they can sometimes be “paragons” and, at other times, “parasites.” However, the results in the general literature may or may not apply to banks, because banks differ from other industries as discussed above.

The existing banking literature does not provide consensus as to the question “should banks diversify portfolios and geographic regions, or should they specialize?” Instead, there is evidence supporting both arguments. Traditional arguments suggest that banks should be as diversified as possible, as banks are typically highly levered, and diversification across sectors reduces their chance of costly financial distress/bankruptcy. Several models of intermediation suggest that diversification makes it cheaper for institutions to achieve credibility in their role as screeners or monitors of borrowers (see Diamond (1984), Ramakrishnan and Thakor (1984), and Boyd and Prescott (1986)). On the other hand, some studies (see Jensen (1986), Berger and Ofek (1996), Servaes (1996), and Denis et al. (1997)) argue and/or provide evidence that financial institutions should focus on a single line of business so as to take greatest advantage of management’s expertise and reduce agency problems, leaving investors to diversify on their own.

Cases of bank crises/failures also lend support to both sides. Proponents of a diversification premium can cite Continental Illinois’ failure in 1984, linked to a large concentration of energy-sector loans, and Bank of New England’s failure over 1989 - 1991, linked to a large concentration in New England commercial real estate loans. Proponents of diversification discount can cite the credit problems that followed rapid diversification at many institutions during the 1980s, including Citicorp, Bank of America, Credit Lyonnais, and a number of major Japanese banks; the current credit crisis in which banks expanded into securities created by other institutions with risks they did not understand; a number of recent cases in which focus has produced superior results without excessive risk, including Comerica, a specialist in middle market and small business lending, and First USA and MBNA, which are specialists in credit card lending.

Further, there are some studies that argue that expected costs of financial distress or bankruptcy may be reduced by spreading operations across different economic environments (see Boot and Schmeits (2000)). For example, Boyd and Graham (1988) study hypothetical mergers between banks and securities firms, real estate companies, and insurance firms, and they find that banks merging with insurance companies might reduce the risk of bankruptcy, while mergers with securities/and real estate companies would increase the risk of bankruptcy.<sup>5</sup> Rose (1989) suggests that banks moving into non-bank product lines could reduce cash flow risk. Templeton and Serveriens

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<sup>5</sup> Boyd and Graham (1988) studies hypothetical mergers because at that time, the activity-based diversification was not yet permitted in the U.S. This study was updated by Lown et al. (2000) with similar findings.

(1992) find that banks diversifying into other financial services would reduce unsystematic risk, while there was no effect on systematic risk. Berger et al. (1999) find that consolidation in the financial services industry has been consistent with greater diversification of risks on average but with little or no cost efficiency improvements.

However, more recent studies suggest that costs may outweigh benefits when banks choose to diversify their product offerings. For example, DeYoung and Roland (2001) find that U.S. banks replacing traditional lending activities with fee-based activities are associated with higher revenue volatility, implying higher earnings volatility (risk).<sup>6</sup> Similarly, Stiroh (2004) documents that non-interest diversification is negatively linked with performance. Acharya et al. (2006) provide results suggesting that there are diseconomies of scope that arise through weakened monitoring incentives and a poorer-quality loan portfolio when a risky bank expands into additional industries and sectors, complementing the agency-theoretic analysis of the boundaries of a bank's activities as proposed in Cerasi and Daltung (2000). Laeven and Levine (2007) find that financial conglomerates engaging in multiple lending activities have lower market values than they would if they were broken into separate financial institutions, and their results are consistent with theories that stress intensified agency problems in financial conglomerates that engage in multiple activities and indicate that any economies of scope are not sufficiently large to produce a diversification premium.

Besides the diversification in product and line of service dimensions, there is also a trend toward banks diversifying geographically. Banks have the potential to achieve economies of scale in geographical dimension, because once an initial investment is made and the basic infrastructure is in place, organizations can expand the system elsewhere at a potentially reduced cost. Benefits of geographical diversification include: better access to capital markets in other regions/countries, which potentially leads to reduced cost of capital (see Deng and Elyasiani (2008)), greater market power (see Iskandar-Datta and McLaughlin (2007)), and reduced tax liabilities as geographically diversified banks can transfer resources from high tax areas to low tax areas. Consistent with these arguments, Mahajan et al. (1996), based on U.S. multinational and domestic banks from 1987-1990, conclude that multinational banks were able to fully exploit economies of scale, and had lower inefficiencies than domestic banks.

On the other hand, some studies argue that there are costs associated with geographic diversification. First, the classical analysis of agency costs (e.g., Amihud and Lev (1981)) can also be

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<sup>6</sup> Demsetz and Strahan (1997) also find that large BHCs were better diversified than small BHCs, but this diversification did not translate into lower risk levels because of lower capital ratios, larger commercial and industrial loan portfolios, and greater use of derivatives by large banks.

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applied to diversified banks, where diversification may help reduce the personal risk for the manager instead of creating value for the shareholders. The findings of Deng and Elyasiani (2008) support this line of argument. Meanwhile, some other disadvantages associated with global diversification, such as increased exchange rate and political risk and difficulties of dealing with different languages, laws and customs can also destroy shareholder's value (e.g., Miller and Parkhe (2002), Fauver et al. (2004), Deng and Elyasiani (2008)). Berger et al. (2000b) examine the efficiency of cross-border consolidations of financial institutions from France, Germany, Spain, the U.K., and the U.S., and find that domestic banks have higher profit efficiency than do foreign banks, except for US-based foreign banks. DeLong (2001) examines U.S. bank mergers with respect to both activity and geographic location and find that banks focusing on both activity and geography were value increasing. Finally, some studies also find that geographic diversification can also lead to organizational inefficiency (e.g., Klein and Saldenberg (1998)).

A few studies use the concepts of revenue and profit scope economies in the banking literature. For example, Berger et al. (1993) analyze profit scope economies using the standard profit function. Berger et al. (1996) analyze revenue scope economies using the alternative revenue function, and Clark and Siems (1997) use the alternative profit function to evaluate expansion-path scale economies. These studies generally do not find consistent benefits of either joint production or specialization within banking industry. Moreover, most of the studies on cost scope economies within financial service industries find no substantial evidence of cost scope economies (e.g., Berger et al. (1987), Mester (1987, 1993), Hunter et al. (1990), Berger and Humphrey (1991), Goldberg et al. (1991), Pulley and Humphrey (1993), Noulas et al. (1990)).

Importantly, the existing banking literature on focus – diversification issue is heavily concentrated in US and European banking markets, while leaving this issue in emerging/transitional economies largely unexamined. Our paper attempts to fill this gap in the literature by studying the economies of diversification in the largest emerging and transitional economy in the world, i.e., China.

### 3 Chinese banks: Their background and experience

In this section, we present a brief overview of the diversification experience of the Chinese banking system, with our main focus on the post-1990s period (for a more general and detailed description and discussion about the background of Chinese banking sector, see Berger et al. (2009), Fu and Heffernan (2009), Hasan et al. (2009), Jia (2009), Lin and Zhang (2009)).

Chinese banks in the past did not have much choice in terms of product diversification. They were often required by policy makers to direct their loans to certain sectors or to certain customers (e.g., provide policy loans). Consider the Big Four banks as examples. Agricultural Bank of China (ABC) was required to direct majority of their loans to agricultural sector, especially in rural areas. China Construction Bank (CCB) was instructed to provide majority of their lending to real estate and construction materials industries. Industrial and Commercial Bank of China (ICBC) was mandated to lend heavily to manufacturing and commercial sectors. Bank of China (BOC) was advised to focus on the foreign exchange and currency businesses. Such restrictions gradually disappeared in the latter half of the 1990s.

In addition, Chinese regulators used to insist on strict guidelines separating commercial banking, investment banking (including asset management), insurance, and trust businesses, believing that restrictive firewalls between different financial services can prevent spillover of financial crises, as coded in 1995 Commercial Banking Law. It was not until recently that some of the restrictions began to loosen. For example, although the Chinese government is still reluctant to grant commercial banks licenses for investment banking business (such licensing became very unlikely since the breakout of financial crisis in US), more cooperation between commercial banks and insurance companies has recently been encouraged by regulators.<sup>7</sup> Meanwhile, the issuance of the 'Guidance of Cooperation between the Operations of Banks and Trust Companies' by China Banking Regulatory Commission (CBRC) in December 2008 seems to suggest that the Chinese regulators are more open to the idea of cooperation between nontraditional banking businesses and commercial bank operations.

Even within the commercial banking business, the Chinese banks historically rely heavily on net interest income, with the fee-based business being much more underdeveloped. According

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<sup>7</sup> On January 16, 2008, a Memorandum of Understanding on Strengthening Cooperation between the Banking and Insurance sectors and the Cross-sector Supervision was co-signed by the China Banking Regulatory Commission (CBRC) and the China Insurance Regulatory Commission, which provides a regulatory framework to guide to more formal cooperation between commercial banks and insurance companies.

to Yuan (2006), most Chinese banks feature highly immature cash management and treasury businesses, with fee-based business only accounting for about 10% of their total revenues on average. However, many Chinese banks are now focused on restructuring their operations and building their fee businesses, and newly emerging businesses such as cash management and wealth management show strong growth potential (Yuan (2006)). For example, Bank of China currently provides such fee-based business as paying fees, giving pay packets, handling stock fund transfer service, handling securities trading settlement, and handling insurance services.

Meanwhile, Chinese commercial banks also began to diversify into the trust business to seek broader growth. It is reported that Bank of Communications paid 1.22 billion RMB (US\$163 million) for 85 percent of Hubei International Trust & Investment Co., and the trust venture will provide services including asset packaging and financial consulting. China Minsheng Banking Corporation is also reported to have proposed to purchase a 25 percent stake in Shenzhen-listed Shaanxi International Trust for 2.34 billion RMB (US\$313 million).<sup>8</sup> This move is not surprising, as China conducted a revamp of its trust industry in early 2000s by closing down more than 200 trust companies, which borrowed heavily to invest in unprofitable projects. Since then, Chinese regulators have been hoping to nourish the sector by allowing firms to lure strategic investors. Chinese banks are also revving up bids to conduct business expansion by tapping fund management, private equity, and insurance industries to lessen their dependence on credit growth.

Universal banking practices were once the practice for some Chinese banks from 1985 to 1993, including some of the Big Four. However, the concept of universal banking was practically abandoned after the 1995 Commercial Bank Law became effective. To be aligned with WTO agreement, a new set of rules took effect to relax the restrictions on geographical restrictions on foreign banks operated in China, while restrictions on geographical diversification have been much more relaxed for the Chinese domestic banks. For example, all domestic banks (except the city commercial banks) are permitted to establish branches and take deposits and lend across various regions in China. The most geographically diversified banks are the Big Four, and Bank of Communications (there is also a convention to term these five banks as "Big Five"), with each bank's branches extending to almost every corner of China, including both rural and urban areas. However, the great variety of economic and geographic conditions across regions in China contributes to the difficulty of information sharing, even within the same bank. Bank of China, for instance, with about 22,000 branches, only knows exactly how many branches it has six weeks after it closes its

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<sup>8</sup> Source: BoCom launches new trust to diversify growth prospects, Shanghai Daily (October 29, 2007).

financial accounts. According to companies involved in the bank's ongoing technological overhaul, the state of the art of data transfer technologies nowadays cannot help as much when data from Tibet comes by camel train from the Gobi desert (see Robinson (2007)).

One of the interesting and unexplored areas of the Chinese banks' strategies is their expansion into foreign markets. In July 2007, China Development Bank took a small stake in Barclays Bank, helping to finance the British group's bid for a Dutch bank, ABN AMRO. This was the first time a Chinese bank took a stake in a European or American bank. The Chinese regulators have been very cautious in allowing big investments or takeovers by mainland banks in foreign ones, probably due to the concerns of the vast differences between the risk systems of the Chinese banks and the banks in the developed countries.

Overall, the environment of the Chinese banks is changing from little flexibility to more flexibility for the banks to choose between focused versus diversified strategies. With the forthcoming new rules and regulations under the WTO accession agreement, Chinese banks can choose a diversified or focused strategy.

## 4 Data and methodology

### 4.1 Sample

Our sample is an unbalanced panel which includes financial data of 88 Chinese banks during the period 1996 to 2006, totaling 464 observations. All financial items are inflation-adjusted to the base year 1996. The basic data source is Bankscope - Fitch's International Bank Database. The major data source for branch data to construct geography diversification measures is annual issues of Almanac of China's Finance and Banking (ACFB), 1996-2006. Also, whenever Bankscope does not provide enough information or has questionable values, we collect or double-check the data from other official sources, such as annual issues of ACFB and the annual issues of China Statistical Yearbooks. Most of the sample banks follow Chinese Accounting Standards (CAS), while a few also prepared annual reports based on International Accounting Standards (IAS). The banks following IAS standards are primarily the joint venture banks (whose foreign ownership is more than 25% and less than 100%), foreign banks (100% owned by foreign), and banks listed in the domestic and/or foreign stock markets. While there are some differences between the CAS and IAS, it should be mentioned that the CAS was developed only in recent years following the principles of



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IAS. While we recognize that there may be some inconsistencies in financial data using different accounting standards, we do not find a material difference between the financial statements of the same bank while reporting under both CAS and IAS.

Among the 88 sample Chinese banks, there are the Big Four, which make up more than 66% of total commercial banking assets, and the 12 national shareholding commercial banks – known as the “second-tier” domestic banks – which own about 21% of commercial banking assets (based on ACFB statistics in 2006). Our sample also includes 50 city commercial banks and 22 joint venture/foreign banks, which make up about 4% of the total commercial banking assets in China in 2006.<sup>9</sup> In sum, our sample covers over 90% of the total assets of commercial banks in China.

For each bank in our sample, data are available to calculate the following portfolio decompositions:

1. A disaggregated loan decomposition based on each bank's industry loans, commercial loans, real estate loans, agriculture loans, and consumer loans.
2. A disaggregated deposit decomposition based on each bank's customer demand deposits, customer savings deposits, non-bank corporate deposits, deposits by other banks, and other deposits.
3. A disaggregated asset decomposition based on each bank's total loans, deposits in other banks, financial investments (including investments in government securities, trading securities, and other financial assets), total fixed assets, and other assets.
4. A disaggregated geographical decomposition based on each bank's loans on various regions in China, including Northern, Eastern, Central, Southern, and Western regions.

We follow the geographical definitions of the Chinese Statistics Bureau to classify the 31 provinces and municipalities into these five regions.

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<sup>9</sup> All the city commercial banks in China, along with the joint venture and foreign banks and other banking institutions, make up the “third-tier” banks in the industry, and they make up about 30% of the total banking assets in China (based on ACFB statistics in 2006).

## 4.2 Economies of diversification approach

In the following, we briefly discuss the approaches to measure economies of diversification and estimation issues, including functional form and variable selection. The section concludes by outlining a regression analysis of economies of diversification designed to determine the types of firms most likely to realize economies of diversification.

Because our approach to measure economies of diversification is based on the framework of economies of scope, we begin our discussion with scope economies. Profit scope economies are defined as the proportional increase in profits from producing given outputs by joint producers versus specialist firms. Likewise, cost scope economies are defined as the proportional increase in costs from producing given outputs by specializing firms versus joint producers.

It is important to choose an appropriate functional form for the profit (cost) function, so that the profits (costs) of a hypothetical focused firm can be predicted and then compared to the profits (costs) of the observed diversified firm to calculate scope economies. Once a specific functional form is adopted, the parameters of the profit (cost) function are estimated based on the observations of joint producers, with the assumption that the same functional form and parameters apply to the specialists as well. This is usually necessitated by an absence of data on specializing firms. For the selection of the profit (cost) function, we follow Berger et al. (2000a) and adopt a modified version of the composite form.<sup>10</sup> The composite functional form was first developed by Pulley and Braunstein (1992), and several studies have applied this form to study bank cost scope economies (Pulley and Humphrey (1993), McKillop et al. (1996)) and bank revenue scope economies (Berger et al. (1996)).

The modified version of composite form that we adopt combines a quadratic structure for outputs and fixed netputs with a log-quadratic component for input prices, with interaction terms so that zero values for outputs are allowed, and separability is not imposed. Assume we estimate the measure the profit function for loan portfolios. We specify:

$$\frac{\pi}{z \times w_m} = \left[ \sum_{i=1}^n \beta_i \frac{L_i}{z} + \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n \delta_{i,j} \frac{L_i}{z} \frac{L_j}{z} + \sum_{i=1}^n \sum_{k=1}^{m-1} \gamma_{i,k} \frac{L_i}{z} \ln \left( \frac{w_k}{w_m} \right) + \sum_{t=1}^{T-1} \lambda_t D_t \right]$$

<sup>10</sup> We choose composite form instead of translog functional form because translog functional forms suffer from several drawbacks when it is applied to measure scope economies. For example, it does not allow zero values for outputs and fixed netputs, the translog is not well behaved in regions around zero, and scope economy estimates have been shown to vary widely, depending upon the value chosen to represent specialized production (Berger et al. (1987), Roller (1990)).

$$\times \exp \left[ \sum_{k=1}^m \phi_k \ln \left( \frac{w_k}{w_m} \right) + \frac{1}{2} \sum_{k=1}^{m-1} \sum_{l=1}^{m-1} \phi_{k,l} \ln \left( \frac{w_k}{w_m} \right) \ln \left( \frac{w_l}{w_m} \right) \right] + \varepsilon \quad (1)$$

where  $\pi$  is profit,  $L_i$  is the  $i^{\text{th}}$  loan output,  $i = 1, 2, \dots, n$  ( $n = 5$  in our case).  $z$  is the fixed netput (total assets),  $w_k$  is the  $k^{\text{th}}$  input price,  $k = 1, 2, \dots, m$  ( $m = 3$  in our case). For the input prices, we have:  $w_1$  (price of funds, proxied by the ratio of interest expenses to total deposits),  $w_2$  (price of fixed capital, proxied by the ratio of other operating expenses to fixed assets),  $w_3$  (price of labor, proxied by the ratio of personnel expenses to total number of employees).  $D_t$  is the  $t^{\text{th}}$  year dummy, where  $t = 1, 2, \dots, T-1$  ( $T = 11$  in our case).

In the profit function specified in equation (1), we normalize the dependent variable of the profit and cost functions by the quantity of the fixed netput ( $z$ ) and the price of last input ( $w_3$ ). We also normalize all the output terms by  $z$ , and we normalize the first two input prices by  $w_3$ . As mentioned earlier,  $z$  is total assets, and  $w_3$  is the price of labor. The normalization by total assets,  $z$ , is designed to control for heteroskedasticity, reduce scale biases in estimation, and give the model more economic interpretation. The normalization by  $w_3$  imposes linear homogeneity in the input prices (see Berger et al. (2000a) for more discussion). In the following, let  $\pi(L_1, L_2, L_3, L_4, L_5, w, z, \text{year})$  and  $C(L_1, L_2, L_3, L_4, L_5, w, z, \text{year})$  be the predicted profit function and cost functions for all variables at their means.<sup>11</sup>

After using nonlinear least squares regressions to estimate the coefficients in the composite profit function based on the observed sample of joint producers, we can now obtain the predicted profits for both observed diversified banks and the hypothetical focused banks, by assuming that the focused banks follow the same profit function as the diversified banks. The predicted profits for observed diversified banks and hypothetical focused banks enable us to measure the profit scope economies, which is defined as the proportional increase in predicted profits from 5 focused banks versus producing jointly, as shown in the following:

$$\begin{aligned} S_{\Pi}^T(1,2,3,4,5) = & \{ \pi(L_1, L_2, L_3, L_4, L_5, w, z, \text{year}) - [\pi(L_1, 0, 0, 0, 0, w, z/5, \text{year}) \\ & + \pi(0, L_2, 0, 0, 0, w, z/5, \text{year}) + \pi(0, 0, L_3, 0, 0, w, z/5, \text{year}) \\ & + \pi(0, 0, 0, 0, L_4, 0, w, z/5, \text{year}) + \pi(0, 0, 0, 0, 0, L_5, w, z/5, \text{year})] \} \\ & / \pi(L_1, L_2, L_3, L_4, L_5, w, z, \text{year}). \end{aligned} \quad (2)$$

Note that in equation (2),  $z/5$  is used when calculating the predicted profits for the hypothetical focused firms because we assume that each of the 5 focused firms only has  $z/5$  assets in-

<sup>11</sup> Note that we estimate the alternative profit function, which specifies output quantities, rather than the standard profit function, which specifies output prices.

stead of  $z$  assets. As discussed elsewhere (e.g., Berger et al. (2000a)), some problems can arise when estimating scope economies, including inaccurate evaluations of specialist costs and inaccurate measurement of scope economies are introduced because considerable extrapolation beyond the sample data is required given that no firms are observed at zero outputs. Therefore, quasi-scope economies may be calculated, assuming that firms produce at least the minimum observed value of each of the outputs (and we term such hypothetical focused firm as the ‘hypothetical quasi-focused firm’):

$$\begin{aligned}
 S_{\Pi}^T(1,2,3,4,5) = & \{ \pi(L_1, L_2, L_3, L_4, L_5, w, z, \text{year}) - [\pi(L_1 - 4L_{1\min}, L_{2\min}, L_{3\min}, L_{4\min}, L_{5\min}, \\
 & w, z/5, \text{year}) \\
 & + \pi(L_{1\min}, L_2 - 4L_{2\min}, L_{3\min}, L_{4\min}, L_{5\min}, w, z/5, \text{year}) \\
 & + \pi(L_{1\min}, L_{2\min}, L_3 - 4L_{3\min}, L_{4\min}, L_{5\min}, w, z/5, \text{year}) \\
 & + \pi(L_{1\min}, L_{2\min}, L_{3\min}, L_4 - 4L_{4\min}, L_{5\min}, w, z/5, \text{year}) \\
 & + \pi(L_{1\min}, L_{2\min}, L_{3\min}, L_{4\min}, L_5 - 4L_{5\min}, w, z/5, \text{year}) \} \\
 & / \pi(L_1, L_2, L_3, L_4, L_5, w, z, \text{year}). \tag{3}
 \end{aligned}$$

Analogous to profit scope economies measured by equation (2) and/or (3), we present a new measure here and term it as ‘economies of diversification,’ which is described below in equation (4) – (6). We formally define economies of diversification as the increase in profits or reduction in costs of firms diversifying across various products versus specializing in each of the products. The difference between our new measure here and more conventional measure of economies of scope (described by equation (2) and (3)) lies in the differences of the assumptions: We assume that the hypothetical focused bank pools together all the resources into producing one of the products at one time (so that  $\sum_{i=1}^n L_i$  is produced for each of the products at one time for the focused bank, where  $n$  is the total number of products for a diversified bank), while the conventional measures assume the hypothetical focused bank only produces  $L_i$  in product  $i$  at one time. Therefore, in our context of the product diversification for the Chinese banks, our new approach yields five measures, each measures the proportional differences in predicted profits between the observed diversified bank and a hypothetical focused bank which has loans of one type, but of the same total value of loans as the diversified bank. For the second loan category, for example, the measure would be:

$$D_{\Pi}^T(1,2,3,4,5) = [\pi(L_1, L_2, L_3, L_4, L_5, w, z, \text{year}) - \pi(0, L_1 + L_2 + L_3 + L_4 + L_5, 0, 0, 0, w, z, \text{year})] / \pi(L_1, L_2, L_3, L_4, L_5, w, z, \text{year}). \quad (4)$$

We also use this measure for some different portfolios that are observed in the data set. Again, to deal with the problem of zero outputs, we create the measure of quasi-diversification economies, where the focused firms produce at least the minimum of each output. For the second product, for example, the measure would be:

$$QD_{\Pi}^T(1,2,3,4,5) = \{ \pi(L_1, L_2, L_3, L_4, L_5, w, z, \text{year}) - \pi[L_{1\min}, (L_1 + L_2 + L_3 + L_4 + L_5) - (L_{1\min} + L_{3\min} + L_{4\min} + L_{5\min}), L_{3\min}, L_{4\min}, L_{5\min}, w, z, \text{year}] \} / \pi(L_1, L_2, L_3, L_4, L_5, w, z, \text{year}). \quad (5)$$

We also give the quasi-diversification economies for cost measures as below:

$$QD_C^T(1,2,3,4,5) = \{ C[L_{1\min}, (L_1 + L_2 + L_3 + L_4 + L_5) - (L_{1\min} + L_{3\min} + L_{4\min} + L_{5\min}), L_{3\min}, L_{4\min}, L_{5\min}, w, z, \text{year}] - C(L_1, L_2, L_3, L_4, L_5, w, z, \text{year}) \} / C(L_1, L_2, L_3, L_4, L_5, w, z, \text{year}). \quad (6)$$

The measurement of profit economies of diversification for deposit, asset, and geographical portfolios is calculated in a similar fashion. In all cases, a positive number suggests a diversification premium or economies of diversification, and a negative number suggests a diversification discount, or diseconomies of diversification.

Some ambiguity can potentially arise regarding the specific parameters that can be directly linked to the observed diversification premium or discount here. In other words, it is the combined effect of number of portfolio categories, share in each category, and the estimated profit (or cost) function that results in the difference of profit premium (or cost discount) that we derive for each of the bank-year observations in our sample.

### 4.3 Focus index

We also construct a more conventional measure of focus versus diversification, the Focus Index. We measure the Focus Index by employing a Herfindahl-Hirschman Index (HHI) measure following Acharya et al. (2006). The Focus Index is the sum of squares of the proportions of portfolios in

each classification. In our case, we construct four different Focus Indices, which are loan, deposit, asset, and geographic Focus Indices.

In the case of loan Focus Index, if we denote the loans in each of the five loan categories as  $L_i$ , where  $i=1, 2, \dots, 5$ , we then have:

$$\text{Loan Focus Index} = \sum_{i=1}^5 (L_i / Q)^2, \text{ where } Q = \sum_{j=1}^5 L_j. \quad (7)$$

Note that the Focus Index, by definition, ranges from  $1/n$ , or  $1/5$  in this case, to 1, with higher a value of the index indicating more focus (less diversification). We also acknowledge that the Focus Indices suffer an arbitrary feature that is shared by all HHI approach-based measures in that they are incapable of capturing the difference in dimensions of diversification when same level of Focus Indices can be achieved by either changing the number of categories (e.g., loan types) or changing the proportions (e.g., the shares of loans in each category).

#### 4.4 Efficiency measures

Cost and profit efficiency measure how well a bank is predicted to perform relative to a “best-practice” bank producing the same outputs under the same environmental conditions. That is, efficiency measures how close to the minimum cost or maximum profit a bank is, where the minimum and maximum are determined by best performers in the sample. We estimate efficiency levels by specifying the commonly-used translog functional form for the cost and profit functions. For convenience, we show only the cost function:

$$\begin{aligned} \ln(C / w_3 z)_{it} = & \alpha_0 + \sum_{j=1}^4 \delta_j \ln(y_j / z)_{it} + \frac{1}{2} \sum_{j=1}^4 \sum_{k=1}^4 \delta_{jk} \ln(y_j / z)_{it} \ln(y_k / z)_{it} + \sum_{l=1}^2 \beta_l \ln(w_l / w_3)_{it} \\ & + \frac{1}{2} \sum_{l=1}^2 \sum_{m=1}^2 \beta_{lm} \ln(w_l / w_3)_{it} \ln(w_m / w_3)_{it} + \sum_{j=1}^4 \sum_{l=1}^2 \theta_{jl} \ln(y_j / z)_{it} \ln(w_l / w_3)_{it} \\ & + \text{year dummies} + \ln \mu_{it} + \ln \nu_{it} \end{aligned} \quad (8)$$

where  $i, t$  index the bank and year, respectively,  $k = 1, \dots, 4$  index the four output variables, and  $\delta_{jk} \equiv \delta_{kj}$ .  $C$  represents the bank’s total costs. There are four outputs ( $y$ ): total loans, total deposits, liquid assets, other earning assets; three input prices ( $w$ ):  $w_1$  (price of funds, proxied by the ratio of interest expenses to total deposits),  $w_2$  (price of fixed capital, proxied by the ratio of other operating expenses to fixed assets),  $w_3$  (price of labor, proxied by the ratio of personnel expenses to total number

of employees); and one fixed netput ( $z$ ): total assets. The  $\ln \mu_{it}$  term represents a bank's efficiency level and  $\ln v_{it}$  is a random error that incorporates both measurement error and luck. The cost function is estimated using the  $\ln \mu_{it} + \ln v_{it}$  as a composite error term. The normalization by bank's total assets ( $z$ ) reduces heteroskedasticity, and allows banks of any size to have comparable residual terms from which the efficiencies are calculated. The normalization by the last input price ( $w_3$ ) ensures price homogeneity.

A bank's cost efficiency score is determined by comparing its actual costs to best-practice minimum costs to produce the same output under the same conditions using estimates of the efficiency factor  $\ln \mu_{it}$ , which is disentangled from the estimated cost function residual using half-normal distributional assumptions, whereas  $\ln v_{it}$  follows the normal distribution. Profit efficiency scores are estimated similarly. Total profits replace total costs and we add a constant before taking the log to avoid taking a log of negative number.

## 4.5 Other variables

We employ the following (annual) variables obtained from Bankscope and other sources for the banks in our sample over the period 1996-2006:

### *Performance measures:*

- ROA: return on assets measured as the ratio of net income to total assets.<sup>12</sup>
- Expenses/assets: the ratio of total expenses to total assets.

### *Risk measures:*

- Loan loss provisions/assets: the ratio of loan loss provisions to total assets, which can also be interpreted as an ex ante measure of the level of expected losses.<sup>13</sup>
- Nonperforming loans/assets: the ratio of nonperforming loans to total assets, which can be interpreted as an ex post measure of the actual losses from lending activities.
- Equity/assets: capital ratio of the bank measured as equity (book value)/assets, the approximate equivalent of the bank's tier 1 capital ratio.

<sup>12</sup> For the foreign banks in our sample, we use the ROA of the Chinese operations, not the consolidated earnings of these banks.

<sup>13</sup> We also tried to use alternative proxy for risk, i.e., ROA volatility, which is measured as the standard deviation of ROA over the sample years for the same bank, and the results remain qualitatively the same.

*Size measures:*

We use a continuous variable, i.e.,  $\ln(\text{assets})$  as the measure for size of the bank. The continuous variable such as  $\ln(\text{assets})$  is normally expected to be a superior regressor than some arbitrary size dummies, except the case when there is a non-monotonic relationship between size and performance. Therefore, in all regression analyses of the paper, we also include the squared term of  $\ln(\text{assets})$  to control for the potential nonlinear relationship between size and performance.<sup>14</sup>

*Ownership variables:*

In this paper, all ownership variables are measured at the bank-year level. First, we define a dummy variable, Big Four, to represent the four biggest Chinese banks, i.e., Bank of China, Industrial and Commercial Bank of China, Agricultural Bank of China, and China Construction Bank. Second, we construct several continuous variables to capture more nuances of the ownership structure of the Chinese banks. State ownership represents the percentage of shares owned by the state and state-owned enterprises (other than the Big Four). Domestic private ownership measures the percentage of shares owned by domestic private individuals and institutions. Foreign ownership captures the percentage of shares owned by foreigners (foreign individuals and institutions).<sup>15</sup>

*Conglomerate affiliation:*

Conglomerate affiliation dummy equals 1 if the bank is affiliated with a conglomerate, 0 otherwise.

*Hyper-regulated period:*

Hyper-regulated period dummy equals 1 during 1996-2001 period, 0 otherwise.

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<sup>14</sup> We thank an anonymous referee for this suggestion. We provide discussion of some further robustness tests using size dummies at the end of Section 5.

<sup>15</sup> We thank an anonymous referee for suggesting that we use the continuous ownership variables instead of discretized ownership data in the analysis. In addition, we provide some discussion of additional robustness tests in which we use those ownership dummy variables in the regressions at the end of Section 5.



## 4.6 Regression analysis

There are two sets of regression analyses in our study. First, we conduct a regression analysis of the determinants of the economies of diversification, where the dependent variables are profit premiums and cost discounts. The profit premium is the measure shown in equation (5) above – the proportional difference in predicted profits between the observed diversified bank and a hypothetical quasi-focused firm that produces the same total amount of output, while the hypothetical quasi-focused firm is defined earlier in Section 4.2 as the hypothetical focused firm which produces at least the minimum of each of the products. The cost discount (shown in equation (6)) is analogously defined as the proportional difference in predicted costs of a quasi-focused firm and the observed diversified bank. The profit premium and cost discount are regressed on a group of bank-level characteristics including ownership variables, risk measures, and bank size. We are particularly interested in the effects of foreign ownership, which was shown to be an important determinant of performance of Chinese banks in an earlier study (Berger et al., 2009). Risk and bank size are included in the regressions as control variables. In the second regression analysis, we regress accounting performance measures (i.e., ROA and costs/assets), and stochastic frontier efficiency measures on the more conventional measures of diversification – the Focus Indices that we construct (including loan, deposit, asset and geographic Focus Indices), along with the ownership, risk, and size.

## 5 Empirical results

Table 1 presents summary statistics for ROA, the cost ratio, decomposition of loan, deposit, asset, and geographical portfolios, and also some firm-level characteristics variables, including risk proxies and size variables – these variables follow the definitions provided in Section 4. All financial items are in billions of \$US, and inflation-adjusted to the price level of year 1996. This table shows that, among the components of loan portfolios of an average Chinese bank, industry loans make up the biggest proportion of the total loans (67.10%), followed by commercial loans (14.88%), consumer loans (7.74%), real estate loans (5.87%), and agriculture loans (4.41%), while the shares of each components change significantly from one bank to another. Among the components of deposit portfolios of an average Chinese bank, customer demand deposits make up the largest share (56.76%), followed by customer savings deposits (34.36%), banking deposits (8.29%), corporate deposits (0.3%), and other deposits (0.28%). Among the components of asset portfolios, loans

make up the largest share (59.45%), followed by financial investments (22.95%), other assets (10.79%), deposits in other banks (5.21%), and total fixed assets (1.60%). In terms of geographical diversification, Eastern China makes up the largest proportion of an average Chinese bank (42.31%), followed by Northern China (24.44%), Southern China (14.16%), Central China (10.76%), and Western China (8.34%).

Table 2 presents summary statistics of the profit premiums and cost discounts measured by economies of diversification for loan portfolios. The definitions of the decompositions of the portfolios are the same as in Table 1. A profit premium is defined as the proportional difference in the predicted profits between the observed diversified bank and a hypothetical quasi-focused bank. A cost discount is analogously defined as the proportional difference in the predicted costs between a hypothetical quasi-focused bank and the observed diversified bank. Table 2 shows the summary statistics for each loan category as well as the average profit premium and cost discount over all of the loan categories.

The negative means of profit premiums and cost discounts suggest that more focus is associated with higher profits and lower costs. The overall mean of the profit premium, -0.203, implies that the diversified banks, on average, are losing about 1/5 of their profits compared to the hypothetical bank which puts almost all its value of loans into one category. The mean of cost discount, -0.117, implies that the diversified banks, on average, could have saved about 1/10 of their costs if they focused on one of the loan categories. The consistency of the negative findings is convincing evidence in favor of the hypothesis that lending focus is associated with better profit and cost performance.

Table 3 presents the summary statistics including the mean, median, standard deviation, minimum, and maximum for the measures of economies of diversification in terms of profits and costs for all the banks over the sample period 1996-2006. Summary statistics of subsample banks by size class (i.e., small banks, medium banks, large banks) are also presented in Table 3. Panel A of Table 3 presents the summary statistics of the measure of economies of diversification in terms of profit premiums and cost discounts for all observations and all of the individual loan, deposit, asset, and geographic categories. Note that the loan diversification summary statistics match the average loan profit premium and cost discount shown in Table 2. Panels B, C, and D of Table 3 presents the summary statistics of the economies of diversification for small banks, medium banks, and large banks, respectively. All of the means of the profit premiums and cost discounts are negative, and this holds for every size class, which strongly suggests diseconomies of diversification for

Chinese banks in terms of their product and geography portfolios. Again, the consistency across product and geographic categories and across size classes strongly suggests that focused firms are more profitable and less costly for a given total output than diversified firms.

Table 4 presents the ordinary least squares (OLS) regressions of the profit premiums on ownership variables and other firm-level characteristics, including risk proxies, size measures, conglomerate affiliation dummy, and hyper-regulated period dummy. As noted, the conglomerate affiliation dummy equals 1 if the bank is affiliated with a conglomerate, 0 otherwise, and the hyper-regulated period dummy equals 1 for period 1996-2001, and 0 otherwise. Domestic private ownership and the less-regulated period are considered omitted variables in the regressions. In this table as well as throughout the analysis of this study, we use the one-year lagged term (i.e., year  $t-1$ ) of ownership variables instead of concurrent terms of ownership because normally it takes some time for the ownership to affect performance. The profit premiums in the first, second, third, and fourth paired columns are calculated based on decompositions of loan, deposit, asset, and geographical portfolios, respectively, and these decompositions follow the same definitions as described in previous tables. We present two columns for each definition of portfolio decomposition with two different risk measures, namely, loan loss provisions/assets, and nonperforming loans/assets, entered into the regression alternatively. Loan loss provision/assets captures the ex ante estimation of the expected losses from lending activities, while nonperforming loans/assets is an ex post measure. Table 5 presents the regressions of cost discounts on the same set of variables. While there are a number of results in Table 4 and Table 5, we concentrate our attention on the foreign ownership for two reasons. First, in prior research, foreign bank ownership in China is associated with significantly better profit and cost efficiency (Berger et al., 2009). Second, as will be shown, the results for foreign ownership are consistent across a number of regressions in this paper. Except for the case of geography diversification in the profit premium regression, foreign ownership is associated with significant and positive coefficients. This suggests that foreign owners are able to at least partially mitigate the diseconomies of diversification, making banks suffer fewer profit losses and fewer cost increases associated with diversification.

Table 6 presents the summary statistics of Focus Indices which are based on Herfindahl-Hirschman Index (HHI) measures of loan, deposit, asset, and geographic portfolios. The method by which the Focus Indices are calculated is described in the previous section. By definition, the Focus Indices range from the value of  $1/5$  to 1, the closer the value to 1 (i.e., the higher the value), the more focused (i.e., less diversified) the bank is. In Table 6, we note that most of the firms are fairly

well diversified in terms of loans, deposits, and assets, but are more focused in terms of their geographic region, particularly the small and medium sized institutions.

Table 7 presents the ordinary least squares (OLS) regressions of return on assets (ROA) on the Focus Indices, ownership variables, conglomerate affiliation dummy, the interaction terms between the Focus Indices and ownership, between Focus Indices and conglomerate affiliation dummy, and control variables including risk proxies, size measures, and hyper-regulated period dummy. Domestic private ownership and the less-regulated period are considered omitted variables in the regressions. The Focus Index in the first pair of columns represents the loan Focus Index, and the same Focus Index is also used to construct the interaction terms between ownership (and conglomerate affiliation) and Focus Indices. The Focus Indices in the second, third, and fourth pairs of columns represent deposit, asset, and geographic Focus Indices, respectively.<sup>16</sup> To partially address the issue concerning the endogeneity of focus measures, we consider the relationship between focus in year  $t-1$  on performance measures in year  $t$ . We complement this analysis with a robustness check that employs focus measures in year  $t$  as well, but treats them as endogenously determined variables. These tests show that our results are robust to the endogeneity of focus measures.<sup>17</sup>

We call attention to three main results in Table 7. First, the Focus Indices, across alternative definitions, are positively and significantly associated with ROA, implying that focused banks associated with domestic private ownership enjoy higher levels of ROA on average.<sup>18</sup> When we combine this evidence with the observation of insignificant coefficients of interaction terms between Focus Indices and Big Four, non-Big Four state ownership in this table, it indicates that focused banks – unless they are associated with foreign ownership – yield higher ROA on average. This result is consistent with the finding using the economies of diversification measure in Table 4 and 5, and reinforces the observation there that more focused banks tend to be more profitable than diversified institutions. Second, foreign ownership is positively and significantly associated with ROA, implying that banks with foreign ownership enjoy higher ROA on average. This is consistent with the higher profit efficiency for foreign-owned banks in China found in Berger et al. (2009).

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<sup>16</sup> By treating potential interdependencies of various diversification or focus in terms of their impact on performance separately, we are likely to ignore the “spatial differences,” in the fact that there may be closer relationships between some regional pairs, but not others. Similarly, some banks may get deposits and loans, but do not offer other non-traditional facilities. We acknowledge such shortcomings in the tests of the paper, and we thank an anonymous referee for pointing this out.

<sup>17</sup> We thank the anonymous referees for this suggestion. The robustness test tables are available upon request.

<sup>18</sup> We also run some robustness tests to examine whether the same results hold when we enter the different dimensions of diversification measures (i.e., the different Focus Indices) in the same regression. The results show that our findings on the individual diversification measure are robust after we control for other measures of diversification. These tables are available upon request.

Third, the interaction terms between the foreign ownership and Focus Indices are negative and significant, implying that foreign ownership may play a mitigating role when banks diversify, in the sense that the diversified banks are not penalized as much in terms of ROA if they are associated with more foreign ownership. In the same fashion, the negative and significant coefficients of interaction terms between Focus Indices and conglomerate affiliation dummy indicate that conglomerate affiliation also mitigates the negative effects of diversification on ROA.

Table 8 presents the ordinary least squares (OLS) regressions of total expenses/total assets on the same group of independent variables as in Table 7. When we switch our attention to the cost perspective as this table presents, we generally find consistent results. First, the negative and significant coefficients of Focus Indices imply that focused banks enjoy lower costs than diversified banks, holding other factors constant. Banks associated with more foreign ownership, on average, enjoy lower costs than otherwise. The interaction terms between foreign ownership (and conglomerate affiliation) and Focus Indices are generally associated with positive and significant coefficients, which once again imply the mitigating role of foreign ownership (conglomerate affiliation), in that the diversified banks (i.e., banks with lower Focus Indices) are associated with lower costs when foreign ownership (conglomerate affiliation) is in place.

To obtain a more comprehensive understanding of the effect of a bank's focus/diversification strategy, we need to study its effect on both bank profit/cost performance and bank risk.<sup>19</sup> If focus produces an increase in bank profit/cost performance and a decrease in bank risk, then we can interpret this result as implying that focus improves overall bank performance. However, if focus produces an increase in profit/cost performance and an increase in risk, then the overall effects of focus/diversification on banks are ambiguous and cannot be determined without taking a stand on what constitutes an "efficient" risk-return trade-off. Table 9 examines the effects of diversification on the risk of the Chinese banks and it presents the ordinary least squares (OLS) regressions of loan loss provisions/assets (on the left four columns) and nonperforming loans/assets (on the right four columns) on Focus Indices, ownership variables, conglomerate affiliation dummy, the interaction terms between Focus Indices and ownership, between Focus Indices and conglomerate affiliation dummy, and control variables including equity ratio, size measures, and hyper-regulated period dummy. Domestic private ownership and the less-regulated period are omitted variables in the regressions. The Focus Index in the first column represents the loan Focus Index, and the same Focus Index is used to construct the interaction terms between ownership (and con-

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<sup>19</sup> We thank an anonymous referee for this suggestion.

glomerate affiliation) and Focus Indices. The Focus Indices in the second, third, and fourth columns represent deposit, asset, and geographic Focus Indices, respectively. As discussed earlier, loan loss provisions ratio is an ex ante measure of risk while nonperforming loans ratio is an ex post measure of risk. Despite such differences in these two measures, both tables show qualitatively similar results: focused banks, on average, are associated with lower risks, and foreign ownership and conglomerate affiliation tend to mitigate the negative role of diversification on bank risks.

In addition, we apply heteroskedasticity tests to our data in order to investigate in more detail of the issue of the effects of diversification on risk. Recently, some studies (see, e.g., Adams et al. (2005), Cheng (2008)) have applied the Glejser's (1969) heteroskedasticity test in their studies of the variability of performance or risks. To conduct the Glejser test, we first need to specify a model for the performance measure, i.e., ROA. In other words, the first-stage regression includes a number of the right-hand-side variables which could explain performance levels, and in our case, we use the same specification as in Table 7 as in our first-stage regressions. In the second-stage regressions, the test is applied to the absolute values of the residuals of the first regression, which are now treated as the dependent variable, and the independent variables are the variables that could potentially explain the performance volatility. In our test, we include the ownership variables, Focus Indices, interactions between ownership and Focus Indices, equity ratio, size measures, conglomerate affiliation dummy, and hyper-regulated period dummy. The results show that diversification is not significantly associated with an increase in performance volatility, which provides consistent evidence as presented by Table 9. A table of these tests is available upon request.<sup>20</sup>

Table 10 presents the summary statistics of basic variables used in the profit and cost efficiency estimations. In the translog-based estimations of profit (cost) efficiency, output variables considered are total loans, total deposits, liquid assets, and other earning assets, and the input variables are:  $w_1$  (price of funds, proxied by the ratio of interest expenses to total deposits),  $w_2$  (price of fixed capital, proxied by the ratio of other operating expenses to fixed assets),  $w_3$  (price of labor, proxied by the ratio of personnel expenses to total number of employees). The outputs are normalized by total assets, which are considered as a fixed netput  $z$ . As above, all financial values are inflation-adjusted to the base year 1996.

Table 11 presents the ordinary least squares (OLS) regressions of profit efficiency on the same group of independent variables as in Table 7. The three main findings using the accounting measures, i.e., ROA and costs/assets, are essentially replicated here. The coefficients of Focus In-

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<sup>20</sup> We thank an anonymous referee for the suggestion of these tests.

dices across alternative definitions of diversification are positive and statistically significant, implying that focused banks are associated with greater profit efficiency. Also, the coefficients of foreign ownership are positive and significant, suggesting that foreign ownership is associated with higher profit efficiency. The negative coefficients of the interaction terms between the foreign ownership (conglomerate affiliation dummy) and Focus Indices further confirm the mitigating effects of foreign ownership (conglomerate affiliation) as found in the previous tables.

Table 12 presents the ordinary least squares (OLS) regressions of cost efficiency on the same group of independent variables as in Table 11. The results again suggest that 1) more focus is associated with higher efficiency; 2) foreign ownership is generally positively related to efficiency; and 3) foreign ownership plays a role in mitigating the poor performance effects of diversification.

We also conduct a number of robustness tests. First, we replace the continuous ownership variables (i.e., state ownership, domestic private ownership, foreign ownership) with the ownership dummies, for the reason that treating ownership as dummies instead of continuous variables has been quite a standard procedure in the banking literature (see, e.g., Saunders (1990), Altunbas et al. (2001), Berger et al. (2005, 2008), Micco et al. (2007)). We define majority state-owned banks as those where the state and state-owned enterprises ownership is  $> 50\%$  of total ownership (other than the Big Four), majority private domestic banks as those whose private domestic ownership is  $> 50\%$  of total ownership, majority foreign banks as those whose foreign ownership is  $> 50\%$  of total ownership, and minority foreign banks as those with  $0 < \text{foreign ownership} \leq 50\%$ . Our robustness test tables show that both majority and minority foreign ownership dummies are associated with the better profit and/or economies of diversification, higher ROA and/or lower costs, lower risk, and higher profit and cost efficiency measures. More importantly, we find both majority and minority foreign ownership dummies play a mitigating role when banks diversify, and these results are essentially consistent with our evidence found with the continuous ownership variables. Second, we replace the continuous size variables with the size dummies (bank size dummies are based on total assets (inflation-adjusted to 1996): the bank is small if assets  $\leq$  US \$1 billion; medium if US \$1 billion  $<$  assets  $\leq$  US \$20 billion; and large if assets  $>$  US \$20 billion), and if the size is non-monotonically related with performance or risk, the size dummies are expected to capture some extent of such nonlinearity as well. For example, in Table 4, 5, 8, 11, 12, we find that the squared terms of  $\ln(\text{assets})$ , at least for some of the regressions, are associated with significant coefficients. Such convexity (positive coefficients) or concavity (negative coefficients) of size effect on performance found in these tables based on continuous size variables are not always perfectly captured by the size dummies in our robustness tests, which may be resulted from the fact that the size dum-

mies are constructed based on some rather arbitrary benchmarks rather than the real threshold or discontinuity in the relationship between size and performance of banks. To conclude, our robustness tests show that our main evidence in the paper is robust to different specification of variables and/or assumptions. These tables are available upon request.<sup>21</sup>

## 6 Discussion and conclusions

The paper investigates the effects of product and geographical focus and diversification strategies on performance using a sample of 88 Chinese banks representing about 90% of commercial banking assets during 1996-2006. We present a new measure of economies of diversification and we compare the performance effects with those of a more conventional focus index measure. Consistent across these two approaches, and across accounting performance measures and efficiency frontier measures, we find diseconomies of diversification among the sample banks in the loan, deposit, asset, and geographic dimensions. That is, more focused banks are associated with higher profits, lower costs, higher profit efficiency, and higher cost efficiency. The diversification discount evidence that we find for the average Chinese bank in our sample, and their cross-sectional changes across different ownership types as well as their time-series changes across different regulatory regimes, may shed light on the mechanisms as to why Chinese banks are found to suffer the diversification discount and why they still diversify despite the discount. We believe the diversification discount of Chinese banks, at least partially, comes from the lack of managerial expertise of the top management teams and the slack or ineffective incentive schemes for the managers to maximize the shareholders' wealth. In China, most of the banks' managers are appointed by the government, and their promotions largely depend on how well they cooperate with the government's directions instead of making independent decisions. Under such circumstances, managers are less likely to take a firm stand on the diversification/focus strategy that maximizes the profit of the bank or wealth of the shareholders. The intensity of influence from the central and local governments is expected to follow a downward trend in the forthcoming years, though the influence might still be quite substantial for those majority state-owned banks.

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<sup>21</sup> We thank the anonymous referees for the suggestion of these tests.



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We also find that foreign ownership plays a mitigating role in diseconomies of diversification. The banks that are associated with more foreign ownership tend to suffer a smaller diversification discount or a lesser loss of profits or increase in costs from diversification. In the context of Chinese banks, the foreign ownership represents a presence of monitoring and delivering of managerial expertise at the top management level. At the same time, the foreign ownership is also often associated with more/better networks, partnerships, and even direct or indirect affiliation with international conglomerates. This evidence is consistent with existing studies that find that the involvement of foreign banks provides an additional certification for the domestic banks, and sometimes the mere presence of foreign bank owners improves the culture and efficiency of the overall banking sector (Hasan and Marton, 2003; Berger et. al., 2009). Our observation that foreign bank ownership and conglomerate affiliation tend to mitigate the diseconomies of diversification in the Chinese banking may be of help in the discussion of policy recommendations with regards to foreign bank entry in China and other emerging markets.

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Table 1 Summary statistics of firm-level characteristics variables

Variable	Obs.	Mean	Median	Std. Dev.	Minimum	Maximum
<i>Performance measures</i>						
Return on assets (ROA)	464	0.016	0.014	0.006	-0.003	0.100
Total expenses/assets	464	0.025	0.020	0.014	0.004	0.087
<i>Loan decomposition</i>						
Industry loans	464	18.000	0.979	54.900	0.002	416.000
Commercial loans	464	3.991	0.240	13.900	0.000	141.000
Real estate loans	464	1.576	0.029	6.897	0.000	78.200
Agriculture loans	464	1.183	0.084	5.828	0.000	89.500
Consumer loans	464	2.076	0.262	6.608	0.000	70.700
<i>Deposit decomposition</i>						
Customer demand deposits	464	22.300	1.615	67.200	0.000	423.000
Customer savings deposits	464	13.500	0.665	42.600	0.000	384.000
Corporate deposits	464	0.117	0.004	0.400	0.000	3.826
Banking deposits	464	3.258	0.135	9.717	0.000	81.100
Other deposits	464	0.110	0.002	0.396	0.000	3.849
<i>Asset decomposition</i>						
Loans	464	27.200	1.684	82.100	0.000	725.000
Deposits in other banks	464	2.383	0.173	7.930	0.000	96.700
Financial investments	464	10.500	0.681	35.400	0.000	341.000
Total fixed assets	464	0.733	0.051	2.181	0.000	12.900
Other assets	464	4.939	0.316	14.600	0.000	98.900
<i>Geographical decomposition (loans)</i>						
Northern	464	6.180	0.000	89.200	0.000	1760.000
Central	464	2.720	0.000	37.700	0.000	648.000
Eastern	464	10.700	0.000	151.000	0.000	2410.000
Southern	464	3.580	0.000	47.700	0.000	861.000
Western	464	2.110	0.000	26.800	0.000	447.000
<i>Control variables</i>						
Loan loss provisions/assets	464	0.013	0.010	0.012	0.000	0.120
Nonperforming loans/assets	464	0.069	0.042	0.089	0.001	0.800
Equity/assets	464	0.100	0.049	0.159	0.000	0.995
ln(assets)	464	15.261	15.019	2.148	10.390	20.596
Conglomerate affiliation	464	0.317	0.000	0.466	0.000	1.000
Hyper-regulated period	464	0.328	0.000	0.470	0.000	1.000

Table 1 presents summary statistics of ROA, cost ratio, decomposition of loan, deposit, asset, and geographical portfolios, and also some firm-level characteristics variables, including risk proxies and size variables. The disaggregated loan decomposition is based on each bank's loans to industry loans, commercial loans, real estate loans, agriculture loans, and consumer loans. The disaggregated deposit decomposition is based on each bank's customer demand deposits, customer savings deposits, non-bank corporate deposits, deposits by other banks, and other deposits. The disaggregated asset decomposition is based on each bank's total loans, deposits in other banks, financial investments (including investment in government securities, trading securities, and other financial assets), total fixed assets, and other assets. The disaggregated geographical decomposition is based on each bank's loans on various regions in China, including northern, central, eastern, southern, and western regions. Conglomerate affiliation equals to 1 if the bank is affiliated with a conglomerate, 0 otherwise. Hyper-regulated period equals to 1 during 1996-2001 period, 0 otherwise. All the financial items, except ln(assets, in thousand \$US), are in billions of \$US, and inflation-adjusted to the price level of year 1996.

Table 2 Summary statistics of economies of diversification measures for loan portfolios

	Obs.	Mean	Median	Std Dev.	Minimum	Maximum
<b>Economies of Diversification in Loan Portfolios</b>						
<i>Profit premium</i>						
Industry loans	464	-0.007	0.000	0.129	-0.962	0.828
Commercial loans	464	-0.042	0.000	0.187	-0.953	0.000
Real estate loans	464	-0.075	0.000	0.243	-1.010	0.000
Agriculture loans	464	-0.582	-0.823	0.403	-1.100	0.000
Consumer loans	464	-0.311	0.000	0.413	-1.100	0.000
Average profit premium for loan portfolios	464	-0.203	-0.174	0.170	-0.769	0.166
<i>Cost discount</i>						
Industry loans	464	-0.029	-0.027	0.057	-0.555	0.840
Commercial loans	464	-0.028	-0.025	0.058	-0.904	0.676
Real estate loans	464	-0.249	-0.216	0.572	-0.602	0.834
Agriculture loans	464	-0.112	-0.095	0.274	-0.291	0.402
Consumer loans	464	-0.184	-0.159	0.445	-0.469	0.647
Average cost discount for loan portfolios	464	-0.117	-0.104	0.082	-0.589	0.317

Table 2 presents summary statistics of the profit premium and cost discount measured by economies of diversification for loan portfolios. The definitions of the decompositions of the portfolios are the same as in Table 1. Profit premium is defined as the proportional difference in predicted profits between the observed diversified bank and a hypothetical quasi-focused bank with the same total amount of output, while a hypothetical quasi-focused bank is defined in our paper as the hypothetical focused bank which produces at least the minimum in each of the products. Cost discount is defined as the proportional difference in predicted costs between a hypothetical quasi-focused bank and the observed diversified bank.

Table 3 Summary statistics of economies of diversification measures for loan, deposit, asset, and geographic portfolios

	Diversification Type	Obs.	Mean	Median	Std. Dev.	Minimum	Maximum
<i>Panel A: All observations</i>							
Profit Premium	Loan diversification	464	-0.203	-0.174	0.170	-0.769	0.166
	Deposit diversification	464	-0.052	-0.054	0.358	-1.981	2.021
	Asset diversification	464	-0.159	-0.151	0.031	-0.318	-0.107
	Geographical diversification	464	-0.049	-0.050	0.021	-0.160	0.015
Cost Discount	Loan diversification	464	-0.117	-0.104	0.082	-0.589	0.317
	Deposit diversification	464	-0.073	-0.052	0.358	-1.500	1.500
	Asset diversification	464	-0.233	-0.186	0.182	-1.235	1.492
	Geographical diversification	464	-0.452	-0.434	0.943	-2.516	1.209
<i>Panel B: Summary statistics for small banks: assets &lt; US \$1 billion</i>							
Profit Premium	Loan diversification	100	-0.130	0.000	0.169	-0.607	0.166
	Deposit diversification	100	-0.014	-0.020	0.197	-0.355	1.529
	Asset diversification	100	-0.162	-0.153	0.033	-0.267	-0.107
	Geographical diversification	100	-0.046	-0.052	0.019	-0.081	0.015
Cost Discount	Loan diversification	100	-0.090	-0.078	0.087	-0.589	0.010
	Deposit diversification	100	-0.001	-0.035	0.358	-1.500	1.500
	Asset diversification	100	-0.244	-0.197	0.260	-1.235	1.492
	Geographical diversification	100	-0.706	-0.486	0.951	-2.516	1.209
<i>Panel C: Summary statistics for medium banks: US \$1 billion &lt; assets &lt; US \$20 billion</i>							
Profit Premium	Loan diversification	261	-0.206	-0.174	0.164	-0.705	0.142
	Deposit diversification	261	-0.054	-0.054	0.420	-1.981	2.021
	Asset diversification	261	-0.163	-0.152	0.031	-0.318	-0.113
	Geographical diversification	261	-0.049	-0.050	0.020	-0.160	0.011
Cost Discount	Loan diversification	261	-0.127	-0.105	0.080	-0.589	0.317
	Deposit diversification	261	-0.111	-0.059	0.406	-1.500	1.500
	Asset diversification	261	-0.243	-0.191	0.163	-1.235	0.199
	Geographical diversification	261	-0.702	-0.651	0.849	-2.516	1.209
<i>Panel D: Summary statistics for large banks: assets &gt; US \$20 billion</i>							
Profit Premium	Loan diversification	103	-0.267	-0.205	0.161	-0.769	0.000
	Deposit diversification	103	-0.083	-0.069	0.303	-1.981	2.021
	Asset diversification	103	-0.148	-0.142	0.027	-0.318	-0.119
	Geographical diversification	103	-0.054	-0.048	0.025	-0.160	0.004
Cost Discount	Loan diversification	103	-0.119	-0.110	0.075	-0.589	0.317
	Deposit diversification	103	-0.048	-0.055	0.166	-0.270	1.500
	Asset diversification	103	-0.196	-0.167	0.123	-1.235	-0.129
	Geographical diversification	103	0.429	0.558	0.563	-1.127	1.209

Table 3 presents summary statistics of the economies of diversification measures (i.e., profit premium and cost discount). Diversifications are defined in four dimensions: loans, deposits, assets, and geography. In addition to the presentation of summary statistics of the overall sample Chinese banks, summary statistics of subsamples of Chinese banks by size (i.e., small banks, medium banks, and large banks) are also presented. More specifically, bank size is defined based on total assets (inflation-adjusted to the base year 1996) of the bank at year  $t$ , and the bank is a small bank if its assets are less than or equal to US \$ 1 billion, medium bank if the bank's assets are greater than US \$1 billion but less than or equal to US \$20 billion; large bank if the bank's assets are greater than US \$20 billion. The definitions of decompositions of the loan, deposit, asset, and geographic portfolios are the same as in Table 1.



Table 4 OLS regressions of profit economies of diversification (profit premium) on firm-level characteristics

	Loan Diversification		Deposit Diversification		Asset Diversification		Geographical Diversification	
Constant	-0.548*	-0.474	-0.486*	-0.403	-0.147**	-0.164**	-0.282***	-0.266***
	[1.70]	[1.60]	[1.73]	[0.70]	[1.98]	[2.07]	[2.96]	[2.86]
Big Four	-0.100	-0.118*	-0.168	-0.191	-0.034**	-0.029*	0.035***	0.039***
	[1.38]	[1.67]	[0.87]	[0.97]	[2.26]	[1.93]	[3.80]	[3.86]
State ownership	-0.018	-0.020	-0.138**	-0.135**	-0.026***	-0.027***	-0.007	-0.007
	[0.53]	[0.58]	[2.29]	[2.26]	[4.03]	[4.07]	[1.31]	[1.45]
Foreign ownership	0.016**	0.010**	0.010**	0.014**	0.019***	0.018***	0.004	0.005
	[2.51]	[2.32]	[2.11]	[2.15]	[2.98]	[2.95]	[0.91]	[1.23]
Loan loss provisions/assets	-0.928		-1.702		-0.398**		-0.170	
	[1.41]		[1.25]		[2.47]		[1.34]	
Nonperforming loans/assets		-0.065		-0.017		-0.002		-0.017
		[0.68]		[0.13]		[0.10]		[1.56]
ln(assets)	0.067	0.060	-0.186	-0.178	-0.041**	-0.043**	0.030**	0.029**
	[0.66]	[0.58]	[0.72]	[0.69]	[2.16]	[2.20]	[2.43]	[2.33]
Squared ln(assets)	-0.003	-0.003	0.006	0.006	0.001**	0.002**	-0.001**	-0.001**
	[0.87]	[0.83]	[0.68]	[0.67]	[2.42]	[2.42]	[2.37]	[2.30]
Equity/assets	0.206**	0.166*	0.217	0.147	0.016	0.001	0.057***	0.050***
	[2.10]	[1.74]	[0.88]	[0.61]	[0.78]	[0.00]	[3.77]	[3.95]
Conglomerate affiliated	0.010	0.011	0.072*	0.072*	0.003	0.003	-0.013***	-0.012***
	[0.50]	[0.57]	[1.82]	[1.78]	[0.78]	[0.79]	[4.22]	[4.10]
Hyper-regulated period	0.001	0.001	0.049	0.051	-0.019***	-0.019***	0.003*	0.004*
	[0.02]	[0.03]	[1.25]	[1.24]	[6.42]	[6.43]	[1.65]	[1.76]
Observations	463	463	463	463	463	463	463	463
R-square	0.11	0.11	0.04	0.04	0.20	0.19	0.14	0.13
Adj R-square	0.09	0.09	0.02	0.02	0.19	0.17	0.12	0.12
F-statistics	11.25	12.79	3.51	4.42	14.51	13.58	6.36	6.49

Table 4 presents the ordinary least squares (OLS) regressions of profit economies of diversification (i.e., profit premium) on ownership variables, risk proxies, size variables (including both ln(assets) and squared term of ln(assets)), conglomerate affiliation dummy (equal to 1 if the bank is affiliated with a conglomerate, 0 otherwise), and hyper-regulated period dummy (equal to 1 for period 1996-2001, 0 otherwise). Domestic private ownership and the less-regulated period are considered omitted variables in the regressions. The profit premiums in the first, second, third and fourth paired columns are calculated based on decompositions of loan, deposit, asset, and geographic portfolios, respectively, and these decompositions follow the same definitions as described in previous tables. Absolute values of t statistics (based on White heteroskedastic-consistent standard errors) are presented in brackets. \*, \*\*, and \*\*\* represent significance level of 10%, 5%, and 1% respectively.

Table 5 OLS Regressions of cost economies of diversification (cost discount) on firm-level characteristics

	Loan Diversification		Deposit Diversification		Asset Diversification		Geographical Diversification	
Constant	-0.098*	-0.070*	-0.097*	-0.051**	-0.656*	-0.732*	-1.640***	-1.918***
	[1.74]	[1.73]	[1.94]	[1.97]	[1.67]	[1.71]	[2.82]	[2.88]
Big Four	-0.048**	-0.043*	-0.279*	-0.263*	-0.096**	-0.068*	0.298*	0.210*
	[2.00]	[1.88]	[1.88]	[1.69]	[2.07]	[1.77]	[1.96]	[1.69]
State ownership	-0.045***	-0.047***	-0.107	-0.104	-0.099*	-0.105*	-0.406**	-0.423**
	[2.92]	[3.03]	[1.03]	[0.99]	[1.71]	[1.78]	[2.32]	[2.40]
Foreign ownership	0.033**	0.037***	0.014**	0.013**	0.099**	0.103**	0.847***	0.848***
	[2.42]	[2.78]	[2.15]	[2.14]	[2.55]	[2.42]	[4.67]	[4.57]
Loan loss provisions/assets			-1.466		-3.105***		-8.369**	
			[0.91]		[2.73]		[2.10]	
Nonperforming loans/assets		-0.084***		-0.019		-0.118		-0.174
		[2.76]		[0.14]		[1.16]		[0.29]
ln(assets)	-0.100*	-0.100*	-0.536**	-0.541**	-0.113	-0.120	-1.548***	-1.574***
	[1.94]	[1.92]	[2.11]	[2.13]	[0.88]	[0.92]	[3.19]	[3.24]
Squared ln(assets)	0.003*	0.003*	0.018**	0.018**	0.004	0.004	0.055***	0.055***
	[1.93]	[1.87]	[2.22]	[2.23]	[0.98]	[0.97]	[3.51]	[3.54]
Equity/assets	0.077	0.038	-0.175	-0.235	0.036	-0.087	-0.444	-0.780
	[1.46]	[0.80]	[0.58]	[0.79]	[0.28]	[0.61]	[0.88]	[1.54]
Conglomerate affiliated	0.007	0.005	-0.095	-0.095	0.018	0.014	0.393***	0.387***
	[0.72]	[0.46]	[1.65]	[1.62]	[0.50]	[0.40]	[3.78]	[3.71]
Hyper-regulated period	-0.043***	-0.046***	-0.028	-0.030	-0.085***	-0.092***	-0.188**	-0.202**
	[6.19]	[6.45]	[0.72]	[0.73]	[4.35]	[4.28]	[2.28]	[2.32]
Observations	463	463	463	463	463	463	463	463
R-square	0.21	0.20	0.04	0.03	0.12	0.10	0.32	0.32
Adj R-square	0.19	0.18	0.02	0.01	0.11	0.08	0.31	0.30
F-statistics	24.77	39.00	2.12	2.36	6.32	6.25	37.50	36.39

Table 5 presents the ordinary least squares (OLS) regressions of cost economies of diversification (cost discount) on ownership variables, risk proxies, size variables (including both ln(assets) and squared term of ln(assets)), conglomerate affiliation dummy (equal to 1 if the bank is affiliated with a conglomerate, 0 otherwise), and hyper-regulated period dummy (equal to 1 for period 1996-2001, 0 otherwise). Domestic private ownership and the less-regulated period are considered omitted variables in the regressions. The cost discounts in the first, second, third and fourth paired columns are calculated based on decompositions of loan, deposit, asset, and geographical portfolios, respectively, and these decompositions follow the same definitions as described in previous tables. Absolute values of t statistics (based on White heteroskedastic-consistent standard errors) are presented in brackets. \*, \*\*, and \*\*\* represent significance level of 10%, 5%, and 1% respectively.

Table 6 Summary statistics of Focus Indices of loan, deposit, asset, and geographic portfolios

	Obs.	Mean	Median	Std. Dev.	Minimum	Maximum
<i>Summary Statistics for all observations</i>						
Loan Focus Index	464	0.428	0.415	0.086	0.282	0.700
Deposit Focus Index	464	0.530	0.401	0.122	0.273	1.000
Asset Focus Index	464	0.420	0.520	0.090	0.281	0.979
Geographic Focus Index	464	0.866	1.000	0.286	0.216	1.000
<i>Summary statistics for small banks: assets &lt; US \$1 billion</i>						
Loan Focus Index	100	0.426	0.412	0.082	0.298	0.609
Deposit Focus Index	100	0.600	0.446	0.179	0.335	1.000
Asset Focus Index	100	0.484	0.568	0.135	0.307	0.979
Geographic Focus Index	100	1.000	1.000	0.000	1.000	1.000
<i>Summary statistics for medium banks: US \$1 billion &lt; assets &lt; US \$20 billion</i>						
Loan Focus Index	261	0.411	0.397	0.075	0.282	0.610
Deposit Focus Index	261	0.528	0.383	0.098	0.273	0.941
Asset Focus Index	261	0.393	0.528	0.056	0.281	0.564
Geographic Focus Index	261	0.970	1.000	0.142	0.270	1.000
<i>Summary statistics for large banks: assets &gt; US \$20 billion</i>						
Loan Focus Index	103	0.474	0.471	0.098	0.299	0.700
Deposit Focus Index	103	0.470	0.428	0.061	0.336	0.593
Asset Focus Index	103	0.428	0.466	0.070	0.299	0.644
Geographic Focus Index	103	0.470	1.000	0.342	0.216	1.000

Table 6 presents the summary statistics of Focus Indices, and decompositions of loan, deposit, asset and geographical portfolios follow the same definitions as in Table 1. Summary statistics of subsamples of Chinese banks by size are also presented.

Table 7 OLS regressions of ROA on Focus Indices and ownership.

	Dependent Variable: ROA							
	Loan		Deposit		Asset		Geographical	
	Diversification		Diversification		Diversification		Diversification	
Constant	-0.024	-0.019	-0.021	-0.020	-0.019	-0.011	-0.029	-0.023
	[0.45]	[0.36]	[0.44]	[0.43]	[0.37]	[0.22]	[0.52]	[0.42]
Big Four	-0.010	-0.008	-0.008	-0.008	0.005	0.003	-0.085***	-0.072***
	[1.56]	[1.36]	[0.98]	[0.97]	[0.78]	[0.58]	[4.24]	[4.16]
State ownership	0.002	0.001	0.005	0.005	0.001	0.001	-0.001	-0.001
	[0.28]	[0.07]	[0.58]	[0.60]	[0.21]	[0.12]	[0.88]	[0.57]
Foreign ownership	0.004**	0.004**	0.010*	0.009**	0.005*	0.003	0.012	0.011
	[2.35]	[2.32]	[1.93]	[1.98]	[1.86]	[1.28]	[1.40]	[1.15]
Focus Index	0.004**	0.002**	0.007***	0.006***	0.002**	0.007*	0.002	0.002
	[2.39]	[2.16]	[2.62]	[2.60]	[2.32]	[1.84]	[0.77]	[0.68]
Focus Index × Big Four	0.021*	0.020*	0.017	0.019	-0.011	-0.005	0.376***	0.321***
	[1.72]	[1.68]	[0.89]	[0.95]	[0.76]	[0.35]	[4.03]	[4.06]
Focus Index × State ownership	-0.007	-0.003	-0.012	-0.013	-0.004	-0.003	-0.001	-0.001
	[0.35]	[0.14]	[0.63]	[0.64]	[0.31]	[0.20]	[0.20]	[0.10]
Focus Index × Foreign ownership	-0.008**	-0.009**	-0.007*	-0.003**	-0.005**	-0.011***	-0.005**	-0.004**
	[2.31]	[2.39]	[1.69]	[2.30]	[2.31]	[2.63]	[2.57]	[2.38]
Focus Index × Conglomerate affiliated	-0.006*	-0.007*	-0.006*	-0.006*	-0.001**	-0.004	-0.001*	-0.002*
	[1.70]	[1.86]	[1.90]	[1.85]	[2.10]	[1.51]	[1.66]	[1.78]
Loan loss provisions/assets	-0.032		-0.029		-0.034		-0.044	
	[0.72]		[0.67]		[0.65]		[0.94]	
Nonperforming loans/assets		-0.005		-0.005		-0.007*		-0.004
		[1.58]		[0.96]		[1.95]		[1.10]
ln(assets)	0.005	0.004	0.004	0.004	0.004	0.003	0.006	0.005
	[0.67]	[0.62]	[0.66]	[0.68]	[0.64]	[0.54]	[0.77]	[0.69]
Squared ln(assets)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	[0.66]	[0.62]	[0.65]	[0.68]	[0.62]	[0.53]	[0.75]	[0.69]
Equity/assets	0.016	0.014	0.017	0.016	0.016	0.015	0.018	0.015
	[1.53]	[1.61]	[1.17]	[1.21]	[1.32]	[1.43]	[1.58]	[1.60]
Conglomerate affiliated	0.002	0.003	0.003	0.003	-0.001	-0.002	-0.002	-0.002
	[0.70]	[0.88]	[0.39]	[0.41]	[0.13]	[0.47]	[1.08]	[1.14]
Hyper-regulated period	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	[1.30]	[1.34]	[1.23]	[1.19]	[0.91]	[1.04]	[1.42]	[1.39]
Observations	463	463	463	463	463	463	463	463
R-square	0.24	0.24	0.24	0.24	0.24	0.24	0.25	0.24
Adj R-square	0.21	0.22	0.21	0.21	0.21	0.22	0.22	0.22
F-statistics	3.43	3.47	4.13	4.78	4.19	4.83	11.10	12.67

Table 7 presents the ordinary least squares (OLS) regressions of return on assets (ROA) on Focus Indices, ownership variables, conglomerate affiliation dummy (equal to 1 if the bank is affiliated with a conglomerate, 0 otherwise), the interaction terms between Focus Indices and ownership variables, between Focus Indices and conglomerate affiliation dummy, and control variables including risk proxies, size variables (including both ln(assets) and squared term of ln(assets)), and hyper-regulated period dummy (equal to 1 for period 1996-2001, 0 otherwise). Domestic private ownership and the less-regulated period are considered omitted variables in the regressions. The Focus Index in the first paired columns represents the loan Focus Index, and the same Focus Index is also used to construct the interaction terms between Focus Indices and other variables. The Focus Indices in the second, third, and four paired columns represent deposit Focus Index, asset Focus Index, geographic Focus Index. Absolute values of t statistics (based on White heteroskedastic-consistent standard errors) are presented in brackets. \*, \*\*, and \*\*\* represent significance level of 10%, 5%, and 1% respectively.

Table 8 OLS regressions of total expenses/total assets on Focus Indices and ownership

	Dependent Variable: Total Expenses/Total Assets							
	Loan		Deposit		Asset		Geographical	
	Diversification		Diversification		Diversification		Diversification	
Constant	-0.147*** [2.76]	-0.151*** [2.81]	-0.136** [2.49]	-0.137** [2.51]	-0.167*** [3.25]	-0.178*** [3.38]	-0.125** [2.48]	-0.130** [2.54]
Big Four	0.001 [0.05]	0.001 [0.05]	0.039*** [3.01]	0.043*** [3.38]	0.028** [2.29]	0.030** [2.41]	0.011 [0.27]	0.001 [0.03]
State ownership	0.027 [1.54]	0.028 [1.61]	-0.031** [2.09]	-0.035** [2.40]	0.006 [0.46]	0.006 [0.45]	-0.004 [1.10]	-0.005 [1.37]
Foreign ownership	0.027* [1.95]	0.029* [2.06]	0.001** [2.08]	0.003** [2.34]	0.023** [2.02]	0.025** [2.22]	0.002** [2.14]	0.005** [2.31]
Focus Index	-0.012 [0.59]	-0.014 [0.68]	-0.025 [1.50]	-0.029* [1.80]	0.039** [2.09]	0.043** [2.27]	-0.003 [0.48]	-0.002 [0.32]
Focus Index × Big Four	-0.014 [0.61]	-0.013 [0.56]	-0.073*** [2.75]	-0.079*** [3.14]	-0.054* [1.91]	-0.062** [2.13]	-0.001 [0.01]	-0.050 [0.30]
Focus Index × State ownership	-0.039 [1.02]	-0.042 [1.10]	0.087*** [2.86]	0.095*** [3.21]	-0.009 [0.32]	-0.009 [0.30]	-0.021*** [3.08]	-0.022*** [3.30]
Focus Index × Foreign ownership	0.052* [1.66]	0.056* [1.77]	0.017** [2.10]	0.025** [2.57]	0.039* [1.67]	0.044* [1.94]	0.005** [2.30]	0.003** [2.19]
Focus Index × Conglomerate affiliated	0.010* [1.72]	0.012* [1.85]	0.021* [1.84]	0.022** [2.02]	0.010* [1.61]	0.015* [1.92]	0.007** [2.32]	0.007** [2.23]
Loan loss provisions/assets	0.085 [1.43]		0.054 [0.95]		0.070 [1.21]		0.073 [1.26]	
Nonperforming loans/assets		0.002 [0.39]		0.009 [1.26]		0.007 [1.27]		0.001 [0.01]
ln(assets)	0.021*** [3.10]	0.021*** [3.13]	0.021*** [3.00]	0.022*** [3.07]	0.022*** [3.38]	0.023*** [3.46]	0.018*** [2.67]	0.018*** [2.75]
Squared ln(assets)	-0.001*** [3.18]	-0.001*** [3.19]	-0.001*** [3.04]	-0.001*** [3.10]	-0.001*** [3.46]	-0.001*** [3.52]	-0.001*** [2.68]	-0.001*** [2.74]
Equity/assets	0.006 [0.79]	0.009 [1.30]	-0.004 [0.48]	-0.002 [0.25]	-0.002 [0.24]	0.002 [0.20]	0.003 [0.43]	0.007 [0.87]
Conglomerate affiliated	-0.008 [1.13]	-0.008 [1.24]	-0.013** [2.23]	-0.013** [2.36]	0.001 [0.03]	0.002 [0.31]	0.005 [1.06]	0.004 [0.99]
Hyper-regulated period	0.011*** [7.61]	0.011*** [7.62]	0.012*** [8.53]	0.012*** [8.51]	0.012*** [8.59]	0.012*** [8.39]	0.011*** [7.81]	0.011*** [7.64]
Observations	463	463	463	463	463	463	463	463
R-square	0.27	0.26	0.29	0.29	0.29	0.29	0.28	0.28
Adj R-square	0.24	0.24	0.27	0.27	0.27	0.27	0.26	0.26
F-statistics	13.43	13.31	14.17	14.01	13.17	12.75	14.22	14.32

Table 8 presents the ordinary least squares (OLS) regressions of total expenses/total assets on Focus Indices, ownership variables, conglomerate affiliation dummy (equal to 1 if the bank is affiliated with a conglomerate, 0 otherwise), the interaction terms between Focus Indices and ownership variables, between Focus Indices and conglomerate affiliation dummy, and control variables including risk proxies, size variables (including both ln(assets) and squared term of ln(assets)), and hyper-regulated period dummy (equal to 1 for period 1996-2001, 0 otherwise). Domestic private ownership and the less-regulated period are considered omitted variables in the regressions. The Focus Index in the first paired columns represents the loan Focus Index, and the same Focus Index is also used to construct the interaction terms between Focus Indices and other variables. The Focus Indices in the second, third, and four paired columns represent deposit Focus Index, asset Focus Index, geographic Focus Index. Absolute values of t statistics (based on White heteroskedastic-consistent standard errors) are presented in brackets. \*, \*\*, and \*\*\* represent significance level of 10%, 5%, and 1% respectively.

Table 9 OLS regressions of Risk on Focus Indices and ownership

	Dependent Variable: Loan Loss Provisions/Assets				Dependent Variable: Nonperforming Loans/Assets			
	Loan Diversification	Deposit Diversification	Asset Diversification	Geography Diversification	Loan Diversification	Deposit Diversification	Asset Diversification	Geography Diversification
Constant	-0.064 [1.35]	-0.026 [0.54]	-0.062 [1.23]	-0.065 [1.27]	0.625* [1.89]	0.008 [0.03]	0.889** [2.57]	0.850** [2.48]
Big Four	0.007 [0.46]	0.035* [1.95]	0.017 [0.97]	0.160*** [3.34]	0.231** [2.24]	0.165 [1.39]	0.148 [1.31]	1.596*** [5.39]
State ownership	0.022 [1.34]	0.039** [2.00]	0.016 [1.03]	0.011 [1.64]	0.183** [2.58]	0.193*** [2.59]	0.146** [2.17]	0.024 [1.57]
Foreign ownership	0.019* [1.86]	0.007* [1.93]	0.011* [1.82]	0.032 [1.74]	0.051 [2.39]	0.410*** [7.66]	0.355** [2.57]	0.056 [2.61]
Focus Index	-0.033 [1.57]	-0.037* [1.76]	-0.012 [0.65]	-0.015* [1.90]	-0.258** [2.34]	-0.244** [2.49]	-0.531*** [4.67]	-0.032 [0.89]
Focus Index × Big Four	-0.009 [0.27]	-0.099*** [2.88]	-0.064* [1.82]	-0.679*** [3.18]	-0.284 [1.47]	-0.075 [0.31]	-0.494* [1.82]	-6.751*** [5.26]
Focus Index × State ownership	0.050 [1.26]	0.085** [2.20]	0.038 [1.07]	0.016** [2.00]	0.441*** [2.71]	0.396** [2.56]	0.388** [2.39]	-0.024 [0.88]
Focus Index × Foreign ownership	0.050 [1.60]	0.016 [0.78]	0.017 [0.66]	0.032 [0.75]	0.062 [0.20]	0.861*** [9.08]	0.920*** [3.11]	0.010 [0.10]
Focus Index × Conglomerate affiliated	0.025 [1.33]	0.022* [1.66]	0.060*** [4.16]	0.005 [0.92]	0.081 [0.77]	0.051 [0.56]	0.162 [1.62]	0.093*** [2.79]
ln(assets)	0.005 [0.80]	0.004 [0.64]	0.006 [0.92]	0.009 [1.28]	-0.050 [1.17]	0.032 [0.86]	-0.074* [1.71]	-0.089** [1.97]
Squared ln(assets)	0.001 [0.35]	0.001 [0.19]	0.001 [0.49]	0.001 [0.90]	0.001 [0.88]	-0.001 [1.14]	0.002 [1.51]	0.002* [1.71]
Equity/assets	0.042*** [4.34]	0.034*** [3.22]	0.050*** [5.23]	0.045*** [4.44]	-0.040 [0.85]	0.032 [0.65]	0.015 [0.28]	-0.096* [1.89]
Conglomerate affiliated	-0.010 [1.27]	-0.010 [1.49]	0.025*** [3.82]	-0.006 [1.16]	0.059 [1.30]	-0.003 [0.07]	-0.043 [1.05]	-0.040 [1.31]
Hyper-regulated period	0.001 [1.11]	0.001 [0.98]	0.000 [0.26]	0.001 [0.89]	0.026*** [2.81]	0.032*** [4.25]	0.024*** [2.95]	0.027*** [3.10]
Observations	463	463	463	463	463	463	463	463
R-square	0.21	0.22	0.25	0.22	0.24	0.41	0.31	0.28
Adj R-square	0.19	0.20	0.23	0.20	0.22	0.40	0.29	0.26
F-statistics	5.17	7.00	8.20	8.19	9.49	19.98	11.99	37.18

Table 9 presents the ordinary least squares (OLS) regressions of loan loss provisions/assets (the left four columns) and nonperforming loans/assets (the right four columns) on Focus Indices, ownership variables, conglomerate affiliation dummy (equal to 1 if the bank is affiliated with a conglomerate, 0 otherwise), the interaction terms between Focus Indices and ownership variables, between Focus Indices and conglomerate affiliation dummy, and control variables including equity ratio, size variables (including both ln(assets) and squared term of ln(assets)), and hyper-regulated period dummy (equal to 1 for period 1996-2001, 0 otherwise). Domestic private ownership and the less-regulated period are considered omitted variables in the regressions. The Focus Index in the first column represents the loan Focus Index, and the same Focus Index is used to construct the interaction terms between Focus Indices and other variables. The Focus Indices in the second, third, and fourth columns represent deposit Focus Index, asset Focus Index, geographic Focus Index. Absolute values of t statistics (based on White heteroskedastic-consistent standard errors) are presented in brackets. \*, \*\*, and \*\*\* represent significance level of 10%, 5%, and 1% respectively.

Table 10 Summary statistics of variables used in efficiency estimations

	Obs.	Mean	Median	Std. Dev.	Minimum	Maximum
<i>Profit (Cost) (in billion US\$)</i>						
Total profits	464	0.189	0.015	0.729	-0.080	5.784
Total costs	464	0.976	0.092	2.679	0.000	21.200
<i>Output Quantities (in billion US\$)</i>						
Total loans ( $y_1$ )	464	23.800	1.617	67.600	0.000	426.000
Total deposits ( $y_2$ )	464	39.300	2.562	114.000	0.000	791.000
Liquid assets ( $y_3$ )	464	5.323	0.347	16.100	0.012	112.000
Other earning assets ( $y_4$ )	464	16.900	1.356	50.700	0.005	444.000
<i>Input Prices</i>						
Price of funds ( $w_1$ )	464	0.027	0.020	0.016	0.003	0.067
Price of fixed capital ( $w_2$ )	464	0.943	0.760	0.592	0.174	2.500
Price of labor ( $w_3$ )	464	14.418	14.528	2.876	0.720	21.105
Total assets (in billion US\$)	464	44.000	3.332	125.000	0.033	880.000

Table 10 presents the summary statistics of basic variables used in the profit and cost efficiency estimations. In the translog based estimations of profit (cost) efficiency, output variables considered are total loans, total deposits, liquid assets, and other earning assets, and the input variables are:  $w_1$  (price of funds, proxied by the ratio of interest expenses to total deposits),  $w_2$  (price of fixed capital, proxied by the ratio of other operating expenses to fixed assets),  $w_3$  (price of labor, proxied by the ratio of personnel expenses to total number of employees). The outputs are normalized by total assets. All financial values are inflation-adjusted to the base year 1996.

Table 11 OLS regressions of profit efficiency on Focus Indices and ownership

	Dependent Variable: Profit Efficiency							
	Loan Diversification		Deposit Diversification		Asset Diversification		Geographical Diversification	
Constant	1.441 <sup>***</sup> [4.54]	1.476 <sup>***</sup> [4.79]	1.515 <sup>***</sup> [3.82]	1.510 <sup>***</sup> [3.79]	1.551 <sup>***</sup> [4.60]	1.612 <sup>***</sup> [4.99]	1.334 <sup>***</sup> [3.23]	1.372 <sup>***</sup> [3.41]
Big Four	-0.082 <sup>*</sup> [1.84]	-0.067 <sup>*</sup> [1.67]	-0.002 <sup>**</sup> [2.02]	-0.019 <sup>**</sup> [2.16]	-0.119 <sup>**</sup> [2.39]	-0.128 <sup>**</sup> [2.57]	-0.132 <sup>**</sup> [2.44]	-0.062 <sup>**</sup> [2.21]
State ownership	-0.067 [0.45]	-0.057 [0.36]	-0.019 [0.13]	-0.006 [0.04]	-0.217 <sup>***</sup> [2.78]	-0.199 <sup>**</sup> [2.55]	-0.017 [0.96]	-0.017 [0.96]
Foreign ownership	0.071 <sup>*</sup> [1.86]	0.076 <sup>*</sup> [1.89]	0.029 <sup>*</sup> [1.85]	0.013 <sup>**</sup> [2.35]	0.083 <sup>**</sup> [2.45]	0.047 <sup>*</sup> [1.78]	0.035 <sup>**</sup> [2.41]	0.039 <sup>**</sup> [2.50]
Focus Index	0.068 <sup>**</sup> [2.33]	0.054 <sup>**</sup> [2.25]	0.047 <sup>**</sup> [2.26]	0.076 <sup>**</sup> [2.42]	0.091 <sup>**</sup> [2.03]	0.047 <sup>**</sup> [2.48]	0.046 <sup>**</sup> [2.36]	0.044 <sup>**</sup> [2.27]
Focus Index × Big Four	0.193 [1.10]	0.173 [0.98]	0.023 [0.08]	0.002 [0.01]	0.306 <sup>*</sup> [1.82]	0.331 <sup>**</sup> [2.09]	0.660 [0.50]	0.365 [0.28]
Focus Index × State ownership	-0.144 [0.43]	-0.120 [0.34]	-0.020 [0.06]	-0.031 [0.09]	-0.491 <sup>***</sup> [3.15]	-0.444 <sup>***</sup> [2.84]	-0.017 [0.48]	-0.018 [0.45]
Focus Index × Foreign ownership	-0.105 <sup>**</sup> [2.55]	-0.106 <sup>**</sup> [2.54]	-0.001 <sup>**</sup> [2.01]	-0.086 <sup>**</sup> [2.12]	-0.128 <sup>**</sup> [2.20]	-0.040 <sup>**</sup> [2.33]	-0.005 <sup>**</sup> [2.06]	-0.007 <sup>**</sup> [2.08]
Focus Index × Conglomerate affiliated	-0.008 <sup>**</sup> [2.11]	-0.006 <sup>**</sup> [2.07]	-0.080 <sup>**</sup> [2.51]	-0.088 <sup>**</sup> [2.56]	-0.093 <sup>**</sup> [2.32]	-0.089 <sup>**</sup> [2.51]	-0.071 <sup>**</sup> [2.33]	-0.066 <sup>**</sup> [2.18]
Loan loss provisions/assets	-0.104 [0.27]		-0.141 [0.39]		-0.309 [0.73]		-0.057 [0.15]	
Nonperforming loans/assets		-0.066 <sup>**</sup> [2.25]		-0.099 <sup>***</sup> [3.19]		-0.090 <sup>***</sup> [3.04]		-0.050 <sup>*</sup> [1.80]
ln(assets)	-0.110 <sup>*</sup> [1.73]	-0.108 <sup>*</sup> [1.90]	-0.125 [1.26]	-0.117 [1.21]	-0.122 [1.46]	-0.105 [1.45]	-0.083 [1.05]	-0.085 [1.21]
Squared ln(assets)	-0.078 [1.64]	-0.081 <sup>*</sup> [1.72]	-0.081 <sup>*</sup> [1.88]	-0.077 <sup>*</sup> [1.78]	-0.094 <sup>**</sup> [2.05]	-0.099 <sup>**</sup> [2.21]	-0.066 [1.21]	-0.069 [1.31]
Equity/assets	0.002 [1.53]	0.002 [1.59]	0.002 <sup>*</sup> [1.77]	0.002 [1.64]	0.003 <sup>*</sup> [1.96]	0.003 <sup>**</sup> [2.10]	0.002 [1.10]	0.002 [1.19]
Conglomerate affiliated	0.008 [0.22]	0.010 [0.31]	0.031 [0.44]	0.033 [0.45]	0.031 [1.05]	0.027 [1.09]	0.066 <sup>**</sup> [2.29]	0.063 <sup>**</sup> [2.24]
Hyper-regulated period	0.001 [0.08]	0.002 [0.39]	-0.001 [0.19]	0.002 [0.37]	-0.001 [0.14]	0.001 [0.20]	0.001 [0.03]	0.002 [0.26]
Observations	463	463	463	463	463	463	463	463
R-square	0.08	0.09	0.08	0.10	0.11	0.13	0.09	0.10
Adj R-square	0.05	0.06	0.05	0.07	0.09	0.10	0.06	0.07
F-statistics	3.46	3.75	3.32	3.80	5.26	5.58	5.39	5.66

Table 11 presents the ordinary least squares (OLS) regressions of profit efficiency on Focus Indices, ownership variables, conglomerate affiliation dummy (equal to 1 if the bank is affiliated with a conglomerate, 0 otherwise), the interaction terms between Focus Indices and ownership variables, between Focus Indices and conglomerate affiliation dummy, and control variables including size (including both ln(assets) and squared term of ln(assets)), and hyper-regulated period dummy (equal to 1 for period 1996-2001, 0 otherwise). Domestic private ownership and the less-regulated period are considered omitted variables in the regressions. The Focus Index in the first paired columns represents the loan Focus Index, and the same Focus Index is also used to construct the interaction terms between Focus Indices and other variables. The Focus Indices in the second, third, and fourth paired columns represent deposit Focus Index, asset Focus Index, geographic Focus Index. Absolute values of t statistics (based on White heteroskedastic-consistent standard errors) are presented in brackets. \*, \*\*, and \*\*\* represent significance level of 10%, 5%, and 1% respectively.



Table 12 OLS regressions of cost efficiency on Focus Indices and ownership

	Dependent Variable: Cost Efficiency							
	Loan Diversification		Deposit Diversification		Asset Diversification		Geographical Diversification	
Constant	-0.766 [1.21]	-0.655 [0.99]	-0.692 [1.12]	-0.680 [1.10]	-0.598 [1.02]	-0.416 [0.68]	-0.521 [0.84]	-0.360 [0.55]
Big Four	-0.026** [2.22]	-0.056** [2.49]	-0.083*** [2.60]	-0.077** [2.56]	-0.130** [2.06]	-0.097* [1.80]	0.683** [2.02]	1.005*** [2.93]
State ownership	-0.081** [2.43]	-0.046** [2.25]	-0.022** [2.12]	-0.030** [2.16]	-0.263* [1.75]	-0.280* [1.93]	-0.050 [1.56]	-0.041 [1.23]
Foreign ownership	-0.040** [2.21]	-0.047** [2.25]	-0.004** [2.04]	-0.051** [2.40]	-0.091* [1.67]	-0.146** [2.04]	0.168 [1.32]	0.159 [1.36]
Focus Index	0.263** [2.10]	0.212* [1.90]	0.041** [2.20]	0.057** [2.27]	0.287 [1.53]	0.383** [2.10]	0.086* [1.67]	0.089* [1.67]
Focus Index × Big Four	-0.031 [0.13]	-0.056 [0.23]	0.245 [0.86]	0.283 [1.00]	-0.277 [1.03]	-0.161 [0.62]	-2.804* [1.87]	-4.169*** [2.70]
Focus Index × State ownership	-0.222 [0.49]	-0.140 [0.32]	0.011 [0.03]	0.026 [0.07]	0.621* [1.70]	0.668* [1.88]	0.060 [1.07]	0.048 [0.82]
Focus Index × Foreign ownership	-0.204** [2.46]	-0.244** [2.55]	-0.057** [2.30]	-0.172* [1.78]	-0.325** [2.10]	-0.472 [1.53]	-0.120* [1.87]	-0.101* [1.79]
Focus Index × Conglomerate affiliated	-0.084** [2.54]	-0.058** [2.37]	-0.108 [1.64]	-0.112* [1.66]	-0.148* [1.84]	-0.206 [1.23]	-0.049** [2.11]	-0.038* [1.84]
Loan loss provisions/assets	-0.680 [0.81]		-0.498 [0.60]		-0.506 [0.59]		-0.550 [0.65]	
Nonperforming loans/assets		-0.109 [1.20]		-0.143 [1.17]		-0.169* [1.66]		-0.147 [1.46]
ln(assets)	0.178* [1.96]	0.145 [1.56]	0.231* [1.86]	0.219* [1.74]	0.143 [1.29]	0.120 [1.09]	0.135 [1.38]	0.096 [0.95]
Squared ln(assets)	0.145* [1.75]	0.136 [1.60]	0.154* [1.93]	0.156** [1.97]	0.152** [1.99]	0.136* [1.72]	0.113 [1.37]	0.094 [1.10]
Equity/assets	-0.004* [1.66]	-0.004 [1.57]	-0.005* [1.87]	-0.005* [1.96]	-0.005* [1.91]	-0.004* [1.69]	-0.003 [1.25]	-0.003 [1.03]
Conglomerate affiliated	0.039 [0.57]	0.026 [0.37]	0.054 [0.69]	0.059 [0.75]	0.060 [0.85]	0.080 [1.19]	0.066* [1.88]	0.063* [1.78]
Hyper-regulated period	0.001 [0.09]	0.003 [0.21]	-0.006 [0.43]	-0.002 [0.12]	-0.001 [0.09]	0.003 [0.17]	-0.005 [0.39]	-0.002 [0.14]
Observations	463	463	463	463	463	463	463	463
R-square	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.05
Adj R-square	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.02
F-statistics	2.39	2.19	1.66	1.74	2.13	2.15	3.32	3.51

Table 12 presents the ordinary least squares (OLS) regressions of cost efficiency on Focus Indices, ownership variables, conglomerate affiliation dummy (equal to 1 if the bank is affiliated with a conglomerate, 0 otherwise), the interaction terms between Focus Indices and ownership variables, between Focus Indices and conglomerate affiliation dummy, and control variables including size (including both ln(assets) and squared term of ln(assets)), and hyper-regulated period dummy (equal to 1 for period 1996-2001, 0 otherwise). Majority Domestic private ownership and the less-regulated period are considered omitted variables in the regressions. The Focus Index in the first paired columns represents the loan Focus Index, and the same Focus Index is also used to construct the interaction terms between Focus Indices and other variables. The Focus Indices in the second, third, and fourth paired columns represent deposit Focus Index, asset Focus Index, geographic Focus Index. Absolute values of t statistics (based on White heteroskedastic-consistent standard errors) are presented in brackets. \*, \*\*, and \*\*\* represent significance level of 10%, 5%, and 1% respectively.

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