Regulatory Reform and Convergence in Banking:
The Case of China

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Abstract

We examine the effect of regulatory reform on the asset allocation and capitalization of Chinese banks, 2002 to 2007, a period following China's entry into the World Trade Organization (WTO). Our empirical evidence rejects the hypothesis that banks in the Big Four, majority state, majority private, and majority foreign categories have common targeted levels of loans and capital in relation to assets. With respect to rates of adjustment towards those targets, our evidence is mixed. Domestic banks exhibit convergence in behavior toward each other but remain distinct from majority foreign banks. Overall, our findings provide evidence that, while the structure of Chinese banking remained segmented after the WTO, a more uniform pattern of behavior has emerged for those Chinese banks that are domestically owned.

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1. Introduction

In 2009, China's economic output exceeded that of Japan to become the second largest economy in the world. This economic expansion has been accompanied by rapid development of the Chinese banking industry in its evolution from a socialist system more than fifty years ago. Reforms enacted in the late 1970s, for instance, divested the lending functions of the central bank (the People's Bank of China) into four principal state-owned banks. Under the Commercial Bank Law of China (CBLC), enacted in 1995, the banks were reorganized on market principles and joined in competition with other new entrants to the banking market. Further liberalization after China's admission to the World Trade Organization (WTO) in December 2001 reduced restrictions on acquisitions and, over the succeeding five years, permitted greater freedom of operational and geographical scope.

Accompanying these legislative and regulatory changes are some questions that have been piquing the interest of academicians and practitioners alike. What are the likely outcomes in the banking industry of deregulation? Does more intense competition push the market towards more homogenous banking products? Does market segmentation persist?

Recent studies on the effect of regulatory reform on Chinese banking include Berger et al. (2009a, 2009b, 2010), Fu and Heffernan (2009), Lin and Zhang (2009), Garcia-Herrero et al. (2009) and Jiang et al. (2009).[1] All the studies undertake tests to determine how and why various types of banks may have responded to regulatory reform over time in terms of banking efficiency, costs, and profits—i.e., they focus primarily on the "performance" part of the widely disseminated "structure/conduct/performance" paradigm in industrial economics. In contrast to these studies, we focus on bank structure. We consider, specifically, the impact of reform on changes in bank capitalization and asset allocation rather than on changes in performance.

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[1] Earlier studies are by Shen and Lu (2008), Wen (2008), Shih et al. (2006) and Li et al. (2001).

Using a methodology that has been previously applied to the analysis of European banks by Dahl et al. (2008), we determine whether asset allocation and capitalization have converged across various categories of Chinese banks. Our sample period, 2002 to 2007, corresponds to the period in which reforms associated with entry into the WTO were implemented. The reforms relied on a presumed capacity for heightened competitive pressure to encourage restructuring at inefficient banks.

Our empirical evidence rejects the hypothesis that banks in various groups converged to common targeted levels of loans and capital in relation to assets, under the regulatory reforms. More specifically, we find that banks which are majority owned by the state have relatively higher targeted levels for lending and lower targeted levels for capitalization than other banks. This finding is inconsistent with the notion that WTO reforms intended to "level the playing field" have created homogeneous activities across Chinese banks. It underscores the formidability of embedded obstacles to restructuring that may arise, for instance, from political protection or other governmental interference (Fu and Heffernan, 2009).

Evidence is mixed concerning the rates of convergence toward targeted levels of lending and capital. Our results reject the hypothesis that different categories of banks, including those which are majority foreign owned, adjust equally toward similar targets. However, further analysis on a subsample that excludes majority foreign banks indicates that the same hypothesis cannot be rejected across domestic banks. This evidence suggests that the erosion of barriers to competition in Chinese banking may have been partially successful in imposing a more uniform pattern of behavior, at least among domestic banks. To the extent that common efficiencies are thereby created across bank groups, this may lead to improved financial intermediation and greater economic development.

The remainder of our paper is organized as follows. Section 2 discusses related literature and summarizes relevant regulatory development in Chinese banking within the context of our study. Section 3 describes the sample; and, Section 4 outlines the empirical methodology. Section 5 presents results of our empirical tests; and, Section 6 concludes.

2. Related literature and Chinese banking background

The structure/conduct/performance paradigm is used to link elements of structure—product differentiation, market segmentation, costs—to business conduct and performance in industrial economics. It extends from descriptions of competition in markets as either *Classical* or *Schumpeterian*. Classical competition is characterized by firms competing in the same products on the basis of efficiency. Under Schumpeterian competition, firms attempt to create a temporary monopoly through creation of a unique variety of products or processes. Saviotii and Pyka (2008) identify an optimal mix of both types of competition (i.e., Classical and Schumpterian) within a market to maximize economic growth and development. Markets in which participants depend too much on either Classical or Schumpeterian competition as a strategy are inferior. Inasmuch as Chinese banks, under regulatory reform, may be moving away from a near-corner solution (Schumpeterian system) to a mixed solution (Schumpeterian and Classical competition), convergence may be effective.

The key to the variety of outcomes that we may obtain rests in the extent to which the set of competitive strengths faced by banks persist after financial integration. As a result of financial reform in China, banks may have overcome historical comparative disadvantages by innovations in production technology, by incentives created by changes in ownership and by greater harmonization of institutions and systems. More competitive markets could cause the distribution of production to gravitate toward more efficient producers, contributing to greater uniformity. For example, Fu and Heffernan (2009) contend that improved competition creates common efficiencies across bank groups.

However, if market integration does not effectively eliminate differences in opportunities, technologies, or constraints, it may have little impact on managerial choice, or it may even exacerbate the magnitude of existing differences. After an earlier phase of financial reform, for instance, differentiated products persisted at larger Chinese banks, with no dramatic changes in market structure (Fu and Heffernan, 2009). This entrenchment is consistent with previous literature on economic concentration, as concentration has been linked to decreased classical competition (Cerasi et al., 2009). Mitton (2008) argues that the degree of economic concentration (decreased classical competition) negatively impacts a

country's economic growth prospects, slowing technology adoption, creating underdevelopment traps, reducing innovation, and increasing economic volatility (see, e.g., Parente and Prescott, 1999; Gali and Zilibotti, 1995; Aghion et al., 2001; and Gabaix, 2005).

Under the framework that increased classical competition forces banks to become more efficient, Levine and Zervos (1998) argue that more efficient banking markets lead to accelerated long-run economic growth (see also Rajan and Zingales, 1998). Neuberger (1997) argues that a model of retail banking competition should allow for non-perfectly elastic product differentiation because the quality of similar products is important to consumers. Thus, as Chinese banks move toward offering similar products, consumer demand for quality will impose the market discipline of efficiency (both pricing and quality) in greater measure upon Chinese banks.

The Chinese banks comprise a unique system, which was established in the late 1940s, following the system in the former Soviet Union. Before 1978, the Chinese system followed a mono-bank model in the sense that PBOC assumed the roles of both central and commercial banking. Other banks were either taken over or restructured into the PBOC system. The banking system expanded by establishing several large state-owned commercial banks (i.e., the Big Four), which assumed the designated lending functions from the PBOC. In 1985, the Big Four were allowed to compete in all sectors. Nonetheless, competition among them was very limited until the mid-1990s because they served mainly as policy-lending conduits for the government, and lacked incentives to compete. In 1995, two major legislative reforms were passed. The Central Bank Law of China went into effect to establish PBOC as the central bank and substantially reduced the influence of local governments on credit allocation decisions. In addition, the Commercial Bank Law of China of 1995, officially termed the major objective of state-owned banks, allowed them to operate as commercial banks according to market principles instead of policy lending. At the same time, *de novo* banks were allowed to enter the market in the mid-1990s.

China became a member of WTO in December 2001. Since then, a new set of regulations, as well as revisions of existing rules, was established in line with the WTO agreement. From a global perspective, the World Trade Organization's (WTO) General Agreement on Trade in Services (GATS) is the first and only multilateral trade agreement liberalizing international commerce in services. In 1997, WTO members

negotiated a permanent agreement on financial services, and as of July 2007, 151 economies were covered by this new element of the international financial framework (see Barth et al., 2009). In terms of financial services, GATS aims at encouraging greater openness among WTO member countries to the provisions of financial services from foreign entities.

Empirical evidence on the effects of reform on Chinese bank performance is mixed. Majority state banks have been found to be less efficient, less profitable, or less risky than majority private banks in some studies (Herrero-Garcia et al., 2009; Jiang et al., 2009; Lin and Zhang, 2009; Berger et al., 2009a, 2009b, 2010; and Jia, 2009), but more efficient, more profitable, or safer in other studies (Jiang et al., 2009; and Berger et al. 2009b). Foreign banks and private banks have been found to be less efficient (Jiang et al., 2009) as well as more efficient (Lin and Zhang, 2009; Berger et al., 2009a, 2009b). Berger et al. (2009a), in an analysis covering 1994 to 2003, find that Chinese banks have improved their efficiency along with the regulatory reforms that encourage reductions in state ownership and increases in foreign ownership. Lin and Zhang (2009) find that changes in the Chinese banks' efficiency from 1997 to 2004 were rather attributable to a pre-acquisition "selection effect" rather than the "post-ownership change in performance improvement." Fu and Heffernan (2009) examines the effect of regulation reforms on the performance of Chinese banks and find that bank efficiency declined from the years 1985 to 1992 but was later reversed during the period of 1993 to 2002. Similarly, Jia (2009) finds that reforms caused some banks to "behave more prudently" over the period from 1985 to 2004. Jiang et al. (2009) find that foreign acquisitions during the period from 1995 to 2005 may have positive long-run effects on bank efficiency, while other changes in ownership had only short-run effects.

3. Sample

We use annual financial information for Chinese banks, 2001 to 2007, from Bankscope. For all banks, we calculate the ratios of total net loans to total assets and total equity capital to total assets. These ratios are critical components of the structure/conduct/performance paradigm and represent important aspects of Chinese bank behavior. The ratio of loans to assets, as evidence of asset allocation, is important

because of the traditional differences in lending activities across different types of Chinese banks—differences that financial reform, at least in part, were intended to diminish. The ratio of equity to assets is important because of the prominence of bank capital structure in financial reforms following the WTO.

Our division of banks into groups follows earlier research, particularly Berger et al. (2009a), which focuses on ownership characteristics. Privatization, in particular, was an important element of regulatory reform that was expected to change banks' corporate governance and harden their budget constraints (Jiang et al., 2009).

Our first category consists of the *Big Four* banks, which operate nationally, and provide retail and wholesale banking services.[2] Collectively, they control more than 70 percent of the loan market in China (Shih et al., 2006). For these banks, the Central Committee of the Communist Party of China nominates governors (Jia, 2009). State ownership is predominant, although recently all four banks have issued, or announced the intention to issue, minority shares to the public. Such offerings may increase liquidity, improve the accuracy of financial records, and add to market discipline.

Majority state banks refer to the banks which are majority owned by the state (except for the Big Four), where state ownership includes central and local government ownership, as well as ownership by state-owned enterprises (SOEs). Therefore, the majority state banks feature more diffuse ownership, operate mainly in medium and large-sized cities, and offer retail and wholesale banking services. Besides the state ownership, the majority state banks can have shares that are owned by private domestic and foreign investors. State banks were established to facilitate the development of an efficient banking system and are less likely to be involved with the implementation of state policy (Fu and Heffernan, 2009). Governors are nominated by the banks' boards of directors (Jia, 2009).[3]

Majority private banks are defined as those banks which are majority owned by domestic private institutions and/or individuals. The majority private banks tend to be smaller and are owned by local

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[2] These are the Industrial and Commercial Bank of China, the Agricultural Bank of China, the China Construction Bank and the Bank of China.

[3] They are China Bohai Bank, China CITIC Bank, Shenzhen Rural Commercial Bank, China Minsheng Banking Corporation, Shanghai Pudong Development Bank, China Merchants Bank, Huishang Bank, Chna Zheshang Bank, Industrial Bank, Xinxiang City Commercial Bank, Laishang Bank, Qishang Bank, Bank of Rizho, Shanghai Rural Commercial Bank, Bank of Wenzhou, Bank of Shanghai, Bank of Ningbo, Bank of Nanjing, Wuxi City Commercial Bank, Dongquan City Commercial Bank, Yantai Bank and Bank of Communications.

government, local enterprises, and households. In contrast to majority state banks, the state holds minority shares in majority private banks (Lin and Zhang, 2009). Created through consolidation of former urban credit cooperatives, they offer services to smaller enterprises and individuals and, increasingly, larger customers.

Majority foreign banks are majority owned by foreign investors. Foreign banks were to have open access to Chinese markets by 2006, although this goal was later deferred (Berger et al., 2009a). Driven by the need for capital and the urgency for importing advanced management and technology, foreign investors have been encouraged to acquire equity stakes in domestic banks (Jiang et al., 2009).[4]

Our final sample has 364 bank observations. Table 1 presents data by bank type. Substantial variation by bank group is evident. Majority state banks have the high loan ratios, perhaps reflecting the traditional status of these banks as lenders driven by societal objectives rather than profit maximization; Shen and Lu (2008) also found that state-owned banks have high lending ratios. The Big Four banks have loan-to-asset ratios which are higher than majority private banks, but lower than majority state banks, which is consistent with Jia (2009), which finds that lending ratios at the Big Four banks approximated those of other banks beginning in the early 2000s. Differences across type were found to be statistically significant at the five percent level for majority foreign banks with respect to majority private banks and for majority private banks vis-à-vis majority state banks.

Majority foreign banks have, by far, the greatest capitalization. The Big Four banks have lower levels of capitalization, which is consistent with Li et al. (2001) and Shen and Lu (2008). Differences across type were found to be statistically significant at the five percent level in comparisons of majority foreign banks with, respectively, Big Four banks, majority state banks, and majority private banks.

Important trends over time in all banks are illustrated in Table 2. The equity-to-asset ratios of the banks fell from ten percent in 2002 to less than seven percent in 2007, perhaps reflecting the impact of problem loans during this period. In this regard, non-performing loans at state-owned banks were estimated to represent 25 percent of all loans in 2002 (Fu and Heffernan, 2009).

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[4]   These are Bank of East Asia, United Overseas Bank, Shinhan Bank, Dah Sing Bank, Evergrowing Bank, BNP Paribas, Bank International Ningbo, First Sino Bank, Qingdao International Bank and Allied Commercial Bank.

4. The model

"Convergence" has been studied previously in the context of developed countries, particularly in Europe (see, e.g., Adam et al. (2002), Berger and Smith (2003), Baele et al. (2004), Casu and Girardone (2005)). Less attention has been paid to developing countries or countries in other parts of the world. Our purpose is to examine bank structure in China as a laboratory within which we can isolate the impact of regulatory reform on convergence in developing countries outside Europe.

One possible method of analyzing convergence would be to simply observe the portfolios of different types of Chinese banks at different points in time. But such comparisons are problematic if banks adapt over time to potential changes in the institutional and competitive setting. In these situations observed outcomes will vary as long as the adaptation process is incomplete.

As an alternative, we begin by letting X_{it} represent a financial ratio for bank i in period t. We refer to X as an *activity*. Suppose that changes in activities at each bank follow a partial adjustment framework. Further assume that banks in all four categories have a common target ratio, $X_n{*}$. We model the adjustment process for bank i in type n with type-specific rate-of-adjustment parameter ρ_n:

$$X_{it} = X_{i,t-1} + \sum_{n=1}^{4} \rho_n [(X_n^* \cdot TYPE_{in}) - (X_{i,t-1} \cdot TYPE_{in})] + \varepsilon_{it}, \tag{1}$$

where $TYPE_{in}$ is a binary variable equal to unity if bank i is in type n and zero otherwise. ρ_n is expected to be positive. The types are Big Four, majority state, majority private and foreign.

Rearranging the terms in equation (1) yields:

$$X_{it} - X_{i,t-1} = \sum_{n=1}^{4} \rho_n (X_n^* \cdot TYPE_{in}) - \sum_{n=1}^{4} \rho_n (X_{i,t-1} \cdot TYPE_{in}) + \varepsilon_{it}. \tag{2}$$

The first term on the right-hand side in the model is unique for all banks within a given type, since ρ_n and $X_n{*}$ are type-specific.

We define *activity-level convergence* for category X as a common target ratio and rate of adjustment. This notion of convergence is adopted because it provides a convenient benchmark for

describing differences by type in activity adjustments. Under activity-level convergence, common targets would imply evolution to relatively homogeneous activities among banks. It is also of interest to note whether rates of convergence (ρ_n) differ across the four different types of banks. This motivates two hypotheses:

Common target hypothesis: $X_1^*=X_2^*=X_3^*=X_4^*$

Common adjustment rate hypothesis: $\rho_1=\rho_2=\rho_3=\rho_4$.

Let X^{**} be the grand mean ratio for a given activity over all banks, types, and years. We use X^{**} as a benchmark for comparison and discussion of individual type target ratios. Specifically, we will determine whether each bank type target ratio is equal to the grand mean of the ratio over the sample period. Dividing both sides of (2) by X^{**} gives:

$$\left[\frac{X_{it}}{X^{**}}\right]-\left[\frac{X_{i,t-1}}{X^{**}}\right]=\sum_{n=1}^{4}\rho_n(\frac{X_n^*}{X^{**}}\cdot TYPE_{in})-\sum_{n=1}^{4}\rho_n(\frac{X_{i,t-1}}{X^{**}}X_{i,t-1}\cdot TYPE_{in})+\varepsilon_{it}. \quad (3)$$

Writing (3) in difference form, with $\widehat{X}_{it}=\frac{X_{it}}{X^{**}}$ and $\widehat{X}_n^*=\frac{X_n^*}{X^{**}}$, yields:

$$\Delta\widehat{X}_{i,t}=\sum_{n=1}^{4}\rho_n(\widehat{X}_n^*\cdot TYPE_{in})-\sum_{n=1}^{4}\rho_n(\widehat{X}_{i,t-1}\cdot TYPE_{in})+\varepsilon_{it}$$

$$(4)$$

$$=\sum_{n=1}^{4}\alpha_n TYPE_{in}-\sum_{n=1}^{4}\rho_n(\widehat{X}_{i,t-1}\cdot TYPE_{in})+\varepsilon_{it}$$

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Note that without normalization, the common target hypothesis, as expressed in $X_1^*=X_2^*=X_3^*=X_4^*$, involves nonlinear combinations of regression coefficients.[5] We therefore use a somewhat less formal, but more tractable, approach to testing that hypothesis. As a result of normalizing by X^{**}, the intercept term for a given bank type, $\alpha_n=\rho_n\widehat{X}_n^*$, will be greater than (less than) the magnitude of the slope coefficient for that type, ρ_n, only if $\widehat{X}_n^*$ is greater than (less than) unity, that is to say, only if the target ratio for type n exceeds the grand mean of the ratio. Thus, estimation of equation (4) provides a natural

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[5] Since the estimate of $\widehat{X}_n^*=\alpha_n/\rho_n$ involves non-linear coefficients standard errors cannot be calculated exactly.

benchmark for testing the hypothesis that the target ratio for a bank type is greater or less than the benchmark ratio by testing whether $\alpha_n = \rho_n$. We estimate $\hat{X}_n^*$ as the quotient of the intercept and slope coefficients—i.e., the ratio of the estimate of the bank-type intercept to the negative of the bank-type slope coefficient.

Tabulation of the results for the test of equal magnitudes of slope and intercept coefficients across the four types will be interpreted to indicate support or rejection of the common target hypothesis. The common adjustment rate hypothesis depends on equal slope coefficients across the four bank types, i.e., that $\rho_1=\rho_2=\rho_3=\rho_4$, i.e., linear in the regression coefficients. This hypothesis will be tested by a single F-test.

We estimate two versions of equation (4) for the ratio of loans to assets and the ratio of equity capital to assets (i.e., the X values). We use seemingly unrelated regression as our estimation technique.[6] This method was selected because of the expected high correlation of cross-equation errors. It accounts for the likelihood that a shock that causes a particular bank to change its emphasis on one activity will likely be accompanied by a change in emphasis in another.[7] We also include an equation for the ratio of net income to total assets as a control because previous research has identified relationships between capital and profitability in Chinese banks (e.g., Garcia-Herrero, 2009). Results for this equation are unreported to conserve space, but available upon request.

Descriptive statistics for levels and changes in levels of the normalized variables ($\hat{X}_{it}$, $\Delta\hat{X}_{it}$) are presented in Table 3. The lagged ratios are normalized by dividing by the grand mean ratios for all banks, and changes reflect the gross change from period to period in the normalized ratios. Since, by construction, the means of the normalized ratios approach unity, and mean changes approach zero, the ranges and standard deviations are useful indexes of cross-section and time-series variation in the ratios relative to the grand means.

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[6] We weight by the log of assets to control for bank size.
[7] Shih et al. (2006) found that regional economic conditions influence bank performance. To incorporate such effects, we tested alternate models that included variables for gross domestic product, government investment, real estate prices and other factors within the province in which a bank is headquartered. The coefficients on these variables were seldom significant and often signed oppositely of what would be reasonably expected. They did not alter the interpretation of the other coefficients.

5. Regression results

Table 4 presents our results in separate panels for each variable. Evidence of uniformity in managerial choice is provided if the common target hypothesis cannot be rejected, i.e., if the tabulation of the four tests of the hypotheses of equal slope and intercept coefficients for each bank type indicates that all countries have similar targets. The results of F-tests of the differences between the magnitude of bank type intercept and the bank type slope coefficients are reported under the column headed α_n / ρ_n in the tables. Evidence of uniformity in the rate of convergence to targets is reflected in the F-test for equal bank type slopes in each equation. The F-test for each equation is presented at the foot of the respective panels of the table.

By way of overview of the performance of the partial adjustment model, in which the slope coefficient ($-\rho$) is interpreted as the negative of the rate of adjustment to the target ratio, we note that seven out of eight estimates are negative and significant at the five percent level, which suggests that banks are adjusting their activities toward individual normalized targets (which, under the alternative hypothesis, is not necessarily a common standard shared by all bank types). The overall test of equivalence of the slope coefficients across all bank types is rejected for both variables, which indicates that the domestic and majority foreign banks are not converging in their adjustments toward targets for lending or capitalization, inconsistent with the notion that the WTO-regulations leveled the playing field.

The quotient of the intercepts and slope coefficients on the loan-to-asset ratio are significantly different from unity at the 5 percent level in two out of four cases (Panel A). Thus, we reject the hypothesis that the four types of banks have equal lending target ratios. Majority foreign banks and majority private banks have higher targeted lending.[8] Our identified persistence of differences in targeted asset allocation and capitalization may reflect the existence of barriers to competition. Garcia-Herrero et al. (2009) attribute persistent differences by bank group (in profitability) to government intervention. They cite annual targets for asset quality and capitalization that are given to banks, suggesting that they cannot really change their

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[8] The quotients of intercepts and slopes are sometimes above unity and sometimes below unity in Table 4. But this will not necessarily always be the case since there is no mathematical connection between X** (data values) and X* (estimated parameters) that constrains the latter to average out to X**. This means that the quotients are not required to average to 1.

business models, even if opportunities arise. The results herein similarly underscore a categorical identity for bank lending markets in China.

The results on tests of the quotients for the equity-to-asset ratio reveal heterogeneity in target levels for all categories of banks (Panel B). The estimated target ratios are lowest for majority state banks and highest for majority foreign banks. These differences may be associated with observed deficiencies in managerial performance at majority state banks and proficiencies at foreign banks (Garcia-Herrero et al., 2009). They may also be related to the continuing problem of non-performing loans in state banks. In this regard, the CBOC initiated a program, partway through our sample period, that was considered necessary to increase capital for state banks (Berger et al., 2009).

As tests for robustness, we perform supplementary analyses. In Table 5, we present results using a subsample of 328 observations that excludes majority foreign banks. The Table 5 results constitute a test of convergence across domestic banks only. This information may be important if incomplete convergence across all four categories of banks is attributable solely to majority foreign banks, which, as noted earlier, have experienced delays in their integration into the Chinese system.

Compared to the results reported in Table 4, there is little difference in interpretation with respect to targeted levels of loans to assets and equity to assets. Evidence of convergence, once again, is lacking. Majority state banks continue to have higher lending targets and lower capital targets. Big Four banks have lower capital targets.

But note an important difference in interpretation of the rate of convergence to targets. Now, the hypothesis of equality cannot be rejected. The greater uniformity in bank movement toward targets provides evidence that domestic banks, in comparison to majority foreign banks, have been affected more by the competitive pressures of reform. The changing nature of bank movement towards a targeted structure a common is is consistent with the findings of other studies that, in some cases at least, changes in performance have followed regulatory reform. Fu and Heffernan (2009), for instance, find that reform improved the efficiency of state banks.

Another test includes an additional equation for the ratio of non-performing loans to assets (recall that results in Table 4 and 5 also had an unreported equation for the income-to-asset ratio). Use of non-

performing loans seems to represent a useful control but is problematic for two reasons. First, the data are notoriously unreliable (Jia, 2009). Second, many banks do not report the data on Bankscope; in fact, our subsample using an equation for non-performing loans drops the observations considerably. In any event, the main results, reported in Tables 6 and 7, are generally consistent with Table 4.

6. Conclusions

We test whether asset allocation and capitalization of Chinese banks have converged across different categories (namely, the Big Four, majority state, majority private, and majority foreign banks) over a recent sample period, 2002 to 2007, when various financial reforms associated with China's entry into the WTO were implemented. These post-2001 reforms were intended, at least partially, to expand the variety of the banking products and service, and to create a more dynamic (and healthy) banking environment by encouraging more intense competition among the domestic banks as well as with foreign banks.

Our evidence rejects a hypothesis that the different categories of banks have a common structure. Differences in targeted levels of loans and equity are evident, particularly for majority state banks, which have relatively higher targeted levels for lending and lower targeted levels for capitalization. The erosion of barriers to competition in China over implementation of the WTO has not imposed a uniform mix of activities on the four types of Chinese banks. The incomplete integration of bank structure that we find for China shows that developing countries share common tendencies in bank convergence as found in studies based on developed countries (see, e.g., Delgado et al., 2007; Dahl et al., 2008; Ianotta et al., 2006; Shrieves et al., 2010).

In terms of how banks adjust to their targets, however, a somewhat different story emerges. Convergence toward targets is not observed when domestic banks and majority foreign banks are included in the same sample. But when majority foreign banks are excluded, the remaining domestic banks are shown to share a more common pattern of behavior. This finding raises the possibility that financial reform is making at least some inroad into changing the structure of domestic banks in China. Inasmuch as

Chinese banks are moving away from a pure Schumpeterian system to a mixed Schumpeterian and classical system, our empirical results suggest a positive step for the Chinese economy (see also the discussions of Saviotii and Pyka (2008)).

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Table 1 – Mean Bank Ratios, by Bank Type

	Loans/Assets	Equity/Assets	Observations
Big Four	0.535	0.029	24
Majority state	0.554	0.044	92
Majority private	0.526	0.061	212
Majority foreign	0.575	0.304	36

Notes: Ratios are for 364 observations on banks, 2002 to 2007. Big Four banks include Bank of China, China Construction Bank, Industrial and Commercial Bank of China, and Agricultural Bank of China. The majority state banks are defined as those that are majority owned by the state, where state refers to the central and local government as well as state-owned enterprises. The majority private banks include those that are majority owned by domestic private institutions and individuals. Majority foreign banks refer to those majority owned by foreign investors.

Table 2 – Mean Bank Ratios, by Year

Year	Loans/Assets	Equity /Assets	Observations
2002	0.511	0.104	36
2003	0.529	0.094	46
2004	0.557	0.075	51
2005	0.542	0.077	75
2006	0.554	0.074	75
2007	0.530	0.069	93

Notes: Ratios are for 364 observations on banks, 2002-2007, across four categories of banks. The definitions of the various bank categories are the same as in Table 1.

Table 3 – Descriptive Statistics

	Mean	Std Dev	Min	Max
Lagged Loan/Asset	1.000	0.206	0.168	1.626
Lagged Equity/Asset	1.000	1.606	-1.467	10.903
Change in Loan/Asset	-0.000	0.135	-0.603	0.689
Change in Equity/Asset	-0.009	0.574	-4.147	2.675

Notes: Ratios are for 364 observations on banks, 2002-2007, across four categories of banks. The definitions of the various bank categories are the same as in Table 1.

Table 4 – Seemingly Unrelated Regressions

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Panel A: Loans / Assets

	Intercept α	slope $-\rho$	F-statistic α_n/ρ_n	α_n/ρ_n
Big Four	.147 (0.93)	-.172 (-1.12)	0.85	1.67
Majority state	.650* (5.09)	-.598* (-5.09)	1.08*	10.80
Majority private	.224* (5.57)	-.235* (-5.78)	0.95	2.01
Majority foreign	.213* (2.82)	-.166* (-2.46)	1.28*	3.97

F-Value for common adjustment rate hypothesis ($\rho_1=\rho_2=\rho_3=\rho_4$): 3.56, PR> F, .01

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Panel B: Equity/Assets

	Intercept α	slope $-\rho$	F-statistic α_n/ρ_n	α_n/ρ_n
Big Four	.098 (1.15)	-.379* (-3.27)	0.26*	8.57
Majority state	.251* (3.93)	-.592* (5.88)	0.42*	22.01
Majority private	.307* (7.38)	-.464* (-9.06)	.65*	20.25
Majority foreign	.420* (2.49)	-.133* (-3.81)	4.21*	4.02

F-Value for common adjustment rate hypothesis ($\rho_1=\rho_2=\rho_3=\rho_4$): 13.56, PR> F, .01

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Notes: The sample consists of 364 observations on banks, 2002-2007. The model includes an equation (not shown) to control for bank profitability. The definitions of the various bank categories are the same as in Table 1. t-statistics are in parenthesis. A negative slope coefficient, coupled with a ratio (α / ρ) in excess of unity, is consistent with a conclusion that the target ratio for a bank type is above the overall mean for the four types in the sample. The system weighted R-square is 29%. Asterisks indicate statistical significance at the 5% level.

Table 5 – Seemingly Unrelated Regressions

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Panel A: Loans / Assets

	Intercept α	slope $-\rho$	F-statistic α_n / ρ_n	α_n / ρ_n
Big Four	.167 (1.08)	-.188 (-1.26)	0.88	1.32
Majority state	.556* (4.24)	-.505* (-4.22)	1.10*	9.66
Majority private	.229* (4.24)	-.237* (-5.97)	0.96	1.12

F-Value for common adjustment rate hypothesis ($\rho_1=\rho_2=\rho_3$) 2.37, PR> F, .09

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Panel B: Equity/Assets

	Intercept α	slope $-\rho$	F-statistic α_n / ρ_n	α_n / ρ_n
Big Four	.136 (1.48)	-.352* (-3.98)	0.38*	6.91
Majority state	.349* (5.03)	-.545* (-7.15)	0.64*	11.59
Majority private	.447* (9.94)	-.448* (-11.49)	.99	1.39

F-Value for common adjustment rate hypothesis ($\rho_1=\rho_2=\rho_3$): 1.39, PR> F, .25

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Notes: The sample consists of 328 observations on banks, 2002-2007. The sample excludes majority foreign banks. The model includes an equation (not shown) to control for bank profitability. The definitions of the various bank categories are the same as in Table 1. t-statistics are in parenthesis. A negative slope coefficient, coupled with a ratio (α / ρ) in excess of unity, is consistent with a conclusion that the target ratio for a bank type is above the overall mean for the four types in the sample. The system weighted R-square is 29%. Asterisks indicate statistical significance at the 5% level.

Table 6 – Seemingly Unrelated Regressions

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Panel A: Loans / Assets

	Intercept	slope	F-statistic	
	α	$-\rho$	α_n / ρ_n	α_n / ρ_n
Big Four	.187	-.214	0.87	2.74
	(1.38)	(-1.55)		
Majority state	.470*	-.428*	1.09*	10.62
	(3.99)	(-3.85)		
Majority private	.149*	-.165*	0.90	3.80
	(3.33)	(-3.61)		
Majority foreign	.269	-.163	1.65	3.13
	(1.02)	(-0.77)		

F-Value for common adjustment rate hypothesis ($\rho_1=\rho_2=\rho_3=\rho_4$): 1.60, PR> F, .18

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Panel B: Equity/Assets

	Intercept	slope	F-statistic	
	α	$-\rho$	α_n / ρ_n	α_n / ρ_n
Big Four	.106	-.363*	0.29*	8.08
	(1.06)	(-4.19)		
Majority state	.398*	-.601*	0.66*	9.58
	(4.86)	(7.37)		
Majority private	.553*	-.548*	1.00	0.01
	(3.69)	(-3.50)		
Majority foreign	-.141	-.073	2.00	0.68
	(-0.44)	(-1.03)		

F-Value for common adjustment rate hypothesis ($\rho_1=\rho_2=\rho_3=\rho_4$): 8.78, PR> F, .01

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Notes: The sample consists of 209 observations on banks, 2002-2007. The model includes equations (not shown) to control for bank profitability and bank non-performing loans. The definitions of the various bank categories are the same as in Table 1. t-statistics are in parenthesis. A negative slope coefficient, coupled with a ratio (α / ρ) in excess of unity, is consistent with a conclusion that the target ratio for a bank type is above the overall mean for the four types in the sample. The system weighted R-square is 35%. Asterisks indicate statistical significance at the 5% level.

Table 7 – Seemingly Unrelated Regressions

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Panel A: Loans / Assets

	Intercept α	slope $-\rho$	F-statistic α_n/ρ_n	α_n/ρ_n
Big Four	.187 (1.36)	-.208 (-1.50)	0.89	1.55
Majority state	.478* (3.98)	-.425* (-3.81)	1.12*	14.32
Majority private	.147* (3.22)	-.157* (-3.41)	0.94	1.50

F-Value for common adjustment rate hypothesis ($\rho_1=\rho_2=\rho_3=\rho_4$): 2.48, PR> F, .08

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Panel B: Equity/Assets

	Intercept α	slope $-\rho$	F-statistic α_n/ρ_n	α_n/ρ_n
Big Four	.108 (0.93)	-.342* (-4.28)	0.32*	5.37
Majority state	.483* (5.14)	-.611* (8.17)	0.79*	3.16
Majority private	.706* (4.23)	-.590* (-4.11)	1.190	4.59

F-Value for common adjustment rate hypothesis ($\rho_1=\rho_2=\rho_3=\rho_4$): 3.29, PR> F, .04

Notes: The sample consists of 198 observations on banks, 2002-2007. The model includes equations (not shown) to control for bank profitability <u>and</u> bank non-performing loans. The definitions of the various bank categories are the same as in Table 1. t-statistics are in parenthesis. A negative slope coefficient, coupled with a ratio (α / ρ) in excess of unity, is consistent with a conclusion that the target ratio for a bank type is above the overall mean for the four types in the sample. The system weighted R-square is 42%. Asterisks indicate statistical significance at the 5% level.