Bank Supervision and Information Content in Bank Stock Price: Global Evidence

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Abstract

Banks are inherently more opaque than non-bank firms, but government regulation mitigates this information asymmetry problem (Flannery et al., 2004). This paper examines the informational role of bank regulators in 34 countries. Using bank stock return synchronicity (R^2 statistics of the expanded market model) as a proxy for the amount of bank-specific information that is impounded into stock prices, we find that the traditional approach to bank supervision, which directly discipline banks by taking specific actions against bank management, bank owners, and bank auditors, mainly help generate market-wide information. Our results suggest that bank regulators should carefully exert their supervisory powers because those have significant market-wide influence. Additionally, we find that a supervisory strategy that forces banks to disclose accurate information and induces the private sector monitoring tends to help generate more bank-specific information. This relationship is more pronounced in countries with sound legal institutions. This study's results help shed light on the debate on the effectiveness of mandated information disclosure by government regulation in improving the banking sector's transparency.

Keywords: Bank supervision, stock return synchronicity

JEL classification: G12; G14; G15; G21; G38; N20

1. Introduction

Banks are inherently more opaque than non-bank firms, but government regulation mitigates this information asymmetry problem (Flannery et al., 2004). Specifically, bank regulators mainly have two different kinds of supervisory policies to alleviate banks' opacity. The first one is the traditional approach to bank supervision, which directly takes specific actions against banks and makes public all formal enforcement actions. Bank regulators can also obtain information from external auditors and partially disclose information from the banks' regulatory reports. In this way, bank regulators directly disclose information about banks. Thus, bank regulators have become a unique information channel bridging bank inside information and investors, which does not exist in non-bank firms. The second one is to force banks to disclose accurate information to the private sector such as setting up rules that bank officials are legally liable for the accuracy of information disclosed to the public. Bank regulators also induce private sector monitoring of banks such as making subordinated debt allowable (which may create a class of private monitors). In this way, bank regulators do not directly generate any information about banks; instead, they force banks to disclose accurate information themselves and induces private sector to get information from the banks.

A lot of studies have shown the active role of bank regulators in the bank information production process (Jordan et al., 1999; SGD, 2000; Deyoung et al., 2001). [2] An important but unexplored issue is the nature of the information (whether it has more

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[2] Jordan et al. (1999) find that improving disclosure of supervisory information at troubled U.S. banks during the banking crisis was not destabilizing and did provide conditions for market discipline to work more effectively. SGD (2000) stressed the importance of banking regulatory reports for securities analysts, rating agencies, and institutional investors in preparing their evaluation because the reports allow direct comparison among banks when comparability is lacking in annual reports. Deyoung et al. (2001) show that on-site examinations do produce value-relevant information about the future safety and soundness of banks several quarters before this information is impounded in debenture prices.

market-wide or bank-specific information content) that is produced by different bank supervisory policies. Although the availability of bank-specific information is beneficial for banking industry safety and investors' analysis about banking industry (Flannery, 1998), bank regulators' special incentive would affect the nature of the information their examination process is designed to capture. Specifically, bank supervisors care much more about risks to the safety, that is, situations in which a bank is going to fail than whether banks have average, good, excellent profits. Also, investors might interpret disclosure of severe problems at some banks by bank regulators as indicating widespread banking problems.

The nature of the information conveyed by different supervisory policies is a very important issue in the bank supervisory process. First, it is important to know which supervisory practice can help generate bank-specific information because the availability of bank-specific information is beneficial to improve market discipline for individual banks. Although the banking industry wide information is helpful to mitigate banks' opaqueness, bank-specific information is more useful to increase individual banks' transparency. Second, it is important to know which supervisory practice has more market-wide information content because bank regulators would use these supervisory practices more carefully in order not to disturb the whole economy. Thus, this can avoid some potential big mistakes made by bank supervisors.

In this paper, we use bank-level data across 34 countries to examine the impact of bank supervision on banks' information environment. We use stock return synchronicity (R^2 statistics of the expanded market model) as a proxy for the amount of bank-specific information that is impounded into stock prices (it is actually a ratio of market-wide

information to the sum of market-wide and firm-specific information).[3] Higher (lower) stock return synchronicity implies relatively more market-wide information content (bank-specific information content).

We obtain bank supervisory data from Barth et al. (2005). These data include information about official supervisory power, such as bank regulators' ability to intervene in banks, stop dividends and other payments, replace managers, and acquire information, etc. There are also some variables about the degree to which supervisory agencies force banks' accurate information disclosure and induce private sectors to monitor banks. Specifically, these variables include whether bank officials are legally liable for the accuracy of information disclosed to the public, whether subordinated debt is allowable (which may create a class of private monitors) and so on.

Econometrically, we use OLS regression to estimate our empirical model. When we compute standard errors, we cluster by country to avoid correlation problems in stock return synchronicity within countries. Our dependent variable is bank stock return synchronicity. The two main explanatory variables are measures of (1) supervisory powers and (2) the degree to which bank regulators require information disclosure and induce private creditors to monitor banks. We also control for some bank- and country-specific factors. Additionally, we use instrumental variables to avoid potential endogeneity problems.

We find that supervisory power is positively associated with bank stock return synchronicity and the legal and government systems do not have the impact on this relationship. This result suggest that traditional approach to bank supervision, which

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[3] Morck et al. (2000) also uses other synchronicity measure, however, those measures are essentially the same as R^2. So, we focus on R^2 in this paper.

directly discipline banks by taking specific actions against bank management, bank owners, and bank auditors, mainly help generate market-wide information. Thus, bank regulators should carefully exert their supervisory powers because those have significant market-wide influence. Specifically, on the one hand, they should avoid some improper bad information disclosure for individual banks because investors might interpret disclosure of severe problems at some banks as indicating widespread banking problems. On the other hand, bank regulators should actively discipline banks because those can stable the whole economy beyond bank-specific monitoring.

The paper also presents evidence that there is a negative relationship between the degree to which bank regulators require information disclosure and induce private creditors to monitor banks and bank stock return synchronicity. This result implies that the supervisory strategy that forces banks to disclose accurate information and induces private sector monitoring of banks tends to help generate more bank-specific information. Additionally, we find that this relationship is more pronounced in the countries with sound legal system.

This research contributes to the literature in important ways. This is the first paper to examine the nature of the information generated by bank regulators, which is a unique information channel for banks. Thus, this paper complements the existing literature that has provided the findings about the nature of the information generated by analysts, insiders and institutional investors using stock return synchronicity measures. [4]Additionally, this paper is related to several recent researches. They show that financial

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[4] Chan and Hameed (2006) find that in emerging markets, analysts help mainly generate greater (lesser) market-wide (firm-specific) information. Piotroski and Roulstone (2004) find that in the U.S., although the presence of insiders and large institutional investors has the effect of increasing the amount of firm-specific information that is incorporated into stock prices, security analysts decrease that amount.

development and the integrity of bank lending is (1) positively associated with supervisory policies that force information disclosure and induce private sector monitoring and (2) negatively associated with supervisory policies that directly discipline banks (Barth et al, 2004; Beck et al, 2006).

This paper is organized as follows. Section 2 describes related literature and develops hypotheses. Section 3 presents the data. The methodology and results are described in Section 4. Section 5 concludes.

2. Related Literature and Hypothesis Development

2.2. Stock return synchronicity as a measure of information content

Roll (1988) argues that the extent to which stock movements synchronize with the market is dependent on the relative amounts of firm-specific and market-level information incorporated into the stock price. Empirical evidence supports the use of stock return synchronicity as a measure of information content in stock prices (Morck et al., 2000; Jin and Myers, 2006; Wurgler, 2000; Chen et al., 2006). However, some scholars argue that firm-specific stock price variations might reflect noise, thereby causing stock prices to deviate from their fundamental values (DeLong et al., 1990; Shleifer and Vishny, 1997). Because noise trading is firm specific, it tends to decrease the synchronicity of stock price movements. Durnev et al. (2003) find that greater firm-specific return variation is correlated with more informed stock pricing. Hence, they support the argument that higher stock return synchronicity (higher R^2 statistics of the expanded market model) is associated with lower level of firm-specific information content of stock prices (higher market-wide information).

Empirical evidence also supports that stock price can reflect the information conveyed by bank regulators. For example, Berger and Davies (1998) find that bank examination ratings by supervisory agency predict changes in market prices. Some scholars argue that some information collected by bank regulators is valuable for potential investors to evaluate a bank and would avoid duplication of information collection and analysis (Shadow Financial Regulatory Committee, 1996).

2.2. Official supervisory power

When bank supervisory agencies have strong supervisory power, they can directly take specific actions against banks and makes public all formal enforcement actions. They can also obtain information from external auditors and partially disclose information from the banks' regulatory reports. On a theoretical basis, it is unclear whether the presence of strong official supervisory power helps produce market-wide or bank-specific information. Given the scarcity of publicly available bank-specific news, due to the inherent opaqueness of banks, the benefits to be gained from collecting bank-specific information might be high so that there are strong incentives for government agencies to collect such information. That is, the inherent opaqueness of banks may lead to greater investor demand for bank regulators that produce bank-specific information. Another benefit to produce more bank-specific information is that it can facilitate market discipline from outside investors for banks, which can help bank regulators to supervise banks (Flannery, 1998).

On the other hand, bank supervisory agency has legal and regulatory powers that are not available to other parties (Prescott, 2008). Their special incentive would affect the

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nature of the information their examination process is designed to capture because bank supervisors care much more about risks to the safety, that is, situations in which a bank is going to fail than whether banks have average, good, excellent profits. From investors' perspective, they might interpret disclosure of severe problems at some banks as indicating widespread banking problems. Increased bank-specific bad information could create depositor runs or a collapse of stock prices, causing widespread bank failures (Calomiris and Mason, 1997; Gilbert and Vaughan, 1998). A good example is the recent financial crisis. When Federal Reserve Bank announced to bail out Bear Stearns, the whole financial market was down dramatically. In contrast, when SEC declared Enron's scandal, the entire market's drop is relatively small. Therefore, due to the possible bad consequence of producing bank-specific information, the information conveyed by the bank regulators might have more macroeconomic content than bank-specific details.

Taken together, it is not clear whether the traditional approach to bank supervision, which directly disciplines banks by taking specific actions against bank management, bank owners, and bank auditors, help generate market-wide or bank-specific information. In this paper, we want to empirically test it using stock return synchronicity as a proxy for the amount of bank-specific information that is impounded into stock prices. The hypotheses can be formalized as below:

Hypothesis 1A: The presence of strong official supervisory power is associated with higher bank stock return synchronicity.

Hypothesis 1B: The presence of strong official supervisory power is associated with lower bank stock return synchronicity.

In the discussion above, we assume that bank supervisors try to maximize social welfare. However, if bank supervisory agencies maximize their own private welfare,

strengthening the power of the supervisory agency may actually help them obtain private benefit from the banks with adverse implications on the governance of banks. Thus, bank regulators have less incentive to produce bank-specific information on the public's interest. In line with this thought, we can still get the prediction that stronger supervisory power is associated with higher bank stock return synchronicity. In extension, the relationship between supervisory power and stock return synchronicity should be less pronounced in countries with sound legal system because superior country-level governance can mitigate this corruption problems associated with stronger supervisory power. We formalized the hypothesis as below:

Hypothesis 1C: The relationship between supervisory power and bank stock return synchronicity should be less pronounced in countries with superior legal system.

2.2. Private monitoring

Another supervisory policy for bank regulators focuses on empowering private monitoring of banks by inducing banks to disclose accurate information to the public and provide incentives to the private sector to monitor banks, so that private agents can overcome information barriers. This view emphasizes that outside investors can get the information about banks directly if bank supervisors can force banks make reasonable information disclosure and provide enough incentive for them. This mechanism also depends on a sound legal system because it can assure that the government successfully enforces these laws for banks to disclose this information and corruptions would not offset the incentive provided for private sector by bank regulators. We formalized the hypothesis as below:

Hypothesis 2A: The presence of strong private monitoring is associated with lower bank stock return synchronicity.

Hypothesis 2B: The relationship between private monitoring and bank stock return synchronicity should be more pronounced in countries with superior legal system.

3. Data and summary statistics

In this paper, we investigate the impact of different supervisory policies on bank stock return synchronicity (R^2 statistics of the expanded market model). Bank stock return synchronicity is affected by several bank-specific and economy-wide factors. As such, it is important that we control for these factors. In the section, we discuss the variables used in our analysis. The definition and source of these variables can also be found in Appendix.

3.1. Bank stock synchronicity

We use R^2 statistics of the expanded market model to measure stock return synchronicity following Morck et al. (2000). We estimate the linear regression

$$r_{it} = \alpha_i + \beta_{1,i} r_{ind,jt} + \beta_{2,i} r_{m,jt} + \beta_{3,i} [r_{US,t} + e_{jt}] + \varepsilon_{it} \tag{1}$$

Where r_{it} represents the return of stock i at week t (Wednesday to Wednesday) and $r_{ind,jt}$ is value-weighted banking industry index excluding the bank in question at week t. We use weekly returns to deal with the potential thin trading problems. We calculate Wednesday to Wednesday return to overcome the impact of the potential seasonal effect like Monday Effect. To construct the banking industry index, country-year observations with less than 3 banks are excluded. This exclusion prevents spurious correlations between firm and industry returns in industries that contain few banks. These variables mentioned above are calculated for all stocks in our sample using DataStream's total

return index (RI), which includes dividends as well as price changes. Stocks that trade for less than 30 weeks during a particular year are excluded. Stock returns are trimmed at $\pm$ 25% to exclude coding errors in DataStream. $r_{m,jt}$ is a domestic market index return , and $r_{US,t}$ is the U.S market return.[5] For stock markets in the Far East, one-day lag U.S. market returns are used to account for time zone difference. ε_{it} is the rate of change in the exchange rate per U.S. dollar. When we use US data to calculate Equation (1), we set $\beta_{3,i}$ to zero.

The regression statistic for Equation (1), R_{ij}^2, measures the percent of the variation in the weekly returns of stock i in country j explained by variations in country j's banking industry return, the domestic market return and the U.S. market return. $(1- R_{ij}^2)$ measures the portion of bank-specific information has been incorporated into bank stock return. Because R^2 is within the interval [0, 1], we therefore apply logistic transformations to it using the formula as shown in Equation (2).

$$SYNCH = \log(\frac{R^2}{1-R^2}) \tag{2}$$

Logistic transformation of the R^2 in Equation (2) (*SYNCH*) can be further decomposed into $\log(\delta_m^2)$ and $\log(\delta_i^2)$, which is shown in Equation (3):

$$SYNCH_i = \log(\frac{R^2}{1-R^2}) = \log(\frac{\delta_m^2}{\delta_m^2 + \delta_i^2} \bigg/ 1 - \frac{\delta_m^2}{\delta_m^2 + \delta_i^2}) = \log(\delta_m^2) - \log(\delta_i^2) \tag{3}$$

where δ_m^2 is the variation in the return of bank i explained by market factors and δ_i^2 is the residual variation in the return of bank i.

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[5] We use S&P 500 index to calculate US market return for the results reported. When we use Dow Jones Industrial Average index to calculate US market return, we still get the same conclusion.

3.2. Bank supervisory policies

We use two indicators of supervisory practices to test the hypotheses outlined in Section 2, which is included in a survey conducted in 2003. We obtain the data from Barth et al. (2005). One key variable is *Supervisory Power*. This index measures supervisory agencies' power of taking specific measures to prevent and correct bank problems, such as the ability to intervene in bank, replace managers, stop dividends and other payments, acquire information, etc. If supervisors are empowered with strong authority to force banks to share more inside information discovered in on-site examinations or off-site surveillance, they might help to generate more information for outside investors, information that is not volunteered by banks in their publicly-available financial reports. Additionally, bank regulators make public all formal enforcement actions sometimes. This also conveys some information about banks to the public. This variable is constructed based on fourteen dummy variables and is the sum of the assigned values, with higher values indicating greater power.

The other key variable is *Private Monitoring*, which is designed to measure the degree to which bank regulators force banks to disclose accurate information and induce private sector to monitor banks. For example, whether bank directors and officials are legally responsible for the accuracy of disclosed information, whether banks must be rated and audited, whether subordinated debt is allowable that may create some private monitors, and whether there is no explicit deposit insurance, etc. Bank regulators do not directly generate any information about banks employing this supervisory policy; instead, they push banks to disclose accurate information and induces private sector to get

information from the banks. This variable is constructed based on eleven dummy variables and is the sum of the assigned values, with higher values indicating more private supervision.

3.3. Country-level control variables

We also controlled for the existing factors such as the logarithm of the total number of securities in a country's stock market (*Number of Stocks Listed*), the logarithm of GDP per capita (*GDP per capita*), variance in GDP per capita growth (*Variance in GDP Growth*) and finally a good government index (*Good Government Index*) that influence stock synchronicity mentioned by Morck et al. (2000). Specifically, we calculate the variable *Number of Stocks Listed* based on the data from DataStream. Higher synchronicity might simply reflect fewer traded stocks because each individual security is a more important part of the market index in a market with few securities. We calculate the variables *GDP per capita* based on the data from World Development Indicator (WDI) to measure economic development. To measure macroeconomic instability, we use *Variance in GDP Growth* for each country, with per capita GDP measured in nominal U.S. dollars from WDI, estimated from previous four years. Stocks in the countries with higher macroeconomic instability tend to have higher stock return synchronicity. We use the variance of the domestic inflation rate across the same period as a robustness check. The variable *Good Government Index* is the sum of three indexes from La Porta et al. (1998), each ranging from zero to ten. These indexes measure (1) government corruption, (2) the risk of expropriation of private property by the government, and (3) the risk of the government repudiating contracts. Low values for

each index indicate less respect for private property. This index measures the extent to which a country's politicians respect private property rights. Mock et al. (2001) show that Good Government Index is negatively associated with stock return synchronicity because outside investors have less incentive to trade stocks based on their private information and incorporate it into the stock price in countries with poor respect for property rights.

Jin and Myers (2006) show that besides poor governance, opaqueness of firms may result in the stock prices failing to accurately reflect on specific information and events being undertaken in the firm. Thus, we obtain the variable *Accounting Standards* from La Porta et al. (1998), which to a large extent is a consequence of country-level disclosure rules. This variable is an index created by examining and rating companies' annual reports on their inclusion or omission of 90 items by Center for International Financial Analysis and Research.

In the banking industry, there are several factors that might influence bank stock return synchronicity besides the existing determinants for general firms. If the country is more bank-oriented, then the whole economy more depends on banking sector and bank stock price are more aligned with the whole market. We use the index of domestic credit provided by banking sector (% of GDP) from WDI to measure the extent to which countries are bank-oriented (*Credit Provided by Bank*).

Additionally, we obtain the country-level ownership data from Barth et al. (2005). Specifically, the variable *State Ownership* is measured as the percentage of banking assets in banks that are fifty percent or more government owned. Higher state ownership worsens banks' corporate governance. This will impede outside investors to trade bank stocks based on the bank-specific information because these information may not be as

accurate as expected. The variable *Foreign Ownership* is measured as the percentage of banking assets in banks that are fifty percent or more foreign owned. Foreign-owned institutions may have superior governance mechanism and disclosure standards, especially in developing nations.

We obtain the variable *Banking Freedom* form Heritage Foundation. It is a measure of relative openness of banking and financial system of the country and measures whether foreign banks and financial services firms are able to operate freely, how difficult it is to open domestic banks and other financial services firms, how heavily regulated the financial system is, the presence of state-owned banks, whether the government influences allocation of credit, and whether banks are free to provide customers with insurance and invest in securities (Barth et al., 2001). Higher values mean few restrictions on banking.

Higher concentration in the banking industry in some economies may cause a high degree of bank stock price synchronicity. We construct a banking industry Herfindahl index (*Industry Concentration*) for each country using banks' total assets to control for these effects.

3.4. Firm-specific control variables

In our analysis, we control for several firm attributes. We obtain the data from Bankscope database to construct the variables as below. Specifically, we construct the variable *Size* as the logarithm of bank total assets. We predict that stocks of large banks are more likely to be aligned with the whole market because they have more influence on the whole market. We also control for bank-level disclosure index (*Disclosure*).

Following Nier (2005), this index is constructed for each bank in the sample based on whether banks report some or all of seventeen dimensions of accounting items in bankscope database. Morck et al. (2000) argue that if investors can obtain more firm-specific public information from firm disclosure, they might make more precise predictions regarding firm-specific stock price movements. This will help the incorporation of more firm-specific private information into the stock return. Actively traded stocks react to market information on a timely basis and are more synchronous with market movement. We define the variable *STDROA* as the standard deviation of a firm's ROAs over the preceding five-year period, including the current year. Banks' stock return will be less correlated with overall industry or market trends when the volatility of the banks' profitability increases. We define the variable *M/B* as market value of total assets divided by book value of total assets. Market value of total assets is the sum of market value of equity and total liability. We also construct some variables related to banks' opacity such as *Loan-to-Asset Ratio* (net total loan divided by book value of total asset), *Equity-to-Asset Ratio* (total equity divided by total assets), and *Loan Growth* (total loan growth rate).

Additionally, we obtain the data from IBES database and define the variable *Analyst* as the number of analysts who issued earnings forecasts for a bank during a given calendar year based on. Piotroski and Roulston (2004) and Chan and Hameed (2006) show that stocks which are followed by more analysts incorporate greater (lesser) market-wide (firm-specific) information. We also control for annual trading volume turnover (*VOL*) defined as the total number of shares traded in a year, divided by the total number of shares outstanding at the end of fiscal year, which is from DataStream.

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3.3. **Summary statistics**

After matching the available information for dependent and explanatory variables, we end up with a sample of 3368 observations over the period between 2003 and 2007. Our sample includes 688 banks across 34 countries. The sample constitutes over 85 percent of total banking assets of all countries and all major and important financial institutions are included. In our sample, 43 percent of banks are from US. This motivates us to do robustness tests in the sample without US banks. From summary statistics of Table 1, R^2 varies across banks with the mean value of 0.28 and standard deviation of 0.117. This suggests that bank stock return synchronicity differ a lot across banks. This is also true for logarithm of bank-specific variation and logarithm of market-wide variation. Their standard deviations are 0.446 and 0.847 respectively. One of our two key variables *Supervisory Power* varies between 5 and 14 with a mean of 10.5. The other one *Private Monitoring* varies between 6 and 11 with a mean of 8.5. We also report the summary statistics of our control variables, which are within the reasonable range reported in the existing literature.

Table 2 reports the correlation matrix between bank-level variables. Bank stock return synchronicity (*SYNCH*) is highly, positively correlated with the logarithm of market-wide variation, the logarithm of total assets (*Size*), bank-level disclosure index (*Disclosure*), the number of analyst following (*Analyst*), and growth opportunity (*M/B*). Bank stock return synchronicity (*SYNCH*) is highly, negatively correlated with trading volume (*VOL*) and variance of earnings (*STDROA*). Table 3 reports the correlation matrix between country-level variables. The signs of the correlations of stock price

synchronicity with the structural variables are largely as expected. Bank stock return synchronicity (*SYNCH*) is highly, positively correlated with *Supervisory Power*, *Variance in GDP growth*, and *State Ownership*. Bank stock return synchronicity (*SYNCH*) is highly, negatively correlated with the variables *Private Monitoring*, *Good Government Index*, *GDP per capita*, *Banking freedom,* and *Industry Concentration*.

4. Empirical analysis

4.1. Empirical model and main results

This paper examines the impact of bank supervision on banks' information environment. Our empirical model can be described by the following equation:

SYNCH =α+β$_1$ Supervisory Power+ β$_2$ Private Monitoring+ β$_3$ Credit Provided by Bank+ β$_4$ State Ownership+ β$_5$ Foreign Ownership + β$_6$ Banking Freedom +β$_7$ Good Government Index+ β$_8$ Number of Stocks Listed+ β$_9$ GDP per capita+ β$_{10}$ Variance in GDP Growth+ β$_{11}$ Accounting Standards+ β$_{12}$ Size + β$_{13}$ Disclosure + β$_{14}$ Analyst+ β$_{15}$ VOL+β$_{16}$ STDROA +β$_{17}$ M/B+β$_{18}$ Loan-to-Asset Ratio +β$_{19}$ Equity-to-Asset Ratio +β$_{20}$ Loan Growth+ ε (4)

In the regression, we control for year effect. We do not include either country-level or firm-level fixed effects in our regression since there is no time variation in the key country-level supervisory variables and legal indices. Thus, inclusion of either firm-level or country-level fixed effects would make it impossible to identify how supervisory variables affect bank stock return synchronicity. When we compute standard errors, we

cluster by country to avoid correlation problems in stock synchronicity within countries. Specifically, we do not require that error terms are independent across banks within the same country; rather, we require that error terms are independent across countries.

Table 3 shows the estimation results of Equation (4). The dependent variable is logistic transformation of R^2 (*SYNCH*). Higher (lower) value of *SYNCH* implies relatively more market-wide information content (bank-specific information content). In every regression we control for the firm-specific traits such as *Size*, *Disclosure, Analyst, VOL, STDROA, M/B, Loan-to-Asset Ratio, Equity-to-Asset Ratio, Loan Growth* as well as macroeconomic controls: *Good Government Index, Number of Stocks Listed, GDP per capita, Variance in GDP Growth, and Accounting Standards*. To this set of control variables, the first regression adds *Supervisory Power*, and the second one adds *Private Monitoring*, then other regressions add a variety of other control variables such as *Credit Provided by Bank*, *State Ownership*, *Foreign Ownership*, and *Banking Freedom*. In the last column, we repeat our regression in the sample without US banks. The results show that *Supervisory Power* enters positively and significantly in all of the regressions. This suggest that powerful supervisors, i.e., supervisors that have the power to directly discipline banks help generate more market-wide information instead of bank-specific information. In contrast, the coefficient of *Private Monitoring* is already negative and significant. This implies that the supervisory policy that forces banks to disclose accurate information and induces private sector to monitor banks help generate bank-specific information.

The effect of supervisory practices on bank stock return synchronicity is not only statistically significant, but also economically relevant. In order to assess the economic

importance of supervisory policies for bank stock return synchronicity, we use the results reported in column (6) of Table 4 to quantify the effect that *Supervisory Power* and *Private Monitoring* have on the level of bank stock return synchronicity. Specifically, we compute the change of the level in bank stock return synchronicity when changing bank supervisory policies based on the coefficients reported in column (6) of Table 4. For example, the estimates imply that one standard deviation increase in *Supervisory Power* increases bank stock return synchronicity by 2.477*0.151 or 0.347, roughly 6.2 percent of stock return synchronicity across banks. One standard deviation increase in *Private Monitoring* decreases bank stock return synchronicity by 1.799*0.146 or 0.263, roughly 4.4 percent of stock return synchronicity across banks. Taken together, these examples underline the importance that different supervisory policies have for bank stock return synchronicity.

We also observe that bank stocks in countries that are more bank oriented, higher state ownership, lower banking freedom and more developed are more aligned with the whole market. Large banks and banks with lower bank-level disclosure, more analyst following, and lower trading volume have higher stock return synchronicity.

4.2. More market-wide variation or less bank-specific variation?

When a bank's stock is more aligned with the market, which is associated with a higher proportion of market-wide information, it might have more market-wide variation or less bank-specific variation. For example, higher government regulation in banking industry may reduce the amount of bank-specific information noise. Non-aggregated information about bank financial situations is noisy. Since the banks diversify their loan

exposure across many borrowers, it is difficult for outside investors to judge whether a single loss event in a bank's loans indicates a generally mispriced portfolio or just an extreme realization in a correctly priced portfolio (Frolov, 2004). If part of bank-specific stock price movements reflects information noise, then the presence of higher bank supervision decreases the level of bank-specific information noise because they can aggregate bank information and disclose it. This consequently decreases the influence of bank-specific information on variation of the stock return. We can still get that same result that stronger supervisory power is associated with higher R^2.

To examine whether *Supervisory Power* (*Private Monitoring*) is associated with larger market-wide variation (bank-specific variation), we estimate another regression that is similar to Equation (4), but replacing the stock return synchronicity (*SYNCH*) with the market-wide variation $\log(\delta_m^2)$ (bank-specific variation $\log(\delta_i^2)$) as the dependent variable in the regression, which is shown in Equation (5). $\log(\delta_m^2)$ and $\log(\delta_i^2)$ are decomposition of the logistic transformation of the R^2 in Equation (2) (*SYNCH*), which is shown in Equation (3).

$\log(\delta_m^2)$ ($\log(\delta_i^2)$)= *α+β₁ Supervisory Power+ β₂ Private Monitoring+ β₃ Credit Provided by Bank+ β₄ State Ownership+ β₅ Foreign Ownership + β₆ Banking Freedom +β₇ Good Government Index+ β₈ Number of Stocks Listed+ β₉ GDP per capita+ β₁₀ Variance in GDP Growth+ β₁₁ Accounting Standards+ β₁₂ Size + β₁₃ Disclosure + β₁₄ Analyst+ β₁₅ VOL+β₁₆ STDROA +β₁₇ M/B+β₁₈ Loan-to-Asset Ratio +β₁₉ Equity-to-Asset Ratio +β₂₀ Loan Growth+ ε* (5)

Table 5 shows the estimation results. In column (1), (2), and (3), the dependent variable is market-wide stock price variation $\log(\delta_m^2)$. In column (4), (5), and (6), the dependent variable is bank-specific stock price variation $\log(\delta_i^2)$. Results reported in column (3) and (6) are based on the sample without US banks. We observe that the *Supervisory Power* is positively and significantly related to market-wide stock price variation. The *Supervisory Power* is also positively related to bank-specific stock return variation, but this effect is smaller in magnitude and, at best, significant only in a one-tailed test. In contrast, The *Private Monitoring* is not significantly related to market-wide stock price variation. The *Private Monitoring* is significantly positively related to bank-specific stock return variation. These results do not support that higher government regulation in banking industry may reduce the amount of bank-specific information noise. However, these results imply that the supervisory strategy that supervisors directly discipline banks mainly help generate more market-wide information and the supervisory policy that forces banks to disclose accurate information and induces private sector to monitor banks help generate bank-specific information.

4.3. Nonlinear effect

In section 2, we predict that there is a nonlinear relationship between different supervisory policies and bank stock return synchronicity. Specifically, supervisory agencies force banks to disclose accurate information to the public and induce private sector to monitor banks. Then private investors can obtain some information and trade based on it to incorporate more bank-specific information into the stock price. This view presumes that the government not only has laws requiring banks to disclose accurate

information, but also it successfully enforces these laws for banks to disclose this information. This view also presumes that private investors have a well functioning legal system at their disposal so that their incentive are not offset by government corruption, which is associated with weak legal protection. From this perspective, improvements in information disclosure rules will only decrease bank stock return synchronicity when the legal system and government work effectively. Furthermore, in countries with weak legal protection, supervisory agencies may abuse their powers. Thus, supervisors do not work on conveying bank-specific information to the public on the public's interest. From this perspective, increases in supervisory power may only decrease bank stock return synchronicity in countries with weak legal protection. We examine whether the impact of both Supervisory Power and Private Monitoring on bank stock return synchronicity depends on national institutions.

In table 6, we include interaction terms to test for possible nonlinear relationships between supervisory policies, the level of investor protection, and bank stock return synchronicity. More specifically, we include two interaction terms: the interaction between the *Good Government Index* and *Supervisory Power* (*Private Monitoring*). Results reported in column (3) are based on the sample without US banks.

The results show that *Private Monitoring* enters with a significant, negative coefficient while the interaction between *Good Government Index* and *Private Monitoring* enters with a significant positive coefficient. The derivative of column (2) with respect to *Private Monitoring* equals -0.309+0.005*(Good Government Index). This is always positive because the maximum value of *Good Government Index* is 27.610. These results suggest that *Private Monitoring* decreases bank stock return synchronicity

and this relationship is less pronounced in countries with sufficiently well developed legal and government institutions. The results also show that *Supervisory Power* enters with a significant, positive coefficient while the interaction between *Good Government Index* and *Supervisory Power* enters with an insignificant negative coefficient. These results imply that Supervisory Power has a significant, positive effect on bank stock return synchronicity and the legal and government systems do not have the impact on this relationship. These results suggest that the positive association between stock return synchronicity and official supervisory power is posited to be a consequence of the special characteristics of bank regulators as a unique information channel and the high influence of banking industry in the whole economy. Our results are not driven by the hypothesis that in countries with weak legal protection, supervisory agencies may abuse their powers. Thus, supervisors do not work on conveying bank-specific information to the public on the public's interest.

4.4. Endogeneity

The potential endogeneity may bias our results because our variables to measure the level of supervisory policies are not exogenous. For example, there may be feedback from bank stock return synchronicity to policy: lower levels of bank specific information content in the bank stock price may induce call for higher supervisory power and less private monitoring. To address this concern, the ideal way is to find a natural experiment such as innovation of supervisory policies and examine the impact of this event on bank stock return synchronicity. However, the absence of time-series data on these policies does not allow us to do such analyses. Thus, we use two-stage least squares estimation

methods to deal with this problem. We use three instrumental variables: the absolute value of a country's latitude, ethnic fractionalization and the length of time it has been independent based on the theory and empirical work in Barth et al. (2004, 2005) and Beck et al. (2006). Some scholars argue that in tropical areas, Europeans frequently did not settle in large number and they tended to create more powerful administrative structures that protected the elite (see Levine, 2005 for a review). Easterly and Levine (1997) argue that more ethnically diverse economies are likely to choose policies that help them to expropriate resources from others. They also argue that the longer the countries gained their independence; they have more opportunity to adopt policies more conductive to broad-based economic growth.

In the first-stage regression, we reject the null hypothesis at five percent level that these instruments do not explain cross-country differences in supervisory policy variables: *Supervisory Power* and *Private Monitoring*. These three instrumental variables can explain 26% of cross-country variation in *Supervisory Power* and 44% of cross-country variation in *Private Monitoring*. These results confirm that latitude, ethnic fractionalization and years of independence are reasonably good instrument variables for bank supervisory practices. This is consistent with Beck et al. (2006).

Table 7 reports the second-stage regression results. Results reported in column (3) are based on the sample without US banks. We observe that *Supervisory Power* enters positively and significantly and *Private Monitoring* enters negatively and significantly in all of these regressions. These results suggest that our conclusions still hold even when using instrumental variables. Specifically, the supervisory strategy that supervisors directly discipline banks mainly help generate more market-wide information instead of

bank-specific information.   In contrast, the supervisory policy that forces banks to disclose accurate information and induces private sector to monitor banks help generate bank-specific information.

4.5. Robustness tests

This section examines whether our results hold when alternative regression specifications are employed. In unreported results, the following alternatives are considered: [6]

First, we use alternative estimators of R^2 measures. We obtain the similar results when we use monthly stock return data instead of weekly ones. When we use local market model instead of expanded market model to calculate R^2 measures, our results are still robust.

Second, to ensure that the results reported were not dependent on winsorizing cut-offs, we also winsorized our variables at the 2 and 98 percentiles; 5 and 95 percentiles instead of winsorizing the data at the 1 and 99 percentiles. Our results are still robust.

Third, a potential concern is that results could be driven by different bank types (Investment banking, savings banks, etc.). To deal with this issue, we run the analysis using only commercial banks and obtain the same conclusions.

5. Conclusion

This paper examines how different bank supervisory policies influence bank stock price information content measured by bank stock return synchronicity. If one supervisory policy primarily facilitates the incorporation of market-wide information,

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[6] Although not reported, these results are available upon request.

returns will display greater synchronicity. Conversely, stock prices will exhibit less synchronous movement if the policy contributes primarily bank-specific information.

In this paper, we find that stronger supervisory power is associated with higher bank stock synchronicity. This relationship is not affected by the legal and government systems do. These results suggest that the positive association between stock return synchronicity and official supervisory power is posited to be a consequence of the special characteristics of bank regulators as a unique information channel and the high influence of banking industry in the whole economy. We also find that that there is a negative relationship between the degree to which bank regulators require information disclosure and induce private creditors to monitor banks and bank stock synchronicity. This result implies that the supervisory strategies that force banks to disclose accurate information and induce private sector monitoring of banks tend to help generate more bank specific information. Additionally, we find that this relationship is more pronounced in the countries with sound legal system.

This study's results help shed light on the debate on the effectiveness of mandated information disclosure by government regulation in improving the banking sector's transparency. Our results suggest that bank regulators should carefully exert their supervisory power because their information has significant market-wide influence. Specifically, on the one hand, they should avoid some improper bad information disclosure for individual banks because investors might interpret disclosure of severe problems at some banks as indicating widespread banking problems. On the other hand, bank regulators should actively discipline banks because those can stable the whole economy beyond bank-specific monitoring. In order to increase bank-specific

information disclosure, the supervisory strategy that forces banks to disclose accurate information and induce private sector monitoring of banks should be employed. This supervisory strategy is more effective in countries with superior legal system.

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Table 1
Summary statistics

This table presents summary statistics for the variables used in our empirical analysis. Number of observations, mean, median, minimum, maximum, and standard deviation, are reported. The details of definitions and sources of all the explanatory variables are reported in Appendix A.

	Observations	Mean	Median	Min	Max	SD
Bank-level variables						
R^2	3368	0.280	0.251	0.004	0.596	0.117
SYNCH	3368	-1.407	-1.093	-5.621	0.388	1.558
$\log(\delta_i^2)$	3368	-3.514	-3.451	-4.749	-1.541	0.446
$\log(\delta_m^2)$	3368	-4.920	-4.522	-7.165	-2.454	0.847
Total assets $ Millions	3368	324.266	38.832	0.508	14,841.010	1,220.682
Size	3368	2.501	1.598	-0.301	4.173	1.011
Disclosure	3368	0.764	0.800	0.200	0.900	0.142
Analyst	3368	7.452	8.531	0.000	14.502	3.565
VOL	3368	0.975	0.623	0.101	3.003	1.218
STDROA	3368	0.031	0.011	0.0004	0.113	0.136
M/B	3368	4.215	1.788	0.054	9.062	1.476
Loan-to-Asset Ratio	3368	0.580	0.593	0.001	0.910	0.160
Equity-to-Asset Ratio	3368	0.081	0.072	0.001	0.971	0.080
Loan Growth	3368	0.080	0.091	-0.340	0.651	0.240
Country-level variables						
Supervisory Power	34	10.500	11.000	5.000	14.000	2.477
Private Monitoring	34	8.500	8.600	6.000	11.000	1.799
Good Government Index	34	19.451	20.220	13.000	27.610	3.403
Accounting Standards	34	64.719	65.000	36.000	83.000	11.971
State Ownership	34	0.1350	0.2000	0.000	0.7530	0.1910
Banking Freedom	34	3.487	3.330	2.000	5.000	0.726
Credit Provided by Bank	170	1.135	1.059	0.109	3.059	0.625
Industry Concentration	170	0.481	0.341	0.261	0.881	0.131
Number of Stocks Listed	170	5.764	5.650	3.714	8.436	1.161
GDP per capita	170	9.214	9.877	6.303	10.580	1.269
Variance in GDP Growth	170	0.0009	0.0008	0.0007	0.0014	0.0001

Table 2

Correlations between logistic transformation of R^2 and bank-level variables

This table presents correlations between logistic transformation of R^2 (*SYNCH*) and the bank-level variables used in our empirical analysis. The details of definitions and sources of all the explanatory variables are reported in Appendix A. P-values are reported in parentheses. *, **, *** indicate significance levels of 10, 5, and 1 percent, respectively.

		a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
a.	SYNCH	1										
b.	$\log(\delta_i^2)$	0.21	1									
		(0.34)										
c.	$\log(\delta_m^2)$	0.91***	0.26***	1								
		(0.00)	(0.00)									
d.	Size	0.60***	-0.25***	0.62***	1							
		(0.00)	(0.00)	(0.00)								
e.	Disclosure	-0.04***	0.08***	0.02	0.10***	1						
		(0.27)	(0.02)	(0.45)	(0.00)							
f.	Analyst	0.01***	0.02	0.01***	0.18	0.14	1					
		(0.00)	(0.10)	(0.00)	(0.25)	(0.25)						
g.	VOL	-0.12***	-0.03***	-0.08	-0.21	0.25	-0.12	1				
		(0.00)	(0.00)	(0.34)	(0.45)	(0.41)	(0.41)					
h.	STDROA	-0.12***	-0.07***	-0.09	-0.21	0.15	-0.14	0.11	1			
		(0.00)	(0.00)	(0.45)	(0.34)	(0.25)	(0.51)	(0.21)				
i.	M/B	0.24***	0.14***	0.25	0.14	-0.35	0.15	-0.11	-0.11	1		
		(0.00)	(0.00)	(0.36)	(0.31)	(0.35)	(0.41)	(0.32)	(0.25)			
j.	Loan-to-Asset Ratio	0.14	0.10	0.13	0.14	-0.00	0.00	-0.11	0.24	0.00	1	
		(0.34)	(0.64)	(0.56)	(0.21)	(0.21)	(0.21)	(0.23)	(0.25)	(0.26)		
k.	Equity-to-Asset Ratio	0.24	0.16	0.35	0.31	-0.00	0.00	-0.00	0.15	0.00	0.13***	1
		(0.35)	(0.24)	(0.47)	(0.2145)	(0.31)	(0.15)	(0.37)	(0.25)	(0.43)	(0.00)	
l.	Loan Growth	0.24	0.16	0.19	0.21	-0.00	0.00	-0.00	0.00	0.00	0.00	0.00
		(0.30)	(0.45)	(0.28)	(0.42)	(0.21)	(0.51)	(0.35)_	(0.32)	(0.26)	(0.25)	(0.43)

Table 3
Correlations between logistic transformation of R^2 and country-level variables

This table presents correlations between logistic transformation of R^2 (*SYNCH*) and the country-level variables used in our empirical analysis. The details of definitions and sources of all the explanatory variables are reported in Appendix A. P-values are reported in parentheses. *, **, *** indicate significance levels of 10, 5, and 1 percent, respectively.

		a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.
a.	SYNCH	1											
b.	Supervisory Power	0.03***	1										
		(0.00)											
c.	Private Monitoring	-0.12***	-0.05	1									
		(0.00)	(0.15)										
d.	Good Government Index	-0.21***	-0.45	0.12	1								
		(0.00)	(0.34)	(0.13)									
e.	Number of Listed Stocks	-0.03	0.64	-0.20***	0.73	1							
		(0.37)	(0.26)	(0.00)	(0.34)								
f.	GDP per capita	-0.13***	0.18	-0.00	0.76	0.54	1						
		(0.00)	(0.23)	(0.96)	(0.43)	(0.43)							
g.	Variance in GDP Growth	0.13***	0.18***	-0.17***	-0.29***	-0.14	-0.31	1					
		(0.00)	(0.00)	(0.00)	(0.00)	(0.23)	(0.12)						
h.	Accounting Standards	-0.00	0.05	-0.14	0.46	0.37	0.39	-0.24	1				
		(0.79)	(0.19)	(0.30)	(0.24)	(0.25)	(0.45)	(0.25)					
i.	Credit Provided by Bank	0.04***	0.44	-0.31	0.55	0.72	0.70	-0.25	0.24	1			
		(0.00)	(0.12)	(0.23)	(0.34)	(0.98)	(0.34)	(0.14)	(0.19)				
j.	State Ownership	0.08**	-0.07	-0.14***	-0.59***	-0.35	-0.78	0.26	-0.44	-0.55	1		
		(0.02)	(0.52)	(0.00)	(0.00)	(0.24)	(0.13)	(0.78)	(0.17)	(0.25)			
k.	Banking Freedom	-0.12***	0.27	0.02	0.64	0.41	0.59	-0.02	0.37	0.33	-0.53	1	
		(0.00)	(0.24)	(0.54)	(0.45)	(0.24)	(0.13)	(0.46)	(0.19)	(0.24)	(0.56)		
l.	Foreign Ownership	-0.04	-0.03	-0.02	0.29***	0.22	0.62	-0.15	-0.31	0.44	-0.01***	-0.44	1
		(0.24)	(0.35)	(0.47)	(0.00)	(0.34)	(0.28)	(0.65)	(0.21)	(0.31)	(0.00)	(0.25)	
m.	Industry Concentration	0.11***	0.10***	0.17***	0.00	0.01	0.00	0.00	0.05	0.00	0.00	0.00	0.01
		(0.00)	(0.36)	(0.83)	(0.43)	(0.21)	(0.24)	(0.26)	(0.24)	(0.21)	(0.15)	(0.45)	(0.14)

Table 4 Supervision and Stock Return Synchronicity

Dependent variable logistic Transformation of R^2 is from expanded market model. Results reported in column (1)-(6) are based on the full sample and results reported in column (7) are based on the sample without US banks. The details of definitions and sources of all the explanatory variables are reported in Appendix A. T-statistics are reported in parentheses. When we compute standard errors, we cluster by country.*, **, *** indicate significance levels of 10, 5, and 1 percent, respectively.

Dependent Variables	Logistic Transformation of R^2 (SYNCH)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Supervisory Power	0.176***	0.178***	0.127***	0.133***	0.155***	0.151***	0.146***
	(4.517)	(4.483)	(3.114)	(3.197)	(3.602)	(3.405)	(3.997)
Private Monitoring		-0.026***	-0.097***	-0.125***	-0.146*	-0.146*	-0.130*
		(-4.337)	(-4.235)	(-4.534)	(-4.718)	(-4.717)	(-4.788)
Credit Provided by Bank			0.006***	0.005***	0.006***	0.006***	0.005***
			(4.735)	(4.466)	(4.492)	(4.480)	(5.15)
State Ownership				0.648***	0.796***	0.795***	0.418***
				(5.239)	(4.493)	(4.483)	(5.945)
Foreign Ownership					-0.845	-0.883	-0.887
					(0.004)	(0.005)	(0.009)
Banking Freedom						-0.044***	-0.098***
						(-4.364)	(-4.974)
Good Government Index	-0.030***	-0.035***	-0.011***	-0.005***	-0.012***	-0.011***	-0.080*
	(-4.321)	(-4.293)	(-5.399)	(-4.177)	(-5.372)	(-5.365)	(-1.822)
Number of Stocks Listed	-0.011	-0.004	-0.177**	-0.162*	-0.197**	-0.196**	-0.192**
	(-0.184)	(-0.065)	(-2.381)	(-1.893)	(-2.284)	(-2.286)	(-2.346)
GDP per capita	-0.144**	-0.138*	-0.435***	-0.494***	-0.538***	-0.535***	-0.285**
	(-1.964)	(-1.822)	(-4.470)	(-4.553)	(-4.724)	(-4.787)	(-2.590)
Variance of GDP Growth	0.014	0.013	0.024**	0.022**	0.015	0.014	0.014
	(1.330)	(1.137)	(2.189)	(1.979)	(1.258)	(1.257)	(1.317)
Accounting Standard	0.022	0.023	0.028	0.027	0.025	0.024	0.026
	(0.845)	(0.837)	(0.524)	(0.183)	(0.937)	(0.936)	(0.638)
Industry Concentration	0.021	0.023	0.020	0.023	0.024	0.025	0.023
	(0.065)	(0.066)	(0.066)	(0.087)	(0.067)	(0.070)	(0.063)
Size	0.494***	0.493***	0.501***	0.507***	0.513***	0.510***	0.402***
	(18.506)	(18.483)	(19.025)	(19.027)	(19.172)	(19.101)	(13.314)
Disclosure	-0.577***	-0.562***	-0.486***	-0.463***	-0.317***	-0.315***	-1.175***
	(-4.612)	(-4.555)	(-3.366)	(-4.296)	(-5.845)	(-5.824)	(-5.997)
Analyst	0.111***	0.132***	0.101***	0.094***	0.104***	0.103***	0.104***
	(4.021)	(4.012)	(5.032)	(4.036)	(4.024)	(4.026)	(4.026)
VOL	-0.310***	-0.509***	-0.603***	-0.525***	-0.476***	-0.475***	-0.473***
	(-4.015)	(-4.026)	(-4.023)	(-5.027)	(-4.034)	(-5.034)	(-5.012)

STDROA	-0.110	-0.134	-0.104	-0.095	-0.104	-0.104	-0.101
	(0.020)	(0.013)	(0.033)	(0.034)	(0.024)	(0.023)	(0.024)
M/B	0.113	0.162	0.104	0.082	0.101	0.118	0.136
	(0.081)	(0.075)	(0.027)	(0.014)	(0.043)	(0.045)	(0.044)
Loan-to-Asset Ratio	0.151	0.146	0.123	0.184	0.137	0.114	0.133
	(0.021)	(0.023)	(0.017)	(0.037)	(0.024)	(0.024)	(0.027)
Equity-to-Asset Ratio	0.135	0.152	0.123	0.085	0.118	0.115	0.145
	(0.073)	(0.014)	(0.044)	(0.049)	(0.065)	(0.056)	(0.046)
Loan Growth	0.103	0.104	0.105	0.085	0.108	0.118	0.139
	(0.081)	(0.084)	(0.086)	(0.084)	(0.079)	(0.084)	(0.085)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R-Squared	0.415	0.415	0.435	0.435	0.443	0.446	0.493
N. of observations	3368	3368	3368	3368	3368	3368	1448

Table 5 Supervision and Market-wide (Bank-specific) Returns Variation

Dependent variable is the logarithm of market-wide variation in column (1)-(3) and the logarithm of bank-specific variation in column (4)-(6). Results reported in column (1)-(2) and (4)-(5) are based on the full sample and results reported in column (3) and (6) are based on the sample without US banks. The details of definitions and sources of all the explanatory variables are reported in Appendix A. T-statistics are reported in parentheses. When we compute standard errors, we cluster by country.*, **, *** indicate significance levels of 10, 5, and 1 percent, respectively.

Dependent Variables	Logarithm of market-wide variation			Logarithm of bank-specific variation		
	(1)	(2)	(3)	(4)	(5)	(6)
Supervisory Power	0.219***	0.195***	0.189***	0.040*	0.043*	0.043
	(4.880)	(3.865)	(4.378)	(1.672)	(1.653)	(1.516)
Private Monitoring	0.047	0.114	0.099	0.221***	0.232***	0.231***
	(0.533)	(1.177)	(1.151)	(4.436)	(4.644)	(4.546)
Credit Provided by Bank		0.006***	0.006***		0.001	0.001
		(4.323)	(4.811)		(0.696)	(0.693)
State Ownership		0.652	1.090**		-1.448***	-1.509***
		(1.078)	(2.081)		(-4.585)	(-4.362)
Foreign Ownership		-0.836	-0.847		-0.886	-0.880
		(0.006)	(0.007)		(0.003)	(0.006)
Banking Freedom		-0.059	-0.121		0.015***	0.023***
		(-0.431)	(-1.017)		(4.211)	(4.293)
Good Government Index	-0.134***	-0.084**	-0.195***	0.099	0.096	0.115
	(-4.380)	(-2.281)	(-3.741)	(0.032)	(0.997)	(0.334)
Number of Stocks Listed	0.186**	-0.075	-0.081	0.190***	0.122**	0.111*
	(2.509)	(-0.768)	(-0.836)	(4.791)	(2.385)	(1.738)
GDP per capita	-0.157*	-0.372***	-0.077	-0.020	0.166**	0.208**
	(-1.849)	(-2.879)	(-0.592)	(-0.429)	(2.461)	(2.419)
Variance of GDP Growth	0.005	0.018	0.016	-0.007	0.003	0.002
	(0.425)	(1.297)	(1.260)	(-1.092)	(0.360)	(0.222)
Accounting Standard	0.002	0.012	0.013	0.021***	0.013**	0.013**
	(0.177)	(1.251)	(1.512)	(4.377)	(2.563)	(2.368)
Industry Concentration	0.024	0.021	0.025	0.020	0.021	0.024
	(0.063)	(0.063)	(0.069)	(0.080)	(0.061)	(0.079)
Size	0.288***	0.298***	0.180***	-0.205***	-0.214***	-0.223***
	(9.601)	(9.836)	(5.027)	(-12.743)	(-13.528)	(-9.432)
Disclosure	0.191	0.342	-0.679	0.753***	0.659***	0.496***
	(0.470)	(0.803)	(-1.464)	(3.459)	(2.964)	(4.620)
Analyst	0.119***	0.138***	0.109***	0.099***	0.109***	0.106***

	(4.089)	(4.677)	(5.083)	(4.082)	(4.092)	(4.087)
VOL	-0.319	-0.508	-0.606	0.526***	0.473***	0.478*
	(-0.019)	(-0.021)	(-0.022)	(5.029)	(4.033)	(5.037)
STDROA	-0.119	-0.136	-0.108	-0.099	-0.107	-0.108
	(0.024)	(0.016)	(0.034)	(0.037)	(0.023)	(0.027)
M/B	0.116	0.164	0.105	0.085	0.103	0.117
	(0.085)	(0.078)	(0.025)	(0.018)	(0.048)	(0.047)
Loan-to-Asset Ratio	0.155	0.147	0.128	0.183	0.136	0.118
	(0.020)	(0.027)	(0.014)	(0.038)	(0.023)	(0.026)
Equity-to-Asset Ratio	0.138	0.158	0.124	0.088	0.117	0.114
	(0.078)	(0.013)	(0.048)	(0.044)	(0.068)	(0.057)
Loan Growth	0.107	0.105	0.104	0.088	0.110	0.116
	(0.089)	(0.087)	(0.083)	(0.088)	(0.072)	(0.083)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R-Squared	0.305	0.336	0.447	0.328	0.357	0.414
N. of observations	3368	3368	1448	3368	3368	1448

Table 6 Supervision and Stock Return Synchronicity Controlling for Nonlinear Effects

Dependent variable logistic Transformation of R^2 is from expanded market model. Results reported in column (1) and (2) are based on the full sample and results reported in column (3) are based on the sample without US banks. The details of definitions and sources of all the explanatory variables are reported in Appendix A. T-statistics are reported in parentheses. When we compute standard errors, we cluster by country.*, **, *** indicate significance levels of 10, 5, and 1 percent, respectively.

Dependent Variables	Logistic Transformation of R^2 (SYNCH)		
	(1)	(2)	(3)
Supervisory Power*Good Government Index	-0.004	-0.019	-0.010
	(-0.407)	(-0.747)	(-0.704)
Private Monitoring*Good Government Index	0.005***	0.005***	0.003***
	(4.770)	(4.059)	(4.052)
Supervisory Power	0.125***	0.193***	0.038***
	(4.657)	(4.924)	(4.142)
Private Monitoring	-0.390***	-0.309***	-0.142***
	(-4.868)	(-4.428)	(-4.102)
Credit Provided by Bank		0.007***	0.006***
		(4.847)	(5.082)
State Ownership		0.592***	0.390***
		(5.074)	(4.853)
Foreign Ownership		-0.888	-0.839
		(0.018)	(0.015)
Banking Freedom		-0.045***	-0.064***
		(-3.339)	(-4.575)
Good Government Index	-0.254	-0.395	-0.220
	(-1.157)	(-1.531)	(-1.000)
Number of Stocks Listed	0.011	-0.264***	-0.201**
	(0.149)	(-2.617)	(-2.385)
GDP per capita	-0.096	-0.476***	-0.304**
	(-1.096)	(-3.957)	(-2.480)
Variance of GDP Growth	0.012	0.016	0.017
	(1.067)	(1.277)	(1.446)
Accounting Standard	0.026	0.032	0.029
	(0.016)	(0.329)	(0.503)
Industry Concentration	0.029	0.025	0.028
	(0.088)	(0.069)	(0.070)
Size	0.497***	0.517***	0.400***
	(18.455)	(19.218)	(12.721)
Disclosure	-0.570***	-0.331***	-1.114***
	(-4.569)	(-4.881)	(-2.767)

Analyst	0.090***	0.101***	0.105***
	(4.099)	(4.097)	(4.080)
VOL	-0.529***	-0.475***	-0.475***
	(-5.021)	(-4.112)	(-5.012)
STDROA	-0.097	-0.102	-0.101
	(0.033)	(0.025)	(0.020)
M/B	0.081	0.108	0.115
	(0.017)	(0.041)	(0.043)
Loan-to-Asset Ratio	0.186	0.130	0.112
	(0.031)	(0.027)	(0.022)
Equity-to-Asset Ratio	0.086	0.113	0.112
	(0.045)	(0.062)	(0.052)
Loan Growth	0.082	0.118	0.119
	(0.082)	(0.070)	(0.081)
Year Effect	Yes	Yes	Yes
Adjusted-R-Squared	0.416	0.446	0.494
N. of observations	3368	3368	1448

Table 7 Supervision and Stock Return Synchronicity Controlling for Endogeneity Biases

Dependent variable logistic Transformation of R^2 is from expanded market model. Results reported in column (1) and (2) are based on the full sample and results reported in column (3) are based on the sample without US banks. Regressions are run with IV OLS, where the first stage regressions use ethnic fractionalization, percentage of yeas in independent since 1776 and a country's absolute value of latitude as instrumental variables. The details of definitions and sources of all the explanatory variables are reported in Appendix A. T-statistics are reported in parentheses. When we compute standard errors, we cluster by country.*, **, *** indicate significance levels of 10, 5, and 1 percent, respectively.

Dependent Variables	Logistic Transformation of R^2 (SYNCH)		
	(1)	(2)	(3)
Supervisory Power	0.135***	0.182***	0.134***
	(4.123)	(4.234)	(4.523)
Private Monitoring	-0.134***	-0.139***	-0.145***
	(-4.236)	(-4.578)	(-4.256)
Credit Provided by Bank		0.006***	0.007***
		(4.367)	(5.245)
State Ownership		0.467***	0.465***
		(4.044)	(4.633)
Foreign Ownership		-0.812	-0.814
		(0.017)	(0.014)
Banking Freedom		-0.044***	-0.036***
		(-5.225)	(-5.367)
Good Government Index	-0.054***	-0.035***	-0.022***
	(-4.751)	(-4.135)	(-4.000)
Number of Stocks Listed	0.161	-0.124	-0.101
	(0.149)	(-0.617)	(-0.385)
GDP per capita	-0.496***	-0.423***	-0.404**
	(-4.906)	(-4.579)	(-4.408)
Variance of GDP Growth	0.022	0.026	0.027
	(0.007)	(0.233)	(0.423)
Accounting Standard	0.023	0.022	0.024
	(0.026)	(0.027)	(0.035)
Industry Concentration	0.026	0.026	0.026
	(0.061)	(0.062)	(0.060)
Size	0.479***	0.571***	0.412***
	(17.412)	(18.318)	(13.456)
Disclosure	-0.470***	-0.342***	-0.514***
	(-4.552)	(-4.881)	(-5.347)
Analyst	0.111***	0.131***	0.101***

	(4.071)	(4.689)	(5.091)
VOL	-0.318***	-0.507***	-0.604***
	(-4.001)	(-4.002)	(-4.012)
STDROA	-0.118	-0.132	-0.103
	(0.020)	(0.013)	(0.031)
M/B	0.114	0.163	0.103
	(0.088)	(0.076)	(0.028)
Loan-to-Asset Ratio	0.154	0.145	0.125
	(0.024)	(0.025)	(0.018)
Equity-to-Asset Ratio	0.135	0.154	0.123
	(0.074)	(0.017)	(0.044)
Loan Growth	0.104	0.108	0.101
	(0.083)	(0.084)	(0.089)
Year Effect	Yes	Yes	Yes
Adjusted-R-Squared	0.423	0.445	0.478
N. of observations	3368	3368	1448

Appendix A. Variable Definition and Sources

Variable	Description	Sources
SYNCH	Logistic Transformation of R^2, which is from expanded market model (Equation (1)).	DataStream
$\log(\delta_m^2)$	Logarithm of market-wide variation in Equation (3)	DataStream
$\log(\delta_i^2)$	Logarithm of bank-specific variation in Equation (3)	DataStream
Supervisory Power	The sum of fourteen dummy variables that measure (1) whether the supervisory agency have the right to meet with external auditors to discuss their report without the approval of the bank, (2) whether auditors are required by law to communicate directly to the supervisory agency any presumed involvement of bank directors or senior managers in elicit activities, fraud, or insider abuse, (3) whether supervisors can take legal action against external auditors for negligence, (4) whether the supervisory authority can force a bank to change its internal organizational structure, (5) whether off-balance sheet items are disclosed to supervisors? (6) Can the supervisory agency order the bank's directors or management to constitute provisions to cover actual or potential losses, (7) whether the supervisory agency can suspend the directors' decision to distribute: (a) Dividends? (b) Bonuses? (c) Management fees, (8) whether the supervisory agency can legally declare-such that this declaration supersedes the rights of bank shareholders-that a bank is insolvent, (9) whether the Banking Law gives authority to the supervisory agency to intervene that is, suspend some or all ownership rights-a problem bank, (10) Regarding bank restructuring and reorganization, whether can the supervisory agency or any other government agency do the following: (a) Supersede shareholder rights? (b)Remove and replace management, (c) Remove and replace directors?	Barth et al. (2005)
Private Monitoring	The sum of eleven dummy variables that measure (1) whether an external audit is a compulsory obligation for banks, (2) whether auditors are licensed or certified, (3) whether 100 percent of the top ten banks are rated by international credit rating agencies, (4) whether there is an explicit deposit insurance protection system, (5) whether depositors were wholly compensated (to the extent of legal protection) the last time a bank failed,(6) whether accrued, though unpaid interest/principal enter the income statement while the loan is still non-performing, (7) whether financial institutions are required to produce consolidated accounts covering all bank and any non-bank financial subsidiaries, (8) whether bank directors are legally liable if information disclosed is erroneous or misleading, (9) whether off-balance sheet items are disclosed to the public, (10) whether banks must disclose their risk management procedures to the public, (11) whether subordinated debt is allowable (required) as part of capital.	Barth et al. (2005)
Good Government Index	The sum of three indexes from La Porta et al. (1998), each ranging from zero to ten. These indexes measure (1) government corruption,(2) the risk of expropriation of private property by the government, and (3) the risk of the government repudiating contracts. Low values for each index indicate less respect for private property.	La Porta et al. (1998)
Number of Stocks Listed	Logarithm of umber of securities listed in the stock exchange	DataStream
GDP per capita	Logarithm of GDP per capita (constant 2000 US$)	World Development Indicators
Variance in GDP Growth	Variance of previous four year GDP per capita growth (annual %)	World Development Indicators
Accounting Standard	Index created by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 items by Center for International Financial Analysis and Research (CIFAR). These items fall into seven categories (general information, income statements, balance sheets, funds flow statement, accounting standards, stock data and special items). A minimum of three companies in each country was studied. The companies represent a cross section of various industry groups; industrial companies represented 70 percent, and financial companies represented the remaining 30 percent. Scale from zero to 100; low scores indicate low accounting standards.	La Porta et al. (1998)

Industry Concentration	A banking industry Herfindahl index for each country calculated using banks' total assets.	Bankscope
Size	Logarithm of bank's total assets	Bankscope
Disclosure	A composite bank disclosure index for each bank in the sample, based on inclusions/omissions of a checklist of seventeen dimensions of accounting items in a bank's annual financial reports. The details of definitions and sources of this index can be found in Nier (2005).	Bankscope
Analyst	The number of analysts who issued earnings forecasts for a bank during a given calendar year.	IBES
VOL	The total number of shares traded in a year, divided by the total number of shares outstanding at the end of fiscal year	DataStream
STDROA	The standard deviation of a bank's ROAs over the preceding five-year period, including the current year.	Bankscope
M/B	Market value of total assets divided by book value of total assets. Market value of total assets is the sum of market value of equity and total liability.	Bankscope
Loan-to-Asset Ratio	Net total loan divided by book value of total assets.	Bankscope
Equity-to-Asset Ratio	Total equity divided by total assets.	Bankscope
Loan Growth	The logarithm of total loan growth rate.	Bankscope
Credit Provided by Bank	Domestic credit provided by banking sector (% of GDP)	World Development Indicators
Banking Freedom	The composite index of relative openness of banking and financial system of the country. It is a composite index of whether foreign banks and financial services firms are able to operate freely, how difficult it is to open domestic banks and other financial services firms, how heavily regulated the financial system is, the presence of state-owned banks, whether the government influences allocation of credit, and whether banks are free to provide customers with insurance and invest in securities. Higher values mean few restrictions on banking	Heritage Foundation
State Ownership	The percentage of banking assets in banks that are 50 percent or more government owned.	Barth et al. (2005)
Foreign Ownership	The percentage of banking assets in banks that are 50 percent or more foreign owned.	Barth et al. (2005)
Latitude	Absolute value of the latitude of a country's capital, normalized between zero and one.	Beck et al. (2003)
Independence	Percentage of years since 1776 that a country has been independent.	Easterly and Levine (1997)
Ethnic fractionalization	Probability that two randomly selected individuals in a country will not speak the same language.	Easterly and Levine (1997)