Financial Management

Bank Competition and Leverage Adjustments

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We test whether bank competition affects firms' leverage adjustment speeds. Using Chinese data where bank concentration varies across both years and provinces, we find that underlevered firms move to their target leverage faster when bank competition is high. Tests surrounding an exogenous shock to bank competition lead to the same conclusion. We also find that small firms and nonstate-owned firms exhibit faster leverage adjustments when bank competition is high, which is consistent with the conjecture that bank risk taking increases with competition.

Recent research establishes that firms have target capital structures (Frank and Goyal, 2009), but firms make partial/incomplete adjustments toward their targets (e.g., Leary and Roberts, 2005; Flannery and Rangan, 2006; Huang and Ritter, 2009). More recent literature tries to identify the determinants of leverage adjustment speed. Huang and Ritter (2009, p. 239) refer to this topic as "the most important issue in capital structure research today." Factors that have been proposed and found to be important determinants of capital structure decisions include equity issuance costs (Huang and Ritter, 2009; Öztekin, 2015), transactions costs (Korajczyk and Levy, 2003; Strebulaev, 2007; Shivdasani and Stefanescu, 2010), and cash flow realizations (Faulkender et al., 2012). In this paper, we argue that bank competition affects firms' leverage adjustment speeds. Specifically, when bank competition is high, firms should be able to adjust their leverage faster, particularly when they are underlevered.

Although many theoretical and empirical studies examine how credit and financial market conditions (and bank competition specifically) affect economic development, very few studies

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investigate how the credit market environment affects corporate capital structure adjustment.[1] For example, a series of papers utilize the macrolevel differences between countries to relate institutional factors to financial decisions, such as legal origin (Demirgüç-Kunt and Maksimovic, 1999), creditor rights (Giannetti, 2003), stock and bond market structures (de Jong, Kabir, and Nguyen, 2008), to name a few. Fan, Wong, and Zhang (2013) study government ownership in capital structure but not the speed at which firms adjust their leverage to a target. Titman (2002) argues that credit market conditions and supply-side factors can also play an important role in determining firms' capital structure choices. He discusses how the emergence of junk bonds in the 1980s directly altered firms' financing mix. Graham and Harvey (2001) provide survey evidence consistent with Titman's (2002) contention, as they report that managers indeed view supply conditions to be an important factor in their firms' capital structure decisions.

Recent empirical evidence also supports Titman's (2002) contention that supply-side factors may explain firms' financing mix. Faulkender and Petersen (2006) find that firms without credit ratings (i.e., firms that cannot access public debt) have lower leverage ratios. Their findings suggest that debt market segmentation influences firms' leverage ratios. Leary (2009) studies two credit shocks during the 1960s in the United States and finds that when bank debt becomes readily available (unavailable), firms have higher (lower) bank debt ratios. His findings suggest that bank loan supply conditions influence firms' financing mix. We contribute to this literature by assessing how bank competition impacts capital structure adjustments to target leverage.

Why would bank competition affect firms' leverage adjustment speeds? When banking is competitive, it should, per conventional industrial organization theories, increase a bank's willingness to lend to individual firms and to lend at lower costs (Pagano, 1993; Guzman, 2000). In a similar vein, when bank competition increases, the bargaining and monopoly power of individual banks decreases.[2] Therefore, when banks compete to lend, firms should be able to access bank debt more quickly when they need it. Indeed, Leon (2015) examines 69 developing and emerging countries and finds that bank competition alleviates credit constraints. This reasoning implies that when firms are below their target leverage ratios, they should be able to move toward their targets faster when the banking sector is competitive. Note, however, that bank competition is not likely to impact the leverage adjustment speeds of overlevered firms. Banks' incentives are to provide more loans, not fewer. Greater competition among banks does not change this incentive. This asymmetry is similar to Warr et al.'s (2012) finding that firms above their target leverage move toward their target faster when their equity is overvalued because they can issue stock. However, they do not want to issue equity when it is undervalued and thus move toward their targets more slowly.

To study bank competition's effect on firms' leverage adjustment speeds, we use data from all listed firms with available data from China's two stock exchanges during the period 1998-2009. China provides an ideal setting to carry out our empirical tests for several reasons. First, bank debt is the primary source of firms' external finance in China. For example, in 2006, 85% of capital raised by listed firms in China is bank debt (Hale, 2007). Therefore, if bank competition positively affects firms' leverage adjustment speeds, it should be observable using Chinese data. Second,

[1] The literature in this regard is vast. See literature reviews and literatures cited in Berger, Demsetz, and Strahan (1999), Beck, Demirgüç-Kunt, and Maksimovic (2004), Bonaccorsi di Patti and Dell'Ariccia (2004), Cetorelli and Strahan (2006), and Lin et al. (2015).

[2] When banks have bargaining or monopoly power, they can limit loan supply and set high interest rates. For example, see Hannan (1991a, b).

there is an obvious group of dominant banks in China known colloquially as the "Big Four."[3] The Big Four are a significant source of bank debt throughout our entire sample period, but their loan concentration declines significantly throughout the sample period. This decline means that a high degree of time series variation exists in bank competition in China. Third, China is a large country with 31 distinct provinces. The amount of power that the Big Four have in each province varies. Thus, cross-sectional variation exists in bank competition across provinces but all within a single institutional environment.

In general, as competition increases, the bargaining power over the loan price shifts from individual banks toward firms. The loan price is made up of two characteristics—loan spread and transaction costs. However, in China, the central bank, known as the People's Bank of China (PBOC), sets the loan spread through a target credit growth for each bank. So the total loan supply is controlled by the government. In addition, under PBOC regulations, banks are allowed to offer interest rates only within a small band. Therefore, bargaining over loan price centers on transaction costs. Cai, Fang, and Xu (2011) argue, in a paper on corruption, that common business practices in China include bribery of government officials and expenditures to build relational capital. This building and maintaining of relationships is necessary for getting bank loans. In addition, Chen, Liu, and Su (2013) argue that corruption can improve banks' lending decisions and aid private firms in China. Although Cai et al.'s (2011) corruption measure is noisy, we find that bank competition is negatively related to these expenses. As bank competition increases, firms apparently can reduce these relational building expenses, thereby reducing loan transaction costs.

Our primary result is that when bank competition is higher, the firms' leverage adjustment speeds are faster, consistent with our contention. However, this finding applies to only underlevered firms and not overlevered firms. Simply put, firms that need or desire debt to be at their leverage targets can obtain this debt more quickly when bank competition is high. For overlevered firms, bank competition has no effect on leverage adjustment speed. For underlevered firms, a one standard deviation increase in our bank competition measure increases leverage adjustment speed by 15.4%.

Leary (2009) notes that concerns related to causality and endogeneity usually arise when using cross-sectional approaches to study supply-side effects on firms' financing decisions. Therefore, we use a credit shock to identify how supply-side factors affect firms' financing choices. In 2006, foreign banks in China were unrestricted in their lending activities and so were suddenly able to compete with local Chinese banks on a level playing field. For provinces that were home to many foreign banks during 2006, the level of bank competition spikes in 2006. Firms located in provinces with many foreign banks exhibit faster leverage adjustment speeds after 2006 compared to firms located in other provinces. Further, this result again primarily holds for underlevered firms.

Finally, we find that the positive relation between bank competition and leverage adjustment speed is stronger for small firms than for large firms. In addition, when we distinguish between state-owned enterprises (SOEs) and non-SOEs, we find that the positive relation between bank competition and leverage adjustment speeds is stronger for non-SOEs than for SOEs. These findings support the theory that banks increase lending risk as competition increases because the number of loans to lower credit-quality firms rises.

[3] See Allen et al. (2008) for an overview of China's financial system. The Big Four includes the Bank of China, Industrial and Commercial Bank of China, China Construction Bank, and Agricultural Bank of China.

The remainder of our paper proceeds as follows. Section I describes the banking environment in China. Section II describes our data and empirical approach. Section III presents and discusses results. Finally, Section IV provides our conclusions and policy implications.

I. China's Banking System and Structure

A. Development of the Banking System in China

Prior to the mid-1980s, bank competition in China was virtually nonexistent, and the banking sector consisted of only China's central bank (the PBOC) and four fully state-owned banks known colloquially as the Big Four, including Bank of China, China Construction Bank, Agriculture Bank of China, and Industrial and Commercial Bank of China.[4] Starting in the late 1980s, new commercial banks known as joint-stock banks began to spring up, such as the Bank of Communications, China Merchants Bank, and CITIC Industrial Bank. These joint-stock banks dramatically changed China's banking industry as they started competing with the Big Four banks. In 1996, Minsheng Bank became China's first mostly privately owned bank.

In 1994, the policy-banking divisions of the Big Four banks were divested to create three new development banks: China Development Bank, Agricultural Development Bank of China, and the Export-Import Bank of China. In 1995, the Commercial Bank Law was formally enacted to allow the Big Four banks to become more market oriented from both legal and business perspectives. Since 1996, regional commercial banks (e.g., Bank of Beijing, Bank of Shanghai, Bank of Nanjing, etc.) started appearing and quickly began playing an active role for local economies. These banks primarily serve their provinces and most are joint-stock banks.

Following China's entry into the World Trade Organization in 2001, the banking sector progressed further by becoming more global. A series of reforms took place in 2003 so that fully state-owned banks could become joint-stock banks by issuing initial public offerings (IPOs). The main objective behind these IPOs was not simply to raise capital but to introduce better governance and incentive systems so that these banks could become more market oriented.[5] At the end of 2006, the government started to remove many restrictions it had imposed on foreign banks, allowing them to compete on a more even playing field with local Chinese banks.[6] In 2007, the government allowed the Postal Savings Bank of China, which was established in 1986 as a savings banks only, to begin lending explicitly to small- and medium-sized enterprises.

During the last year of our study sample period (2009), the banking system in China consisted of the central bank, the Big Four commercial banks, three development banks, the postal savings bank, 13 national joint-stock commercial banks, 143 regional commercial banks, 95 foreign banks, 11 privately owned rural banks, and 3,056 rural credit cooperatives (these are like credit unions in the United States). Per the National Bureau of Statistics' *China Statistical Yearbooks*, from 1998 to 2009, which represents our study sample period, total deposits of all financial institutions in China grew from 9.57 trillion yuan to 59.77 trillion yuan, which is more than a 500% increase, and the total loan balance grew from 8.65 trillion yuan to 39.97 trillion yuan, which is almost a 400% increase.

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[4] For more details of China's banking system development and structure, see Allen et al. (2005, 2008), Martin (2012), Walter and Howie (2012), and Zhang et al. (2016).

[5] For example, see Berger, Hasan, and Zhou (2009) and Chang et al. (2012).

[6] For example, foreign banks were previously tightly restricted to where and to whom they could lend.

B. Bank Regulations in China

China's central bank regulates China's banking system, in addition to formulating and implementing China's monetary policy. The China Banking Regulatory Commission oversees banks to ensure they adhere to PBOC's banking regulations. Like the US Federal Reserve, the PBOC sets banks' reserve requirements, establishes interest rates for interbank lending, and controls the money supply.

However, the PBOC has two regulatory tools that the US Federal Reserve does not have: 1) it can set benchmark rates on bank deposits and bank loans, and 2) it can set credit limits to banks. Both have direct relevance to our study. First, under PBOC regulations, banks are allowed to offer interest rates only within a band. This regulation means banks may have limited ability to adjust interest rates up or down in the face of bank competition. Second, the PBOC allows each bank's credit to grow by only a fixed fraction each year. For example, the PBOC set a target credit growth rate of 13% to 14% for 2011. Another way the PBOC can control commercial bank lending is through its reserve requirement. In fact, this regulation is the primary way that the PBOC controls the money supply. PBOC control over credit growth and reserve requirements means that banks may have limited ability to increase loans in the face of bank competition.

High banking competition implies not only more loan supply from each bank but also from more banks. Even though China sets curbs on credit growth at each bank, it appears that these curbs are merely targets rather than stringent restrictions. For example, although the PBOC set a target credit growth rate of 13% to 14% for each bank in 2011, the average increase in banks' total loans outstanding grew by 15.7%, suggesting the PBOC's control over credit growth rates is loose (Martin, 2012). How are Chinese banks able to stretch their lending amounts despite reserve requirements? Evidence suggests that Chinese banks increase their loan supply by competing for, and thereby increasing, deposits (Yi and Zhao, 2001). Of course, higher competition for deposits will limit lendable funds.

C. Importance of Bank Financing in China

Throughout our entire sample period (1998-2009), bank debt is by far the primary source of external financing in China. For example, at the end of 2009, the 1,718 listed companies in China's two stock exchanges (Shanghai and Shenzhen) had a total market capitalization of 24.39 trillion yuan. Yet equity financing still lags far behind debt financing (Allen, Qian, and Qian, 2005, 2008; Tong, 2005; Fan, Rui, and Zhao, 2008). Per an estimate by Hale (2007), the corporate bond market in China provided only 1.4% of the total capital raised by corporations in China in 2006, whereas commercial banks provided 85%. According to the China Securities Regulatory Commission's *China Securities and Futures Statistical Yearbook* (2010), the total amount of outstanding corporate bonds was 2.44 trillion yuan in 2009, which represents only 6.1% compared to total bank loans.

D. Bank Competition in China

In the traditional firm-bank relationship framework in the United States, banks develop relationships with firms to mitigate information asymmetries. The evolution of the Chinese banking industry is much different. Few banks were started, the government controlled them, and no other competition was allowed. The low degree of competition during a time of exploding economic growth forged a different kind of growth, one in which firms developed relationships with banks to ensure funding. This type of relationship can be described as rent extraction from banks. Rent extractions are common in China during our sample period. The World Bank measures this behavior with its Control of Corruption index.[7] A country's corruption can be compared on an international scale with the Control of Corruption percentile rank. The country with the most ethical environment earns a 100, while the lowest receives a 0. In the World Bank 2008 report, the Western countries, where most of the banking relationship studies take place, rank very high; the United States ranks 91.7 and the United Kingdom ranks 92.2. China ranked only 35.4 in Control of Corruption. When bank competition is low, corruption has an opportunity to be high, and firms need to develop relational capital to ensure funding. As bank competition increases, banks have less power to extract rents from client firms because other sources of funding develop.

We frame the power between banks and firms via a continuum in which banks began our sample period with all the power. Thus, rents were extracted. During our sample, bank competition increased and the power between them moved closer toward equality. Note that in a Western banking context, a shift in power and subsequent change in the bank-firm relationship can make it difficult for banks to assess credit risk as information asymmetries may increase. If the power shifts so much that creditors dominate the relationship, then they may be able to extract rents from banks. We provide evidence that an increase in bank competition likely shifts the power from lender dominated to a more balanced dynamic. Thus, firms can more efficiently attempt to optimize their capital structure.

There have been significant increases in banking competition over our sample period. From 1998 to 2009, the market share of total deposits of the Big Four banks declined from 74.27% to 50.91%. That is, the market share of non-Big Four banks doubled (i.e., from 25.67% to 49.09%). During the same time, the market share of total loans by the Big Four banks declined from 72.21% to 43.67% (estimated from the *Almanac of China's Finance and Banking Editorial Board 1999-2010*). The banking industry in China has gradually become more competitive (see also Lin, Sun, and Wu, 2015).

Significant differences are also found in bank concentration across China's 31 different provinces. In 2009, the ratio of Big Four banks' total assets in each province to the entire banking sector's total assets in each province ranges from 41.3% in Liaoning to 96.7% in Xizang. The mean (median) is 50.7% (49.5%), and the standard deviation is 9.7% (Monetary Policy Analysis Group in People's Bank of China, *Report on China Regional Financial Market*, 2009). Just as there is variation in corruption among countries, there is also variation among China's provinces (Chen et al., 2013). While Chen et al. (2013) focus on the bribes needed for private firms to acquire loans, they also touch on the corruption of the politicians. That is, while there is corruption between banks and firms, there is also corruption between provincial politicians and banks. In a province that has high corruption between traditional banks and politicians, the bribes from banks to government officials may keep out, or delay, new banks from entering the marketplace. Barth et al. (2009) report that lending corruption and bank competition are negatively related. Thus, provinces with higher corruption will have lower bank competition. This is supported by Beck, Demirgüç-Kunt, and Levine (2006), who study bank regulatory agencies worldwide. Countries with powerful public supervisory agencies tend to have firms that face greater obstacles to obtaining bank loans. They conclude that powerful public supervisory agencies are inconsistent with promoting social welfare. They also provide support for the view that politicians capture welfare through manipulation of the supervisory role. Thus, provinces with higher levels of political corruption will have lower bank competition. We use this by-province variation in bank concentration, together with the time series variation, to provide us with sufficient statistical power and an ideal setting to test the effect that bank competition has on firms' leverage adjustment speeds.

[7] The World Bank's Worldwide Governance Indicators is publicly available at: http://info.worldbank.org/governance/wgi/.

E. Optimal Capital Structure in China

Many of the factors in capital market theory developed for Western economies are also present in China (see Jiang and Kim, 2013, for an overview of financial management practices in China). For example, there is a tax benefit to debt versus equity and bankruptcy costs. Specifically, interest expense is tax deductible when it meets specific criteria. China's current bankruptcy law took effect in 2007 and mirrors the bankruptcy laws of other countries, particularly the United States. Thus, our paper does rely on the idea that Chinese firms have an optimal structure and that the structure can be estimated using established methods.

II. Data and Empirical Methods

A. Data

Our sample includes all Chinese listed firms from both the Shanghai and Shenzhen stock exchanges from 1998 to 2009. The sample begins in 1998 because important financial statements' variables (e.g., short-term debt and depreciation) become available only during this time. Financial statements and stock returns data come from the China Stock Market and Accounting Research database. Following the literature (e.g., Coval and Moskowitz, 1999; Pirinsky and Wang, 2006; Seasholes and Zhu, 2010), we identify a firm's location by the location of its headquarters. We exclude financial firms from our sample, and because we examine year-to-year changes in leverage, we also delete firms that do not have at least two consecutive years of data. To manage any outlier problem, we winsorize the data at 1%. Our final study sample consists of 12,463 firm-year observations.[8]

B. Variable Definitions and Basic Regression Specification

Our methodological approach follows Faulkender et al. (2012). Normally, the literature (e.g., Flannery and Rangan, 2006; Byoun, 2008; Lemmon, Roberts, and Zender, 2008; Huang and Ritter, 2009) estimates leverage adjustment speed with the following regression model:

$$Lev_{i,t} - Lev_{i,t-1} \equiv \frac{D_{i,t}}{A_{i,t}} - \frac{D_{i,t-1}}{A_{i,t-1}} = \lambda\,(Lev^*{}_{i,t} - Lev_{i,t-1}) + \varepsilon_{i,t}, \tag{1}$$

where $D_{i,t}$ is firm i's outstanding debt at time t, $A_{i,t}$ is the firm's book assets at time t, $Lev_{i,t}$ is the leverage ratio (long-term debt plus short-term debt to total assets) at time t, $Lev_{i,t-1}$ is lagged leverage, and $Lev^*{}_{i,t}$ is the estimated target leverage ratio given firm characteristics at $t - 1$. The lambda (λ) value is known as the firm's speed of adjustment toward its target leverage ratio.

However, Faulkender et al. (2012) argue that the lambda in Equation (1) can change without any "active" capital structure adjustment when firms post their income to their equity account. Faulkender et al. (2012) argue that any test designed to measure firms' adjustments to leverage targets should focus on firms' "active" adjustments, where they access capital markets in some way and "pay" the associated transactions costs. Therefore, following Faulkender et al. (2012), we revise Model (1) as:

$$Lev_{i,t} - Lev^p{}_{i,t-1} = \gamma\,(Lev^*{}_{i,t} - Lev^p{}_{i,t-1}) + \varepsilon_{i,t}, \tag{2}$$

[8] Using Strebulaev and Yang's (2013) definition of zero-leverage and almost zero-leverage, our sample is made up of 3.7% zero-leverage and 10.4% almost zero-leverage. Our results are robust to removing these firms from the sample.

where $Lev^p{}_{i,t-1} = \frac{D_{i,t-1}}{A_{i,t-1}+NI_{i,t}}$, and $NI_{i,t}$ is equal to net income during year *t*. Note that leverage at *t* is $Lev^p{}_{i,t-1}$ if the firm does not access capital markets. The left-hand side of Model 2 is the firm's "active" adjustment toward its target leverage ratio.

The literature (e.g., Flannery and Rangan, 2006; Byoun, 2008; Lemmon et al., 2008; Huang and Ritter, 2009) estimates target leverage, $Lev^*{}_{i,t}$, as:

$$Lev^*{}_{i,t} = \beta X_{i,t-1}, \tag{3}$$

where β is a coefficient vector, and $X_{i,t-1}$ is a vector of firm-specific characteristics hypothesized to be related to leverage, along with firm fixed effects and year fixed effects. Once the coefficients are estimated, they can be used to "fit" each firm's target leverage ratio. The choice and definitions of our firm-specific characteristics are the same as those in Faulkender et al. (2012):

EBIT_TA = (Income before extraordinary items + Interest expense + Income taxes) / Total assets;
MB = (Book liabilities + market value of equity) / Total assets;[9]
DEP_TA = Fixed asset depreciation / Total assets;
LnTA = ln(Total assets deflated by the Consumer Price Index to 2004 yuan value);
FA_TA = Fixed assets / Total assets;
R&D_TA = Research and development expenses / Total assets; and
Industry_median Leverage = Median leverage for the firm's one- or two-digit industry.[10]

Some studies (e.g., Flannery and Rangan, 2006; Lemmon et al., 2008; Huang and Ritter, 2009) estimate target leverage concurrently with the speed of adjustment toward target, where Equation (3) can be directly plugged into Equation (1) or (2), leaving just one regression model to estimate as:

$$Lev_{i,t} = \gamma\beta X_{i,t-1} + (1-\gamma)Lev_{i,t-1} + \varepsilon_{i,t}. \tag{4}$$

However, because we are interested in seeing how bank competition affects leverage adjustment speed, we first run Model 4 to estimate target leverage and then use it to estimate Model 2. Estimating Model 4 first allows us to include firm fixed effects and address estimation issues normally found in dynamic panel models. Based on the recommendation of Flannery and Hankins (2012), we estimate Model 4 using a generalized method of moments estimation method like Blundell and Bond's (1998) to compute $\widehat{L}\ ev^*{}_{i,t}$. Then, we use this computed target leverage ratio to estimate Equation (2) using ordinary least squares with bootstrapped standard errors given the generated regressor (Pagan, 1984). Using Equation (2) as our baseline model allows us later to interact deviations from target leverage with a bank competition variable and other variables of

[9] In China, a complication arises when measuring market values of equity because a proportion of many stocks are nontradable. Therefore, we use the book value of equity for these nontradable shares when calculating the firm's market value. Specifically, for each firm, we multiply its amount of tradable shares by the market price at the end of the previous year, and we multiply its amount of nontradable shares by the book value of equity to obtain the total market value of equity. For robustness checks, we follow Bai et al. (2004), and we apply a liquidity discount of 20%, 30%, and 0% (which assumes no discount, where nontradable shares are assumed to equal the market price) when calculating the market value of these nontradable shares. Our results are robust to these alternative measures.

[10] We use finer two-digit industry classifications for the manufacturing industry because more than half of our firms come from this industry. For other industries, we use one-digit industry classifications. Industry classifications are based on Chinese Security Supervision Committee industry classifications.

interest to see how these variables affect leverage adjustment speeds (see Faulkender et al., 2012; Öztekin and Flannery, 2012, for similar leverage adjustment models with interaction terms).

Our measure of bank competition comes from Fan, Wang, and Zhu's (2012) *National Economic Research Institute Index of Marketization of China's Provinces 2011 Report*.[11] In the spirit of Lin et al. (2015), we estimate a bank competition index, *BC_Index*, in each province *j* and in year *t* as:

$$BC\_Index_{j,t} = \frac{Share_{j,t} - Share_{\min,2001}}{Share_{\max,2001} - Share_{\min,2001}} \times 10, \tag{5}$$

where $Share_{j,t}$ is the percentage market share of total deposits in banks other than (1)) the Big Four banks, (2)) the Postal Savings Bank of China, and (3)) the three policy banks in province *j* and in year *t*. $Share_{\max,2001}$ and $Share_{\min,2001}$ are the maximum and minimum *Share* values among all provinces in year 2001, respectively, and they are used to create a standardized index value from zero to 10 in 2001. Therefore, *BC_Index* measures the degree of bank competition in a specific province and in a specific year relative to the degree of bank competition that exists in 2001.[12]

Note that our bank competition index is essentially the inverse of the concentration ratio of notable banks to all banks, which is a standard way of measuring bank competition in the literature. We previously mentioned the eight banks excluded from the *Share* measure. The reason these eight banks are excluded is because they are historically and currently viewed as the "main" state-owned banks even though all the nonpolicy banks are now joint-stock banks.[13] Unfortunately, we are unable to restructure the *BC_Index* variable to exclude only the Big Four banks, but we think the measure is suitable for our study. Because we are interested in lending to firms by commercial banks, we do not want to include loans made by policy banks (their lending is for policy/development projects on behalf of the government).[14] That is, development banks do not compete with either the Big Four or with any other commercial banks. Also and just as important, note that by excluding the market share of Postal Savings Bank, which primarily lends to small- and medium-sized enterprises, the empirical results are biased against finding that small firms (which we specifically address later in our discussion) benefit from bank competition.

Table I shows summary statistics of target leverage (i.e., $Lev^*_{i,t}$), active deviation from target leverage (i.e., $Lev^*_{i,t} - Lev^p_{i,t-1}$), change in active leverage (i.e., $Lev_{i,t} - Lev^p_{i,t-1}$), the *BC_Index*, and firm characteristic variables used in the target leverage calculation. The *BC_Index* ranges from –0.48 to 12.41, with a mean of 6.975 and a standard deviation of 2.656. Note that the standard deviation is large relative to the mean, indicating significant variation in the *BC_Index* across years and provinces.

[11] The National Economic Research Institute (NERI) is a nongovernment, nonprofit research think tank in China. According to its Web site, the NERI conducts independent and objective in-depth research on major issues concerning China's economic development. Other studies that have used Fan et al.'s NERI indices include Wang, Wong, and Xia (2008), Li, Yue, and Zhao (2009), and Fan et al. (2013).

[12] The *BC_Index* is also included as an independent variable in Equation (3) to control for its potential main effect on leverage.

[13] However, as previously mentioned, all Big Four banks are still more than 50% owned by the government. The Postal Savings Bank is also mostly owned by the government, while the three development banks are wholly owned by the government.

[14] Martin (2012) states that all lending by policy banks is only to serve their economic roles.

Table I. Descriptive Statistics

This table reports summary statistics for the variables used in our study. The sample contains all nonfinancial listed firms in China with complete data from China Stock Market and Accounting Research for the time period 1998-2009. Panel A reports statistics on all firms and also on underlevered (below target leverage) and overlevered (above target leverage) firms. Overlevered and underlevered statistics are not reported in Panel B because the variables used to estimate leverage targets are estimated on the full sample. Target leverage ratio ($Lev^*_{i,t}$) is estimated using the method presented in Section II.B. Active deviation ($Lev^*_{i,t}- Lev^p_{i,t-1}$) is the target leverage ratio less the adjusted lagged leverage ratio, which is defined as the previous period's total debt divided by the sum of the previous period's book assets plus net income for the current period. ΔActive leverage ($Lev_{i,t}- Lev^p_{i,t-1}$) is the leverage ratio less the adjusted lagged leverage ratio. BC index is a measure of bank competition, calculated as the total deposit share of banks except the Big Four state-owned banks, Postal Savings Bank of China, and three policy banks, normalized by BC index values in 2001. ETC is the business entertainment and travel expenses to sales ratio, %, but it is only available for 2004. Leverage is total debt (long-term debt plus short-term debt) divided by book value of assets. EBIT_TA is income before extraordinary items plus interest expense plus income taxes divided by total assets. MB is the sum of book liabilities and the market value of equity divided by total assets. DEP_TA is fixed asset depreciation divided by total assets. LnTA is the natural log of total assets deflated by the Consumer Price Index to 2004 yuan value. FA_TA is fixed assets divided by total assets. R&D_TA is the research and development (R&D) expenses divided by total assets. R&D dummy is equal to 1 if there is R&D expense not missing, 0 otherwise. Industry median Leverage is the annual median leverage ratio for two-digit industries (for the manufacturing sector) or one-digit industries (for all other industries), based on the Chinese Security Supervision Committee industry code classifications.

	Mean	Median	*SD*	Underlevered	Overleveraged
Panel A. Leverage Target, Deviation from Target, and Bank Competition Index					
Target leverage ratio	0.321	0.311	0.209	0.398	0.208
Active deviation	0.047	0.038	0.178	0.149	−0.101
ΔActive leverage	0.011	0.008	0.095	0.036	−0.027
BC index	6.975	7.120	2.656	6.678	7.411
ETC	1.163	1.200	0.458	1.163	1.164
Panel B. Firm Characteristics Used in Target Leverage Calculation					
Leverage	0.274	0.263	0.175		
EBIT_TA	0.047	0.054	0.087		
MB	1.360	1.139	0.755		
DEP_TA	0.024	0.020	0.016		
LnTA	21.139	21.032	1.017		
FA_TA	0.299	0.272	0.179		
R&D Dummy	0.891	1.000	0.312		
R&D_TA	0.001	0.000	0.006		
Industry median Leverage	0.268	0.261	0.063		

III. Results

A. Bank Competition and Loans

Before we test the association between bank competition and the speed of leverage adjustments, we first illustrate that increasing bank competition spurs loan transactions. We begin by examining the current leverage of the firm. Table II shows regression results of current leverage on firm

Table II. Changes in Leverage and Bank Competition

This table reports ordinary least squares regression results where the dependent variable is firm's current leverage. Column (1) shows the base regression model results. Column (2) includes the lagged bank competition variable. Column (3) divides the lagged bank competition variable into one for underleveraged firms and one for overleveraged firms. All other variables are defined in Table I. Standard errors are bootstrapped to account for generated regressors (1,000 replications). *p*-Values are reported in parentheses.

	(1)	(2)	(3)
Lagged BC_Index		0.004	
		(0.133)	
Lagged BC_Index_under			0.009***
			(0.004)
Lagged BC_Index_over			−0.003
			(0.292)
Lagged Leverage	0.566***	0.565***	0.562***
	(0.000)	(0.000)	(0.000)
EBIT_TA	−0.129***	−0.129***	−0.128***
	(0.000)	(0.000)	(0.000)
MB	−0.003*	−0.004*	−0.003*
	(0.062)	(0.055)	(0.055)
DEP_TA	−0.458***	−0.455***	−0.459***
	(0.000)	(0.000)	(0.000)
LnTA	0.029***	0.028***	0.028***
	(0.000)	(0.000)	(0.000)
FA_TA	−0.001	−0.001	−0.001
	(0.953)	(0.956)	(0.899)
Lagged R&D_TA	0.197***	0.198***	0.188***
	(0.000)	(0.000)	(0.000)
Lagged R&D_Dum	0.101	0.105	0.118
	(0.552)	(0.533)	(0.473)
Industry median Lev	0.002	0.002	0.002
	(0.519)	(0.504)	(0.522)
Year Dummies	Yes	Yes	Yes
Within R^2	0.415	0.415	0.416
N	12,469	12,469	12,469

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

control variables, including lagged leverage. The base regression is shown in Column (1). Column (2) includes the lagged bank competition variable. Note that the estimate on bank competition is positive and not significant. However, underleveraged firms have a different borrowing incentive than overleveraged firms. Therefore, we divide the lagged bank competition variable into one for underleveraged firms and one for overleveraged firms, as shown in Column (3). The coefficient for the underleveraged firms is positive and significant at the 1% level. Underleveraged firms increase their leverage when banks compete. The coefficient for overleveraged firms is negative and insignificant. It appears that bank competition is not important for overleveraged firms, which makes sense as they do not need more debt.

It is unclear whether the increase in leverage for underleveraged firms comes from changes in debt or equity. Therefore, in Table III, we examine the change in a firm's debt (in Panel A) and

Table III. Bank Competition and Changes in Debt and Equity

This table reports logit regression results where the dependent variable is a dummy. In Panel A (B), when the actual leverage is below the target level, the dummy variable is equal to 1 when the increase of debt (equity) is more than 5%, otherwise the dummy is equal to zero; when the actual leverage is above the target level, the dummy variable is equal to 1 when the decrease of debt (equity) is more than 5% (or the change is less than –5%), otherwise the dummy is equal to zero. All variables are defined in Table I. *p*-Values are reported in parentheses.

	Panel A. Changes in Debt		*Panel B. Changes in Equity*	
	Underleveraged	**Overleveraged**	**Underleveraged**	**Overleveraged**
	If ΔDebt ≥ 5.0% Dependent Variable = 1, Otherwise = 0	**If ΔDebt ≤ –5.0% Dependent Variable = 1, Otherwise = 0**	**If ΔEquity ≤ –5.0% Dependent Variable = 1, Otherwise = 0**	**If ΔEquity ≥ 5.0% Dependent Variable = 1, Otherwise = 0**
BC_Index × Active deviation	0.916***	−0.322	0.017	−0.463
	(0.001)	(0.420)	(0.961)	(0.192)
BC_Index	−0.157***	0.002	0.058	−0.169***
	(0.002)	(0.966)	(0.449)	(0.003)
Active deviation	4.159***	−4.821***	0.633	−1.345***
	(0.000)	(0.000)	(0.109)	(0.000)
EBIT_TA	5.309***	−2.596***	1.856*	0.269
	(0.000)	(0.000)	(0.058)	(0.564)
LnTA	0.132***	0.002	0.017	0.118**
	(0.000)	(0.962)	(0.737)	(0.010)
MB	0.153**	−0.158***	0.040	0.292***
	(0.024)	(0.003)	(0.631)	(0.000)
Year Dummies	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes
N	7,408	5,055	7,408	5,055
Pseudo R^2	0.076	0.070	0.078	0.059

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

equity (in Panel B) as associated with bank competition. We define a loan transaction as having occurred when the level of debt of a firm increases by 5% or more compared to the previous year. Panel A shows the logit regression results for a dummy dependent variable that is one when debt increases by 5% or more and is zero otherwise. The independent variable of interest is the bank competition measure interacted with the active deviation in leverage. The control variables include the bank competition measure, active deviation, and the profit, size, and market-to-book of the firm. The results show a significantly positive relation between the active deviation in leverage with bank competition and loan transactions for underleveraged firms. We conduct a similar analysis for overleveraged firms in Panel A. However, we do not expect overleveraged firms to seek more debt. Therefore, we test whether they have significant debt reductions by using a dependent dummy variable that takes a value of one when debt decreases by 5% or more and is zero otherwise. The results show that overleveraged firm debt reduction is not related to bank competition.

Table IV. Baseline Leverage Adjustment Speeds

This table reports ordinary least squares regression results where the dependent variable is firm's change in active book leverage, ΔActive leverage (i.e., $Lev_{i,t} - Lev^{p}_{i,t-1}$) and the independent variable is firm's active deviation from its target leverage ratio, Active deviation (i.e., $Lev^{*}_{i,t} - Lev^{p}_{i,t-1}$). All variables are defined in Table I. The second (third) column of results represents firm-years with leverage below (above) target leverage. Standard errors are bootstrapped to account for generated regressors (1,000 replications). p-Values are reported in parentheses.

	All	Underlevered	Overlevered
Active deviation	0.291***	0.255***	0.479***
	(0.000)	(0.000)	(0.000)
N	12,463	7,408	5,055
Adjusted R^2	0.300	0.178	0.315

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

Capital structure can also change through adjustments to equity. We conduct an equity analysis in Panel B of Table III that is like the debt change analysis. For underleveraged and (over)leveraged firms, the dependent dummy variable is one when there is a decrease (increase) in equity of 5% or more and zero otherwise. The coefficients of interest are not significant, as shown in Panel B. We conclude that increasing bank competition spurs more loan transactions but not loan reductions or changes in equity. The balance of the paper examines the speed of leverage adjustments for underleveraged firms and bank competition.

B. Speed of Leverage Adjustment: Baseline Regression Results

We first run Model 4 to estimate target leverage and then use it to estimate our baseline Model 2. The results of the first run model are shown in the Appendix. Table IV reports results from estimating Equation (2). Recall that the coefficient on *Active deviation* (i.e., on $Lev^{*}_{i,t} - Lev^{p}_{i,t-1}$) reflects leverage adjustment speed. The first column of results in Table IV reports an annual active leverage adjustment speed of 29.1%. This speed is very similar to the 31.6% active leverage adjustment speed documented for US firms (see Faulkender et al., 2012). We follow Faulkender et al. (2012) and report results separately for firms below (second column) and above (third column) their target leverage ratios. The speed of adjustment for these two sets of firms is strikingly different (25.5% for underlevered firms vs. 47.9% for overlevered firms) and like what Faulkender et al. (2012) find (they find 29.8% for underlevered firms vs. 56.4% for overlevered firms). Faulkender et al. (2012) suggest two possible explanations for the asymmetry: 1) the benefits may be greater for overlevered firms to reach their targets (i.e., their financial distress costs may be high), or 2) the leverage adjustment costs for overlevered firms may somehow be lower.

C. Effect of Bank Competition on Leverage Adjustment Speed

To estimate the effect that bank competition has on leverage adjustment speeds, we follow Faulkender et al. (2012) and generalize a partial adjustment model by specifying that the ith

Table V. Bank Competition and Leverage Adjustment Speed

This table reports ordinary least squares regression results where the dependent variable is firm's change in active book leverage, ΔActive leverage (i.e., $Lev_{i,t} - Lev^{p}{}_{i,t-1}$), and the independent variables are 1) firm's active deviation from its target leverage ratio, Active deviation (i.e., $Lev^{*}{}_{i,t} - Lev^{p}{}_{i,t-1}$), and 2) an interaction term between BC_Index and Active deviation (Panel A) or ETC and Active deviation (Panel B). ETC is the entertainment and travel costs and is only available in 2004. All other variables are defined in Table I. The second (third) column of results represents firm-years with leverage below (above) target leverage. Standard errors are bootstrapped to account for generated regressors (1,000 replications). *p*-Values are reported in parentheses.

Panel A. Bank Competition

	ΔActive leverage		
	All	**Underlevered**	**Overlevered**
Active deviation	0.214***	0.190***	0.450***
	(0.000)	(0.000)	(0.000)
BC_Index × Active deviation	0.012***	0.011***	0.004
	(0.000)	(0.000)	(0.432)
N	12,463	7,408	5,055
Adjusted R^2	0.303	0.183	0.315

Panel B. Bank Competition Mechanism

	ΔActive leverage		
	All	**Underlevered**	**Overlevered**
Active deviation	0.363***	0.336***	0.512***
	(0.000)	(0.000)	(0.000)
ETC × Active deviation	−0.028*	−0.030**	−0.017
	(0.096)	(0.044)	(0.562)
N	3,136	1,837	1,299
Adjusted R^2	0.372	0.234	0.411

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

firm's adjustment speed at time t depends on a variable of interest (in our case, that variable is bank competition) as:

$$Lev_{i,t} - Lev^{p}{}_{i,t-1} = (\gamma_0 + \gamma_1 BC\_Index_{i,t})(Lev^{*}{}_{i,t} - Lev^{p}{}_{i,t-1}) + \varepsilon_{i,t}, \quad (6)$$

where γ_1 is the coefficient on the interaction term between active deviation from target leverage and our bank competition index variable. The coefficient γ_1 captures the influence of bank competition on the speed of leverage adjustment. When γ_1 is positive, bank competition speeds up the adjustment, and when it is negative, bank competition slows down the adjustment. Panel A of Table V presents results from estimating Equation (6). We again report results for all sample firms and separately for overlevered and underlevered firms.

The first column of results in Panel A shows that bank competition increases leverage adjustment speeds (i.e., the coefficient on the interaction term between *BC_Index* and *Active deviation* is positive and statistically significant). This finding supports the hypothesis that bank competition can affect firms' leverage adjustment speeds. This finding also supports conventional industrial organization theories that higher banking competition increases banks' willingness to lend to individual firms. This result is remarkable given that banks are regulated (especially in China) in their loan supply and rates. The results in the second and third columns reveal that high bank competition speeds up leverage adjustment for only underlevered firms, as expected. When firms are underlevered, they can move toward their target leverage ratios more quickly when banks compete to lend. When firms are overlevered, there is no clear reason why banks would compete to help firms reduce their leverage.

The faster leverage adjustment speed for underlevered firms when bank competition is high is both statistically and economically significant. When the *BC_Index* increases by one, it increases underlevered firms' leverage adjustment speeds by a relative 5.8% (i.e., the coefficient on the interaction term is 0.011 compared to the 0.190 coefficient on *Active deviation*). A one standard deviation increase in the *BC_Index* increases underlevered firms' adjustment speeds by 15.4%.

We briefly explore the economic mechanisms that could lead bank competition to affect the speed of adjustment to target capital structure. Bank competition could potentially impact the loan market through price or the total credit supply. Because the PBOC sets the target credit growth for each bank, the total loan supply is also controlled by the government. So, we examine price, which reflects the interest rate spread and any transactions costs. Under PBOC regulations, Chinese banks are allowed to offer interest rates within only a small band. Therefore, banks have limited ability to adjust interest rates up or down, regardless of the level bank competition. Thus, the interest rates are very similar among all banks, including foreign banks. In 2014, banks began to have more freedom to adjust interest rates to compete.[15] The main mechanism through which bank competition can speed up the adjustment to a target capital structure is through the reduction of transaction costs aspect of loan price, which includes time and related expenses (Chen et al., 2013). There is no direct measure of the transaction cost. Thus, we use the corporate expenses on travel and entertainment as a proxy for the transaction cost for a firm to get bank loans. Entertainment and travel costs (ETC) is a standard expenditure item for Chinese firms with an annual amount equal to about 20% of total wage bills. Cai et al. (2011) document that ETC consists of a mix of corruption costs that includes bribery to government officials, expenditures to build relational capital, and managerial excesses. In China, building relational capital with the bank is a necessary step for getting bank loans (Chen et al., 2013). While ETC is a measure of relational capital costs, we believe it to be a noisy one. Thus, this portion of our analysis should be considered exploratory. The correlation between ETC and bank competition is –0.3, which is both negative and statistically significant. Consistent with our argument, when bank competition is high, this transaction cost is lower.

In Panel B of Table V, we estimate Equation (6), but we replace bank competition with ETC. We do not have data on ETC for our entire sample period as it begins in 2004, so we focus on the 2004 to 2006 time period. This period captures the potential changes in ETC through the 2006 deregulation but avoids the complications of the 2007 global financial crisis. The results show that higher ETC slows down the leverage adjustment speed. Thus, the reduction in ETC from an increase in bank competition leads to faster adjustment speeds. The results also show the significance, like in previous results, comes from underlevered firms. While exploratory, we argue that the economic mechanism from bank competition to leverage adjustment speeds could be the transaction costs of acquiring bank loans.

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[15] One data limitation is that we do not have the interest rate and target credit growth for each bank assigned by the PBOC.

D. Robustness Tests

The connection between bank competition and leverage adjustments might be complicated and impacted by endogeneity issues and variable specifications. Thus, we report several robustness tests in Table VI.

1. Financial and Economic Development

The province-level *BC_Index* measure is likely to be positively related to province-level economic activity. As the economy expands, so does the banking and financial sector. Therefore, it could be the economic growth and the associated financial market development instead of the increase in bank competition per se that may be causing faster leverage adjustment speeds. To address this possibility, we control for province-level gross domestic product (GDP) per capita in our regression models.[16] Also, stock and public debt market development could be an alternative for financing. So, we control for the expansion of the stock and bond markets by including the total new equity issuance for the year and the bond issuance for the year. Specifically, we estimate the following partial adjustment model:

$$\begin{aligned} Lev_{i,t} - Lev^{p}{}_{i,t-1} = (&\gamma_0 + \gamma_1 BC\_Index_{i,t} + \gamma_2 GDP\_per\ capita_{i,t} + \gamma_3 Bond\_Issue_{i,t} \\ &+ \gamma_4 Stock\_Issue_{i,t}) \times (Lev^{*}{}_{i,t} - Lev^{p}{}_{i,t-1}) + \varepsilon_{i,t}. \end{aligned} \tag{7}$$

Panel D of Table VI reports results from estimating Equation (7). For the full sample, the table reports that when economic activity is high, firms' leverage adjustment speeds are indeed faster (i.e., the coefficient on the interaction term between *GDP_per capita* and *Active deviation* is positive but not statistically significant). More important, bank competition, in and of itself, still retains positive explanatory power on leverage adjustment speed (i.e., the coefficient on the interaction term between *BC_Index* and *Active deviation* is positive and statistically significant). Just as important, the results in the second and third columns again reveal that high bank competition speeds up leverage adjustments for only underlevered firms, consistent with Panel A of Table V. Somewhat surprisingly, while the coefficients on the interaction term between *GDP_per capita* and *Active deviation* are positive for both overlevered and underlevered firms, they are not statistically significant. We include economic activity in all our remaining analysis.

2. Corporate Governance

Many aspects of the business environment were changing during our sample period. Joining the World Trade Organization in 2001 started many institutional processes in China, including those in corporate governance (Jiang and Kim, 2015). One concern might be that improved leverage adjustment speeds for underlevered firms might be driven more by a changing corporate governance than by an increasing bank competition. To explore this issue, we add four corporate governance variables. Two variables represent the monitor function, the portion of institutional investor ownership and the ratio of independent directors on the board. We also include the portion of ownership by the largest owner to represent control of the firm. Our last corporate governance variable represents manager incentives represented by the log of executive pay. Specifically, we

[16] We standardize the GDP measure so that it has zero mean and unit variance.

Table VI. Robustness Tests for Bank Competition and Leverage Adjustment Speed

This table reports ordinary least squares regression results where the dependent variable is firm's change in active book leverage, ΔActive leverage (i.e., $Lev_{i,t} - Lev^{p}_{i,t-1}$), and the independent variables are 1) firm's active deviation from its target leverage ratio, Active deviation (i.e., $Lev^{*}_{i,t} - Lev^{p}_{i,t-1}$), and 2) an interaction term between BC_Index and Active deviation. The second (third) column of results represents firm-years with leverage below (above) target leverage. Panel A includes economic control variables interacted with active deviation. GDP_per capita is province-level gross domestic product per capita by year. Stock_issue is the total new equity issuance for each year. Bond_issue is the total bond issuance for each year. Panel B includes corporate governance control variables including the portion of institutional investor ownership, the ratio of independent directors on the board, the portion of ownership by the largest owner, and log executive pay. All other variables are defined in Table I. Standard errors are bootstrapped to account for generated regressors (1,000 replications). *p*-Values are reported in parentheses.

Panel A. Economic Controls

	All	Underlevered	Overlevered
Active deviation	0.308***	0.268***	0.480***
	(0.000)	(0.000)	(0.000)
BC_Index × Active deviation	0.016*	0.016**	−0.014
	(0.099)	(0.021)	(0.493)
GDP_per capita × Active deviation	0.011	0.002	0.014
	(0.347)	(0.830)	(0.412)
Bond_Issue × Active deviation	−0.003	0.024	−0.006
	(0.805)	(0.281)	(0.831)
Stock_Issue × Active deviation	0.036**	−0.022	0.041
	(0.011)	(0.389)	(0.127)
Year-fixed effects	Yes	Yes	Yes
Adjusted R^2	0.312	0.191	0.328

Panel B. Corporate Governance

	All	Underlevered	Overlevered
Active deviation	0.307***	0.299***	0.434***
	(0.000)	(0.000)	(0.000)
BC_Index × Active deviation	0.007	0.011**	−0.008
	(0.559)	(0.028)	(0.731)
GDP_per capita × Active deviation	0.027**	0.004	0.041**
	(0.016)	(0.783)	(0.020)
Institutional investors × Active deviation	−0.004	0.023***	−0.027**
	(0.530)	(0.009)	(0.016)
Top 1 shareholder × Active deviation	−0.024***	−0.003	−0.033**
	(0.002)	(0.706)	(0.035)
Executive pay × Active deviation	−0.036***	−0.003	−0.063***
	(0.000)	(0.752)	(0.000)
Independent director ratio × Active deviation	0.025***	0.014**	0.020
	(0.000)	(0.045)	(0.248)
N	10,499	6,089	4,410
Adjusted R^2	0.334	0.215	0.347

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

estimate the following partial adjustment model:

$$Lev_{i,t} - Lev^{p}{}_{i,t-1} = (\gamma_0 + \gamma_1 BC\_Index_{i,t} + \gamma_2 GDP\_percapita_{i,t} + \gamma_3 Institutional\_investors_{i,t} + \gamma_4 Top1\_shareholder_{i,t} + \gamma_5 Executive\_pay_{i,t} + \gamma_6 Independent\_director_{i,t}) \times (Lev^{*}{}_{i,t} - Lev^{p}{}_{i,t-1}) + \varepsilon_{i,t}. \quad (8)$$

Panel E shows that the coefficient for the bank competition index remains significantly positive for the underleveraged firms. Thus, the relationship between the speed of leverage adjustment and bank competition remains robust to a changing corporate governance environment. It is worth noting that more monitoring, as measured by institutional ownership and board independence, also increases the speed of leverage adjustment for underleveraged firms.

3. Robustness Tests Not Tabulated

In this subsection, we briefly mention other robustness tests. For example, irrespective of loan supply issues, a firm's leverage can change without an "active" capital structure decision. When a firm posts positive earnings to shareholder equity, all else equal, our measure of the leverage ratio shows a deviation. This deviation represents a "passive" leverage adjustment. We use "active" deviation measures in our study. Therefore, as a robustness test, we use the passive leverage deviations, instead of the active deviations, for the analysis. These results are consistent with our prior findings using only the active deviations of leverage.

Although our analysis focuses on bank competition, firm-specific characteristics are also likely to impact the speed of leverage adjustment. To assess the confounding effects of firm characteristics, we include variables to measure firm size, profitability, and value. In results not tabulated, it appears that the firm-specific variables are related to the speed of adjustment. Larger firms that are underleveraged to their target move more quickly to that target. However, larger firms that are overleveraged adjust more slowly. Less profitable firms adjust more quickly when they are underleveraged. This makes sense as the lower profits motivate changes in the firm. Last, more highly valued firms adjust more quickly. Nevertheless, bank competition is still an important factor in an underleveraged firm's speed of adjustment to the target.

Capital structure management is conducted with the information set at the time, and the level of bank competition is likely to be included. This causality between leverage adjustment decisions and bank competition might be a source of endogeneity in our model. The first-stage regression determining the target leverage already uses lagged variables to ensure that information is available to decision makers. In this robustness check, we lag the bank competition variable one period in the second regression stage. Using lagged bank competition makes our results stronger.

We also examine whether the results are robust to an alternative measure of firm leverage. We examine an alternative leverage ratio that uses bank loans instead of total debt. The results of this robustness test show that higher bank competition is associated with faster adjustments to target leverage, and this finding is primarily driven by firms that are under that target. These results using bank loans as the debt in the leverage ratio are consistent with our main findings.

To examine the enforcement of cross-province contract laws regarding banking, we utilize a provincial law enforcement index obtained in the same report that contains our banking competition data. The law enforcement index is highly positively correlated with bank competition.

However, after including law enforcement in out speed of leverage adjustment regressions, we find that its coefficients are not significant, and our variables of interest remain economically and statistically unchanged.

Our last robustness test examines the number of bank branches in each province as an alternative measure of bank competition. The results are consistent with our conjecture that bank competition speeds up the leverage adjustment for underlevered firms.

These robustness tests confirm our findings that increases in bank competition leads to increased speed of leverage adjustments to firms' targets. It is primarily the underleveraged firms that increase their adjustment speed.

E. A Natural Experiment: Change in Bank Competition due to an Exogenous Shock

Another way to test whether high bank competition drives faster leverage adjustment speeds is to identify an exogenous shock to the banking sector that might suddenly and dramatically alter the banking landscape. When China joined the World Trade Organization in 2001, China agreed to allow foreign banks to conduct business using local Chinese currency. This deregulation eventually takes place in 2006, and thereby it effectively allows foreign banks to compete with local Chinese banks on a level playing field. During 2006, nine provinces had no foreign banks, 15 provinces had one to five foreign banks, and seven provinces had eight or more foreign banks.[17] Note that no provinces had six or seven foreign banks, thus creating a gap for a natural cutoff differentiating the provinces into two groups with few foreign banks and many foreign banks. In provinces with no or few foreign banks, the 2006 deregulation was unlikely to immediately affect bank competition much. However, in provinces with many foreign banks in 2006, the level of bank competition spikes in 2006.

To determine whether the 2006 deregulation leads to an increase in leverage adjustment speed in those provinces with many foreign banks, we include the following three-way interaction term in our regression model: *D_Foreign-bank* × *D_After-2006* × *Active deviation*, where *D_Foreign-bank* is a dummy variable equal to one (zero) if the province is Beijing or has at least (fewer than) eight foreign banks, and *D_After-2006* is a dummy variable equal to one (zero) if the year is at least after (before) 2006. Specifically, we estimate the following partial adjustment model:

$$\begin{aligned} Lev_{i,t} - Lev^{p}{}_{i,t-1} = (\gamma_0 + \gamma_1 D\_Foreign - bank_{i,t} + \gamma_2 D\_After - 2006_{i,t} \\ + \gamma_3 D\_Foreign - bank_{i,t} \times D\_After - 2006_{i,t} \\ + \gamma_4 GDP\_per\ capital_{i,t}) \times (Lev^{*}{}_{i,t} - Lev^{p}{}_{i,t-1}) + \varepsilon_{i,t}. \end{aligned} \tag{9}$$

A positive coefficient γ_3 indicates that high bank competition resulting from the exogenous shock leads to faster leverage adjustment speeds. Table VII reports results from estimating Equation (10).

Panel A of Table VII reports faster leverage adjustment speeds after 2006 (i.e., the coefficients on the interaction term *D_After-2006* × *Active deviation* are positive and statistically significant). The most important finding from Panel A is that underlevered firms located in provinces with many foreign banks have faster leverage adjustment speeds after the 2006 deregulation compared

[17] The seven provinces with eight or more foreign branches are Shanghai (55), Beijing (25), Shenzhen (22), Guangzhou (18), Tianjin (14), Xiamen (9), and Dalian (8).

Table VII. Exogenous Shock to Bank Competition and Leverage Adjustment Speed

This table reports ordinary least squares regression results where the dependent variable is firm's change in active book leverage, ΔActive leverage (i.e., $Lev_{i,t} - Lev^p_{i,t-1}$), and the independent variables are 1) firm's active deviation from its target leverage ratio, Active deviation (i.e., $Lev^*_{i,t} - Lev^p_{i,t-1}$), 2) an interaction term between D_Foreign-bank and Active deviation, 3) an interaction term between D_After-2006 and Active deviation, 4) a three-way interaction term between D_Foreign-bank, D_After-2006, and Active deviation, and 5) an interaction term between GDP_per capita and Active deviation. D_Foreign-bank is equal to 1 (zero) when the firm is (is not) located in Beijing or a province with at least eight foreign banks in 2006. D_After-2006 is equal to 1 (zero) when the year is at least (before) 2006. All other variables are defined in Table I. The second (third) column of results represents firm-years with leverage below (above) target leverage. Standard errors are bootstrapped to account for generated regressors (1,000 replications). *p*-Values are reported in parentheses.

Panel A. Exogenous Shock to Bank Competition

	All	Underlevered	Overlevered
Active deviation	0.260***	0.250***	0.446***
	(0.000)	(0.000)	(0.000)
D_Foreign-bank × Active deviation	0.002	−0.023	−0.006
	(0.927)	(0.351)	(0.907)
D_After-2006 × Active deviation	0.107***	0.075***	0.078**
	(0.000)	(0.001)	(0.034)
D_Foreign-bank × D_After-2006 × Active deviation	−0.018	0.035*	−0.045
	(0.593)	(0.069)	(0.448)
GDP_per capita × Active deviation	0.013	0.012	0.016
	(0.306)	(0.360)	(0.374)
N	12,463	7,408	5,055
Adjusted R^2	0.310	0.187	0.319

Panel B. Limits Sample to 2005-2007

	All	Underlevered	Overlevered
Active deviation	0.297***	0.336***	0.417***
	(0.000)	(0.000)	(0.000)
D_Foreign-bank × Active deviation	0.122*	−0.119**	0.284***
	(0.056)	(0.044)	(0.000)
D_After-2006 × Active deviation	0.087*	0.075	0.075
	(0.064)	(0.135)	(0.304)
D_Foreign-bank × D_After-2006 × Active deviation	0.014	0.279***	−0.148
	(0.855)	(0.002)	(0.161)
GDP_per capita × Active deviation	−0.062**	0.002	−0.084***
	(0.013)	(0.950)	(0.005)
N	2,445	1,155	1,290
Adjusted R^2	0.353	0.243	0.381

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

to firms located in other provinces (i.e., the coefficient on the three-way interaction in the second column is positive and statistically significant).

The analysis might suffer from many confounding events occurring near the 2006 foreign bank deregulation. Examples include Chinese banks being allowed to conduct IPOs in 2004, a change in the corporate tax code in 2008, and the financial global crisis of 2007-2009 (see Lin, 2011). Therefore, we narrow the window of this analysis to 2005-2007 to focus on the time periods immediately surrounding the 2006 foreign bank deregulation. Panel B of Table VII shows the results. The significance levels of our tests are lower in Panel B because of the dramatic drop in power when using only about 20% of the observations. Nevertheless, the first column coefficient for *D_After-2006* × *Active deviation* is positive and significant at a 10% level. The second and third column estimates for underlevered and overlevered firms, respectively, are both positive and of the same magnitude as in the full sample estimation shown in Panel A. However, these estimates are not statistically significant in this reduced sample. Last and consistent with the estimates from the full sample, the coefficient on the three-way interaction in the second column is positive and statistically significant. This confirms that underlevered firms located in provinces with many foreign banks have faster leverage adjustment speeds after the 2006 deregulation. In summary, for our test based on this natural experiment, where a change in bank competition exogenously occurs, we come to the same conclusion as our primary analysis.

F. Subsample Tests

1. Small Firms

Small firms sometimes have trouble in obtaining bank loans, especially at low costs (Black and Strahan, 2002; Cetorelli and Strahan, 2006). In the case of low competition, banks earn monopoly rents and become relatively conservative in their lending. However, high bank competition results in more risky lending (Boyd and Nicoló, 2005). Therefore, small firms should benefit from bank competition. To test this theory, we include the following three-way interaction term in our regression model: *BC_Index* × *D_small* × *Active deviation*. We must be careful in specifying the dummy variable *D_small* to indicate small firms because, on average, non-SOEs are much smaller than SOEs. In our sample, SOEs (non-SOEs) have a mean total asset value of 4.94 billion yuan (2.06 billion yuan). Therefore, to make sure any small firm findings are not being driven simply by a non-SOE effect, we specify the *D_small* dummy in the following way. For the sample of SOEs-only (non-SOEs-only) firms, *D_small* is equal to 1 when a firm's total assets is smaller than the median total assets of all SOEs (non-SOEs) in the same year and same industry, and zero otherwise. Thus, SOEs and non-SOEs are equally represented in the small firm category. We estimate the following partial adjustment model:

$$Lev_{i,t} - Lev^{p}{}_{i,t-1} = (\gamma_0 + \gamma_1 BC\_Index_{i,t} + \gamma_2 D\_small_{i,t} + \gamma_3 BC\_Index_{i,t} \times D\_small_{i,t} + \gamma_4 GDP\_per\ capita_{i,t}) \times (Lev^{*}{}_{i,t} - Lev^{p}{}_{i,t-1}) + \varepsilon_{i,t}. \quad (10)$$

A positive coefficient, γ_3, indicates that small firms experience faster adjustment speeds when bank competition is high. Table VIII reports the results from estimating Equation (10).

The first column of results in Table VIII shows that small firms have faster leverage adjustment speeds when bank competition is high (i.e., the coefficient on the three-way interaction term is positive and statistically significant). Note that this is consistent with the theory that bank lending risk increases with bank competition. The second and third columns show that the underlevered

Table VIII. Bank Competition and Leverage Adjustment Speed for Small Firms

This table reports ordinary least squares regression results where the dependent variable is firm's change in active book leverage, ΔActive leverage (i.e., $Lev_{i,t} - Lev^{p}_{i,t-1}$), and the independent variables are 1) firm's active deviation from its target leverage ratio, Active deviation (i.e., $Lev^{*}_{i,t} - Lev^{p}_{i,t-1}$), 2) an interaction term between BC_Index and Active deviation, 3) an interaction term between D_small and Active deviation, 4) a three-way interaction term between BC_Index, D_small, and Active deviation, and 5) an interaction term between GDP_per capita and Active deviation. D_small is specified in the following way: for the sample of SOEs-only (non-SOEs-only), D_small is equal to 1 when a firm's total assets is smaller than the median total assets of all SOEs (non-SOEs) in the same year and same industry, and zero otherwise. This way, small firms are equally represented by SOEs and non-SOEs. All other variables are defined in Table I. The second (third) column of results represents firm-years with leverage below (above) target leverage. Standard errors are bootstrapped to account for generated regressors (1,000 replications). p-Values are reported in parentheses.

	All	Underlevered	Overlevered
Active deviation	0.262***	0.265***	0.376***
	(0.000)	(0.000)	(0.000)
BC_Index × Active deviation	−0.004	0.003	0.007
	(0.689)	(0.767)	(0.754)
D_small × Active deviation	0.057***	0.001	0.121***
	(0.000)	(0.912)	(0.000)
BC_Index × D_small × Active deviation	0.030**	0.027**	−0.014
	(0.015)	(0.041)	(0.551)
GDP_per capita × Active deviation	0.029***	0.018	0.025
	(0.005)	(0.222)	(0.147)
N	12,463	7,408	5,055
Adjusted R^2	0.308	0.184	0.322

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

firms drive these results, consistent with our earlier findings. The increase in adjustment speed for underlevered small firms is statistically and economically significant. Also, note that small firms' adjustment speeds are much faster than other firms' adjustment speeds (i.e., the coefficient on the three-way interaction is 0.027 compared to the 0.003 coefficient on the interaction between *BC_Index* and *Active deviation*). That is, small firms benefit more than large firms when bank competition is high. When bank competition is low, large firms can probably still access bank debt relatively easily compared to small firms.

We replace *BC_Index* with *ETC* and find that the coefficient on the three-way interaction term is negative. This finding suggests that reducing transactions costs can be one mechanism for underlevered small firms to increase their leverage adjustment speeds. As an aside, note that this finding also supports using ETC as a proxy for transactions costs, as we would normally expect smaller firms to suffer from larger transactions costs. We do not report these findings due to the much-reduced sample size and to conserve space.

Finally, Table VIII shows an additional interesting finding. The interaction term between *D_small* and *Active deviation* is positive and statistically significant among overlevered firms. Regardless of bank competition, overlevered small firms move to their target leverage faster. This result suggests that small firms (compared to large firms) are particularly keen on reducing their debt ratios when they are overlevered, as small firms usually have higher financial distress costs.

Table IX. Bank Competition and Leverage Adjustment Speed for Non-SOEs

This table reports ordinary least squares regression results where the dependent variable is firm's change in active book leverage, ΔActive leverage (i.e., $Lev_{i,t} - Lev^p{}_{i,t-1}$), and the independent variables are 1) firm's active deviation from its target leverage ratio, Active deviation (i.e., $Lev^*{}_{i,t} - Lev^p{}_{i,t-1}$), 2) an interaction term between BC_Index and Active deviation, 3) an interaction term between D_nonSOE and Active deviation, 4) a three-way interaction term between BC_Index, D_non-SOE, and Active deviation, and 5) an interaction term between GDP_per capita and Active deviation. D_nonSOE is equal to 1 (zero) when the firm is a non-SOE (SOE). All other variables are defined in Table I. The second (third) column of results represents firm-years with leverage below (above) target leverage. Standard errors are bootstrapped to account for generated regressors (1,000 replications). *p*-Values are reported in parentheses.

	ALL	**Underlevered**	**Overlevered**
Active deviation	0.271***	0.250***	0.445***
	(0.000)	(0.000)	(0.000)
BC_Index × Active deviation	0.002	0.008	−0.011
	(0.872)	(0.401)	(0.629)
D_nonSOE × Active deviation	0.061***	0.036**	0.066**
	(0.000)	(0.017)	(0.022)
BC_Index × D_nonSOE × Active deviation	0.025*	0.025**	−0.002
	(0.075)	(0.010)	(0.950)
GDP_per capita × Active deviation	0.024**	0.016	0.022
	(0.015)	(0.138)	(0.199)
N	12,463	7,408	5,055
Adjusted R^2	0.308	0.185	0.318

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

2. Non-SOEs

Most banks are partially state owned and may consider them a lower lending risk, so non-SOEs may have a hard time obtaining bank loans, especially at low costs. As bank competition increases and they take on more lending risk, non-SOEs should benefit.[18] To determine whether non-SOEs benefit from high bank competition, we include the following three-way interaction term in our regression model: *BC_Index* × *D_nonSOE* × *Active deviation*, where *D_nonSOE* is equal to one (zero) when the firm is a non-SOE (SOE). Specifically, we estimate the following partial adjustment model:

$$\begin{aligned} Lev_{i,t} - Lev^p{}_{i,t-1} = {} & (\gamma_0 + \gamma_1 BC\_Index_{i,t} + \gamma_2 D\_nonSOE_{i,t} + \gamma_3 BC\_Index_{i,t} \\ & \times D\_nonSOE_{i,t} + \gamma_4 GDP\_per\ capita_{i,t}) \\ & \times (Lev^*{}_{i,t} - Lev^p{}_{i,t-1}) + \varepsilon_{i,t}. \end{aligned} \quad (11)$$

A positive coefficient, γ_3, indicates that non-SOEs experience faster adjustment speeds when bank competition is high. Table IX reports results from estimating Equation (11).

[18] A firm is identified as an SOE if its ultimate controlling shareholder is the government.

The first column of results in Table IX shows that non-SOEs have faster leverage adjustment speeds when bank competition is high (i.e., the coefficient on the three-way interaction term is positive and statistically significant). This is consistent with the theory that banks increase lending risk when bank competition is high. The second and third columns show that the underlevered firms drive these results, consistent with our earlier findings. The increase in adjustment speed for underlevered non-SOEs is statistically and economically significant. That is, non-SOEs benefit more than SOEs when bank competition is high. When bank competition is low, SOEs can probably still access bank debt relatively easily compared to non-SOEs.

We again replace *BC_Index* with *ETC* and find that the coefficient on the three-way interaction term is negative. This finding suggests that a reduction in transactions costs can be a mechanism that allows underlevered non-SOEs to increase their leverage adjustment speeds. Note that this finding again supports using ETC as a proxy for transactions costs, as non-SOEs in China are known to suffer from larger transactions costs (e.g., Allen et al., 2005; Cull, Xu, and Zhu, 2009). We do not report these findings due to the much-reduced sample size and to conserve space.

Table IX also shows another interesting result. Note that the interaction term between *D_nonSOE* and *Active deviation* is positive and statistically significant in all three columns. This means that regardless of the level of bank competition, non-SOEs tend to be more active in adjusting their capital structure to the target leverage than SOEs.

IV. Conclusions

In addition to firm-specific factors, credit market conditions also affect corporate capital structure. We focus on an integral feature of credit market conditions—namely, bank competition—to determine whether it influences firms' leverage adjustment speeds to capital structure targets. Bank competition should, per conventional industrial organization theories, increase banks' willingness to lend to individual firms and to lend at lower costs. Higher bank competition should allow firms to obtain bank debt quickly and cheaply when they need or desire it. Indeed, we show that underleveraged firms borrow more when bank competition increases. Therefore, if firms are below their target leverage ratios, they should be able to move toward their targets faster when the banking sector is competitive.

Using all listed firms with available data from China's two stock exchanges, during the period 1998-2009, we find that leverage adjustment speeds in China are very similar to results documented for US firms. More important, we find higher bank competition is associated with faster leverage adjustment speeds but only for underlevered firms. When bank competition is higher, underlevered firms move toward their target leverage ratios faster, consistent with our hypothesis.

To alleviate concerns of causality and endogeneity, we identify an exogenous shock to bank competition, specifically, a deregulation that took place in 2006. Foreign banks were suddenly able to compete with local banks on a level playing field. However, not every province had many foreign banks. We find that underlevered firms in those provinces with many foreign banks exhibit faster adjustments speeds after 2006 relative to firms in other provinces. This finding is consistent with our hypothesis that bank competition and firms' leverage adjustment speeds are positively correlated, particularly for underlevered firms.

Overall, our paper has several important implications for policy. When banks compete, firms can stay close to their optimal capital structure. Thus, as in the case of our study, policy makers can work to remove restrictions currently imposed on domestic and foreign banks, making the industry more competitive. However, our results on the increase of competition affecting small and presumably poorer credit quality firms may also serve as a caution to encouraging competition indiscriminately.

Appendix

We first run Model 4 to estimate target leverage and then use the predicted values, $\widehat{L}\ ev^*_{i,t}$, to estimate Model 2. The estimation of Model 4 includes firm fixed effects and, based on the recommendation of Flannery and Hankins (2012), is estimated using a generalized method of moments estimation method similar to Blundell and Bond's (1998). Flannery and Hankins (2012) advocate the corrected least squares dummy variable correction (LSDVC) for the fixed effects bias found in short dynamic panels. Note that this correction provides only variable coefficients used for prediction but not standard deviations. Thus, there are no *p*-values available for the first run model estimates for predicting target leverage. The table shows those coefficients. We use the estimates in the first column. However, we did robustness tests by adding additional variables shown in the second and third columns. Note the stability of the estimates across models.

Dependent Variable Is Lev			
Lagged Lev	0.781	0.781	0.781
Lagged EBIT_TA	−0.083	−0.083	−0.082
Lagged MB	−0.010	−0.010	−0.011
Lagged DEP_TA	−0.465	−0.465	−0.464
Lagged LnTA	0.015	0.015	0.015
Lagged FA_TA	−0.016	−0.016	−0.016
Lagged Industry median Lev	0.142	0.143	0.144
Lagged R&D_TA		0.227	0.231
Lagged R&D_Dum		0.002	0.002
Lagged BC_Index			0.001
Year Dummies	Yes	Yes	Yes
N	12,474	12,474	12,463

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