# Are performances of banks and firms linked? And if so, why?

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## Abstract

Employing data sets from 46 countries, this paper identifies a significant positive relationship between the performance of the financial sector and the non-financial ones in the presence of a growth rate in the GDP and in inflation rates. To account for this relationship, we initially put forth four hypotheses. Results show that "bank concentration" (the first hypothesis) considerably strengthens the relationship but that the "protection of the creditor" (the second hypothesis) weakens it slightly. Noteworthy is that "restrictions on banks engaged in non-banking activities" (the third hypothesis) and the "bank-based system" (the fourth hypothesis) do not have any influence on the relationship, whatsoever.
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## 1. Introduction

The relationship between firms and banks has recently become a subject of growing concern, especially as it leads to both beneficial and adverse effects on firms. The benefits stem from the fact that a bank-centered system presents less of an obstacle with respect to asymmetric information processing and that this type

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of system can facilitate the flow of credit for more productive uses when a firm cannot obtain it elsewhere. The adverse effects pertain to the consequences on a firm resulting from distress in the banking sector. A shock to the bank-centered system may obstruct the diversification of a firm's funding source and investment, given its strong relationship with the bank. Needless to say, all of these effects obviously assume that, in such a system, banks are highly influential on a firm's performance.

Previous studies pursuing these issues have chiefly focused on Japanese and German banks since they are both deemed to be part of bank-centered systems. In line with this type of system, firms and banks are strongly linked and the beneficial and adverse effects can be easily examined. Gibson (1995), for example, first found that the financial health of a Japanese firm's main bank affects the investment of that firm, but later Gibson (1997) staunchly rejected this notion. Kang and Stulz (1997) meanwhile showed that Japanese firms with a higher fraction of their bank loans in debt performed worse. Kang and Stulz (2000) have also determined that, as might be expected, a bank-dependent firm is more severely affected than one which is bank-independent, especially when banks experience large shocks. Using bank data for Germany, Gorton and Schmid (1996), on the other hand, reported mixed results. While German banks seem to have helped to improve the performance of German firms, with no conflict-of-interest having been found as of 1974, the positive influence was reduced to the minimum in 1985. Outside of Japan and Germany, Ongena, Smith, and Michalsen (2000) have used Norwegian data to study the impact on stock prices when firms maintained a strong relationship with distressed banks during the 1988 Norwegian banking crisis. Shen (2002), taking Taiwan bank loan transaction data, has similarly confirmed that funding channels for firms are indeed affected when banks are in distress.

While studies vis-à-vis bank–firm relationships have been abundant, almost all have centered uniquely on one country, as reported before. Limiting the scope to one country has had strong merits: detailed information among banks and related firms, such as the lending relationship, bank loans over total debt ratios and so on can readily be obtained. Accordingly, studies as to how bank shocks affect related firms' performances can be easily most fruitful. Nonetheless, such studies ignore, to a great extent, how a firm's and bank's performances are linked from a global perspective.

Unlike earlier studies, therefore, this paper investigates the relationship between firms' and banks' performances in 46 countries. The use of cross-country data, albeit at the expense of a detailed account of any one single country's firm–bank relationship, allows for much broader questions with regard to firm–bank relationships. Thus, less emphasis is put on the typical micro view of a firm's response to distress in the banking industry within a bank-centered system. Instead, the global view of the relationships between firms' and banks' performances is explored using specific detailed data from various banks and companies over world.

Theoretically, the corporate and banking sectors should have strong ties but in practice, this is not always the case. It is typically thought that a bank cannot perform well without a healthy corporate sector, of which is able to redeem debt, and

thus reduce the non-performing loans. Aside from this, funding channels through a sound banking industry are easier than through a fragile one. Thus, while the performance of the two sectors cannot theoretically be kept apart, opposing views may also empirically exist between them. Healthy corporations do not ensure the soundness of the banking industry since banks themselves may encounter distress owing to moral hazards, restrictive regulations and unduly supervision. Take the 1989 crisis in the savings and loan industry in the US as one classic example. This was not caused by weak corporate performance; on the contrary, it was brought about by greedy CEO. In other words, the two industries may not always be closely linked.[2] For this reason, the degrees to which the two industries are related in different countries are first tested in this paper.

Knowledge of the reduced-form relationship between the corporate and banking sectors is helpful for policy-markers and investors, alike. If the two sectors are isolated, policy-makers need not worry about any contagious effects spreading from the financial sector to the non-financial one. Investors can also successfully diversify their portfolios. By contrast, if the two sectors are tightly knit, the rescue of one sector can often help in the recovery of the other, particularly when both are in distress. This means the authorities can save the least crisis-hit industries first, of which the recovery will spillover to the heavy crisis-hit industries. Furthermore, Berger and Udell (1995) find that large banks tend to lend to medium and large business borrowers, while small banks tend to specialize in lending to small business. This evidence seems to confirm the fear that the ongoing consolidation process in the United States and in Europe will be detrimental to small business. Our paper can also partially reply this question.

The second purpose here is to present the four hypotheses so as to explain the respective relationships. The first two hypotheses concern global versions of the bank-centered argument. More specifically, the first argues that the universal bank, as opposed to the separated bank, serves to intensify the firm–bank relationship. The second underscores that a bank-based system, in contrast to one that is market-based, might very well strengthen the relationship. The third hypothesis examines whether bank concentration improves the relationship. Finally, the fourth hypothesis proposes that governance can mitigate the relationship. The rationale behind these four hypotheses is discussed in the next.

Studies concerning the role four hypotheses play in affecting the relationships between banks' and firms' performances are crucial not only in academic works, but also in policy decision-making. To cite an example, concerning the hypothesis of a bank-based and market-based economy, Greenspan (1999) has suggested that countries most susceptible to banking shocks are those that lack developed capital markets. He reasons that countries with well-developed capital markets insulate borrowers by providing acceptable substitutes when banks stop lending. Because market-based economies, for the most part, have a deep capital market, firms'

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[2] While different industries should have different causal relationships with the banking industry, this paper does not pursue this issue.

performances are less influenced by a bank's performance. It follows, therefore, that if Greenspan's (1999) argument is accepted, then the negative impact of bank distress is expected to be stronger in bank-based economies than in those that are market-based economies.

Also supposed is that in a universal banking system rather than in a separate banking system the relationship is further heightened since the former, by definition, has much stronger ties with the firm. In other words, in the universal banking system, distress in one sector will soon spread to the other,[3] which may result in the failure of banks and the creation of the often-held moral hazard problem of "too big to fail."

The third hypothesis, i.e., that related to bank concentration, also helps to explain how the two sectors are linked. If their linkage is non-responsive to banking concentration, a bank's mergers and acquisitions, which will increase banking concentration, are of concern in themselves but will not spread to other sectors. To illustrate, the banking industry was once facing a global consolidation process around the late 1990s. The value of mergers and acquisitions soared to as high as US$553 billion during the May 1997–1998 period (Koskela & Stenbacka, 2000). This process of concentration may have affected competition and consequently affected loan availability to corporations. Our study explores whether the firm–bank relationship is influenced by concentration in the banking industry.

The impact of governance has recently been under a great deal of scrutiny since it is believed that good governance may not necessarily ensure good performance but that, in contrast, bad governance is definitely detrimental to performance. The World Bank (2001), for example, has recently found those countries with bad governance have low economic growth but not vice versa. Good governance may help safeguard the insulation between the two sectors when one is in distress but the other is not.

The organization of this paper is such that this section outlines the specific hypotheses to be tested. Then, drawing upon recent analytical literature on the two sectors. Section 2 synthesizes the reasons for and channels via which the two sectors are linked. Sections 3 and 4 describe the econometric model and the data used in the analysis, respectively. The main results are summarized in Section 5. The final section offers a summary and some concluding remarks.

## 2. Hypothesis testing

### 2.1. Universal bank versus separated bank

The first hypothesis claims that the universal bank, unlike the separated bank, tends to intensify the relationship between firms' and banks' performances.

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[3] Note that empirical studies that test this concept using German bank data provide only weak support (see Gorton & Schmid, 1996).

Advocates of this view argue that banks in a universal banking system are typically active and have large investors, which improves the performance of firms to the extent that they hold equity and have proxy-voting power (Saunders & Walter, 1994). Banks are seen as long-term investors that then oversee firms' investments and organize firm's funding channels, rather than act as mere myopic investors. Hence, they claim, a universal bank tends to intensify the firm–bank relationship. Opponents, on the other hand, counterclaim by stating that the power of universal banks is harmful because of conflicts-of-interest that arise when a bank is simultaneously an important large equity holder in a firm (Canals, 1997). In that banks, themselves, seem impervious to external control, the concentration of power in banks is viewed as allowing them to essentially run firms on the basis of their own interests. A bank's performance, in this case, moves in a different direction from that of a firm, hence affecting the latter's performance. While both views are plausible, it must be confirmed or rejected by empirical research.

The distinction of a universal bank from a separated bank should not be a dichotomy. Barth, Caprio, and Levine (2000, hereafter BCL) have classified the two systems by measuring the degree to which banks can engage in the "three (prime) non-bank activities," which are, security, real estate and insurance, as well as in one non-financial activity, i.e., mixing of bank and commerce. Countries that allow banks to not only engage in all three activities but also possess commerce tend to be home to universal banks; countries that do not permit these are considered to have separated banks. Their restriction index variables, ranging from 1 to 4, describe the varying degrees of restrictions on these allowable activities. BCL (2000) have then gone on to study the effects of the restrictions on commercial banks' non-bank activities. They do not find a reliable statistical relationship between regulatory restrictions on financial development and industrial competition.

## 2.2. Bank-based versus market-based system

The second hypothesis argues that the bank-based, rather than the market-based, financial system tends to intensify the relationship. Stulz (1999) has pointed out that the financial structure, i.e., the relative importance of banks versus that of markets may have important implications on a firm's performance. Demirgüç-Kunt and Huizinga (2000) have also demonstrated that, for firms, differences in banking and stock market developments do, to a great degree, translate into differences in the cost of bank financing. Rajan and Zingales (1998) have meanwhile argued that sufficient competition from capital markets, first, prevents the misallocation of funds to unprofitable investments and, secondly, mitigates the impact of a financial crisis on the real sector. Simply put, firms in a market-based system should be less affected by a distressed bank. Hence, our a priori conjecture is that the firm–bank relationship should be stronger in bank-based economies than that in market-based ones.

The distinction of bank-based countries from those which are market-based is not the same as that of a universal bank from one which is a specialized bank.

Demirgüç-Kunt and Levine (1999) have categorized countries into developed and undeveloped markets; they have then sub-divided the former in terms of bank-based and market-based systems. Banks in bank-based economies have stronger power in the financial market but less in market-based economies. This separation resembles, but is not identical to, BCL's classification. Countries adopting a universal banking system tend to be bank-based economies, but countries that are bank-based cannot necessarily be considered to have universal banks.

### 2.3. Bank competition

The third hypothesis examines whether or not a high bank concentration or increased bank competition improves the firm–bank relationship. Cetorelli (2001) has surveyed theories, and argues that the effects of the banking market structure on the market structure of industrial sectors are not a priori obvious. On the one hand, adverse selection increases with the degree of competition among banks, suggesting that monopoly power in the banking sector may be beneficial to firms' availability of credit. In addition, efficiency in the banking industry points to a better credit supply. While at first glance, the full impact of banking competition is unclear as far as it affects the relationship, Patti and Dell'Ariccia (2000) have reported that a low concentration is less favorable as far as the emergence of new firms goes. Along the same line, Cetorelli (2001) has shown that bank concentration enhances the market concentration of industries. A country with a high bank concentration, therefore, is expected to enjoy improved relationships among firms and banks.

### 2.4. Governance

Our last interest concerns the impact of corporate governance, which has recently been found to affect both positively and negatively financial intermediaries and firms' performances. While governance is a broad term, we direct our attention to only creditor protection. A country with good governance may make its corporations less vulnerable when banks are in distress, as such corporations tend to have more transparent balance sheets, and hence greater ease in obtaining funds from alternative sources. On the other hand, banks may be less affected by a defaulting corporation in a country with good governance as depositors have faith on banks. The impact of governance is unfavorable to the relationship.

Researchers are also interested in the influence of corporate governance on the financial system. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, hereafter, LLSV), surveyed 49 countries and, in so doing, have come up with a governance index based on various criteria. They have clearly determined that countries with poorer investor protection have smaller, narrower capital markets. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) have also shown that differences in the nature and effectiveness of global financial systems can be traced in part to differences in investor protection against expropriation by insiders.

The application of LLSV indexes has been increasing. For one, Morck, Yeung, and Yu (2000) have shown that their indexes can account for the majority of stock price co-moves in a country. Shen and Chang (2002a) have further demonstrated that the impact of restrictions on banking activities is also partly attributed to these indexes. Shen and Chang (2002b) have additionally confirmed that the liquidity constraint in investment function is also affected by these indexes.

## 3. Econometric specifications

Our econometric model is designed to study the relationship between the performances of banks and firms. Hence,

$$R_{f,it} = \alpha_0 + \alpha_{1,i} R_{b,it} + \alpha_2 y_{it} + \alpha_3 p_{it} + \varepsilon_{it}, \tag{1}$$

$$\alpha_{1,i} = \beta_0 + \beta_1 z_i, \quad i = 1, \ldots, N; \quad t = 1, \ldots, T, \tag{2}$$

where $R_{f,it}$ is the weighted average return of listed firms of country $i$ at year $t$; $R_{b,it}$ is the weighted return of listed banks of country $i$ at year $t$; $y$ is income; $p$ is the price; $z_{it}$ is the hypothesized proxy; $\alpha$ and $\beta$ are unknown parameters; $N$ is the total number of countries; and $T$ is the sample period. The consideration of output and inflation re-included there so as to exclude the possibility that the relationship is affected by a third variable.

Our first focus is on the relationship coefficient $\alpha_{1,i}$. A positive $\alpha_{1,i}$ implies that a firm's performance is positively linked to a bank's performance. In the first stage, our four hypotheses are tested by examining the coefficient on $z_i$, which is proxied alternatively by the following variables:

{UB, BM, HHI and Gov}

The term UB measures the degree of separation of a universal bank and a separated bank. Three different measures, UB1, UB2 and UB3, are employed to examine the intensity of the relationship. The term UB1 is the composite index of the restriction that banks can engage in security activity, insurance and real estate. The tern UB2 is the ability of banks to own and control non-financial firms, while UB3 is the ability of non-financial firms to own and control banks. Both UB2 and UB3 are measures of the cross-shareholding between banks and firms. UB1, UB2 and UB3 are discrete numbers, ranging from 1 to 4, with higher numbers denoting tighter restrictions, and hence more likely to be in a separated banking system. The term BM, which is a dummy variable, is equal to unity if it is a bank-based system but zero if it is a market-based system. The data are taken from Demirgüç-Kunt and Levine (1999).

The term HHI denotes the Herfindahl–Hirschman index, which calculates the square of the largest three banks' assets over the squares of those of all banks. This index must lie between 0 and 10,000. Here, the assets of the third largest

banks are used to calculate HHI. Saunders (2000) notes that if the level of HHI is greater than 1,800, is between 1,000 and 1,800 or is below 1,000, then the market concentration is referred to as highly-, moderately- and un-concentrated, respectively.

The term Gov is the governance index of the protection of a creditor. This index, as mentioned earlier, ranges from 1 to 4 and is formed by adding 1 when (1) the country imposes restrictions, such as creditors' consent or minimum dividends to file for reorganization; (2) the secured creditor is able to gain possession of its security once the reorganization petition has been approved (no automatic stay); (3) the secured creditor is ranked first in the distribution of the proceeds that result from the disposition of the assets of a bankrupt firm; and (4) the debtor does not retain the administration of its property pending the resolution of the reorganization. Undoubtedly, the higher the index is, the stronger the protection of the creditor will be.

One obvious concern about our approach is that the cause and effect might be confused. Black (1975), Fama (1980), and King and Plosser (1984) argued that the causality of any correlation between the performance of a banking system and economic activity runs from the real sector to banks, indicative of a reverse causality. Also, their co-movement can be attributed to suffering from a common external shock, such as a business cycle. Here, these factors are controlled by adding them as additional explanatory variables. The results are robust when we remove the estimation bias.

## 4. Data and basic statistics

Our corporate and bank returns are taken from World scope and Bank scope, respectively. The GDP and consumer price index are taken from *International Financial Statistics* edited by the IMF (2001). The sample period is from 1994 to 1998. Both data disks report only listed companies. Total of 46 countries is used in our study.

While there are 53 countries in World scope, four countries are eliminated because the number of reported companies is lower than five; these are Egypt, Jordan, Morocco, and Zimbabwe. Also not considered are Russia and Slovakia since the sample period is less than two years. Indonesia is also eliminated, as the data are often nonviable. After these adjustments, the countries included in our sample totals 46.[4]

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[4] The 46 sample countries are Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Ireland, Israel, Italy, Japan, Luxembourg, Malaysia, Mexico, the Netherlands, New Zealand, Norway, Pakistan, Peru, the Philippines, Poland, Portugal, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, Turkey, the UK, the USA, and Venezuela.

Table 1 reports the number of companies and banks in each country. The US reports the largest number of companies, followed by Japan and the UK. Countries with the fewest number of companies are Luxembourg, Sri Lanka and Venezuela. By contrast, Germany, in our sample, has the largest number of banks, followed by the US and France.[5] Sri Lanka again makes the list by having the lowest number of banks.

The next two columns are the weighted averaged returns of companies and banks, with assets and equity used as weights, respectively.[6] For example, the weighted averaged returns of all companies are computed for each year, making for five years' worth of weighted average returns. Only the simple average of these returns for each country is reported due to space limitation. Clear from the table is that the dispersion of a bank's returns is larger than that of the corporation's return, where the former ranges from –9.97 (Thailand) to 26.44 (Venezuela), whereas the latter ranges from 0.25 (Thailand) to 9.31 (Peru). See Fig. 1 for the plots of our sample returns.

The next three columns are UB1, UB2 and UB3 which range from 1 to 4. The term UB1 is the restriction index, equaling the average of the restriction on securities, insurance, real estate and those banks owning non-financial firms. It is found that the US scores the number 3 for each of UB1, UB2 and UB3, suggesting that American banks are restricted from engaging in three financially related activities and non-financially related activities. In contrast, numbers for Germany are 1.75, 1.00 and 1.00 for the three restrictions, respectively, indicative that German banks are allowed to engage in both of the above financial and non-financial activities.

The term BM in the next column describes the bank-based and market-based economies. Since this information is not available for China, Denmark, Hungary, Luxembourg, Poland or Taiwan, the number of countries sampled is only 40 when testing this hypothesis.

Wide ranges of HHI, from 33 (USA) to 2,377 (Venezuela) are readily observed with most banks having moderate concentration ratios. A bank-based system does not always have a high HHI value. The Netherlands, for instance, is a market-based economy, but its HHI (1,141.31) is higher than the corresponding values in most bank-based countries, such as Germany (80.74) and Japan (49.47).

GOV values are reported in the last column. Worthy of note is that a bank-based economy does not always have higher creditor protection. For example, Germany and the UK score 3 and 4, respectively, but the former is a bank-based and the latter is a market-based economy. Similarly, Japan and the US score 2 and 1, respectively, but they, too, belong to opposing financial systems.

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[5] The number of German banks is greater than that of USA because of the data available for the five-year period used in this paper.

[6] We use returns on assets for corporations and returns on equity for banks. However, results do not change when we use return on assets for both sectors.

Table 1
Basic statistics

| | Country | No. of firms | No. of banks | $R_f$ | $R_b$ | UB1 | UB2 | UB3 | BM | HHI | Gov |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Argentina | 40 | 145 | 5.14 | 6.01 | 2.50 | 3 | 1 | 1 | 406.44 | 1 |
| 2 | Australia | 228 | 165 | 4.19 | 16.81 | 2.00 | 2 | 3 | 0 | 304.93 | 1 |
| 3 | Austria | 92 | 150 | 2.05 | 8.64 | 1.25 | 1 | 1 | 1 | 422.10 | 3 |
| 4 | Belgium | 118 | 206 | 3.34 | 13.81 | 2.50 | 3 | 1 | 1 | 416.64 | 2 |
| 5 | Brazil | 148 | 266 | 2.63 | 2.26 | 2.50 | 3 | 1 | 0 | 431.09 | 1 |
| 6 | Canada | 563 | 97 | 3.02 | 15.43 | 2.25 | 3 | 3 | 0 | 801.55 | 1 |
| 7 | Chile | 75 | 52 | 6.01 | 2.30 | 2.75 | 3 | 3 | 0 | 419.76 | 2 |
| 8 | China | 107 | 58 | 4.96 | 7.23 | na | na | na | na | 832.05 | 0 |
| 9 | Colombia | 24 | 65 | 3.38 | 8.89 | 2.50 | 4 | 1 | 1 | 231.28 | 0 |
| 10 | Czech | 67 | 38 | 3.47 | −8.67 | na | na | na | na | 466.45 | 2 |
| 11 | Denmark | 167 | 280 | 5.01 | 9.97 | 1.75 | 2 | 1 | 0 | 287.95 | 3 |
| 12 | Finland | 139 | 30 | 4.78 | 3.02 | 1.75 | 1 | 1 | 1 | 1,328.51 | 1 |
| 13 | France | 778 | 1,264 | 1.43 | 4.25 | 2.00 | 2 | 2 | 1 | 98.49 | 0 |
| 14 | Germany | 791 | 2,600 | 2.29 | 8.83 | 1.75 | 1 | 1 | 1 | 80.74 | 3 |
| 15 | Greece | 165 | 65 | 8.70 | 10.51 | 2.25 | 1 | 1 | 1 | 674.21 | 1 |
| 16 | Hong Kong | 283 | 209 | 5.53 | 17.53 | 2.00 | 3 | 3 | 0 | 896.99 | 4 |
| 17 | Hungary | 32 | 51 | 7.91 | 14.71 | na | na | na | na | 1,465.37 | 2 |
| 18 | India | 315 | 90 | 6.31 | 19.00 | 3.00 | 2 | 2 | 1 | 489.24 | 4 |
| 19 | Ireland | 71 | 93 | 5.23 | 12.32 | 1.75 | 1 | 1 | 1 | 579.95 | 1 |
| 20 | Israel | 48 | 34 | 3.34 | 11.94 | 1.00 | 1 | 1 | 1 | 562.33 | 4 |
| 21 | Italy | 166 | 914 | 2.01 | 3.42 | 2.25 | 3 | 3 | 1 | 126.96 | 2 |
| 22 | Japan | 2,204 | 277 | 0.78 | −6.96 | 3.25 | 3 | 3 | 1 | 49.47 | 2 |
| 23 | Luxembourg | 10 | 246 | 4.25 | 14.65 | 1.50 | 1 | 3 | na | 84.81 | na |
| 24 | Malaysia | 329 | 145 | 4.01 | 11.79 | 2.50 | 2 | 2 | 0 | 221.17 | 3 |
| 25 | Mexico | 84 | 74 | 2.88 | 10.92 | 3.25 | 3 | 2 | 0 | 277.54 | 0 |
| 26 | Netherlands | 209 | 152 | 4.32 | 11.48 | 1.50 | 1 | 1 | 0 | 1,141.31 | 2 |
| 27 | New Zealand | 51 | 29 | 4.55 | 21.99 | 1.25 | 2 | 2 | 1 | 363.48 | 3 |
| 28 | Norway | 181 | 81 | 4.32 | 17.80 | 2.00 | 2 | 2 | 1 | 393.27 | 2 |
| 29 | Pakistan | 93 | 31 | 5.37 | 19.16 | 2.50 | 1 | 1 | 1 | 862.03 | 4 |
| 30 | Peru | 33 | 33 | 9.31 | 14.26 | 2.00 | 2 | 2 | 0 | 1,274.72 | 0 |
| 31 | Philippines | 72 | 56 | 6.90 | 15.02 | 2.00 | 3 | 3 | 0 | 675.57 | 0 |
| 32 | Poland | 55 | 60 | 5.73 | 31.25 | na | na | na | na | 962.37 | 2 |
| 33 | Portugal | 81 | 76 | 2.46 | 11.13 | 2.00 | 2 | 1 | 1 | 208.42 | 1 |
| 34 | Singapore | 179 | 101 | 4.09 | 10.72 | 2.25 | 3 | 1 | 0 | 571.18 | 4 |
| 35 | South Africa | 304 | 134 | 6.12 | 14.45 | 1.50 | 1 | 2 | 0 | 221.29 | 3 |
| 36 | South Korea | 262 | 88 | 0.04 | −12.65 | 2.25 | 3 | 3 | 0 | 160.22 | 3 |
| 37 | Spain | 151 | 490 | 3.77 | 14.80 | 1.75 | 1 | 2 | 1 | 217.32 | 2 |
| 38 | Sri Lanka | 12 | 18 | 4.03 | 21.31 | 2.00 | 2 | 3 | 1 | 756.16 | 3 |
| 39 | Sweden | 265 | 60 | 6.28 | 15.95 | 3.00 | 3 | 1 | 0 | 315.75 | 2 |
| 40 | Switzerland | 180 | 540 | 4.82 | 6.21 | 1.50 | 3 | 1 | 0 | 1,178.85 | 1 |
| 41 | Taiwan | 209 | 53 | 6.27 | 11.88 | na | na | na | na | 329.77 | 2 |
| 42 | Thailand | 210 | 60 | 0.25 | −9.97 | 2.25 | 3 | 3 | 0 | 430.11 | 3 |
| 43 | Turkey | 68 | 108 | 8.58 | 38.70 | 3.00 | 3 | 1 | 0 | 360.84 | 2 |
| 44 | UK | 1,664 | 926 | 5.73 | 13.99 | 1.25 | 1 | 1 | 0 | 100.13 | 4 |
| 45 | USA | 8,075 | 1,700 | 4.08 | 15.01 | 3.00 | 3 | 3 | 0 | 33.84 | 1 |
| 46 | Venezuela | 13 | 38 | 8.01 | 26.44 | 2.50 | 3 | 3 | 1 | 2,377.86 | na |

UB1: a summary index: equals the average of securities, insurance, real estate and banks owning. Non-financial firms: the assessment of each country's regulations concerns these activities and rates the degree average index of restrictions on a bank's activities in securities, real estate and insurance. UB2: index of banks' abilities to own non-financial firms; UB3: index of non-financial firms' ability to own banks; BM: bank-based or market-based economies; HHI: Herfindahl–Hirschman indexes; Gov: Governance index, which is the degree of protection of the creditor.
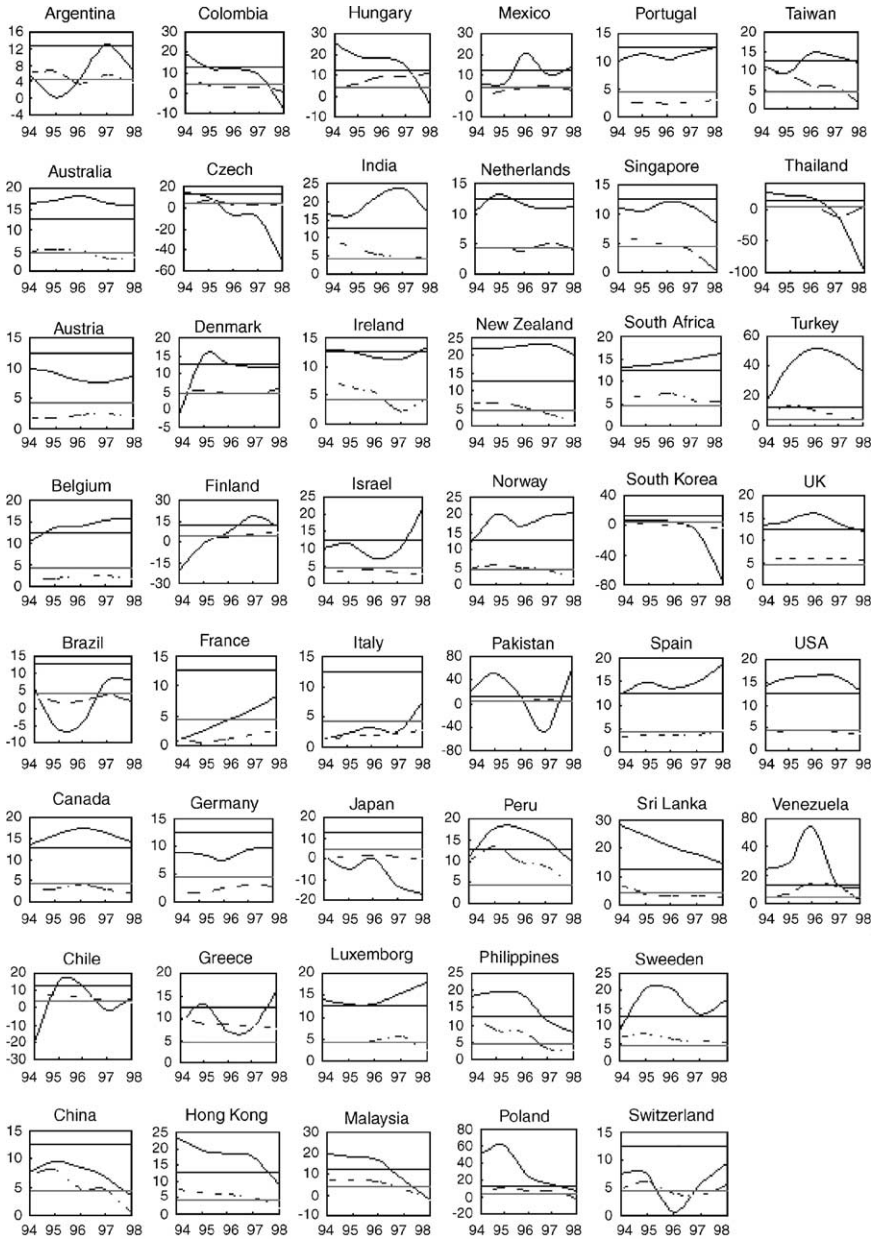
Fig. 1. Trend of banks' ROE and firms' ROA.

Table 2

OLS estimation results—average of five-year data $R_{f,i} = \alpha_0 + \alpha_{1,i} R_{b,i} + \alpha_2 y_i + \alpha_3 p_i + \varepsilon_i$, $\alpha_{1,i} = \beta_0 + \beta_1 z_i$, $z_i$ = UB1, UB2, UB3, BM, HHI and Gov

| | Linear model | Financial structure | | | | | |
| | | UB1 | UB2 | UB3 | BM | HHI | Gov |
|---|---|---|---|---|---|---|---|
| Constant | 2.352*** (3.740) | 1.860** (2.653) | 1.846*** (2.769) | 1.782** (2.615) | 1.725*** (2.747) | 2.594*** (4.012) | 2.253*** (3.506) |
| $R_b$ | 0.119*** (3.590) | | | | | | |
| $\beta_0$ | | 0.131 (1.402) | 0.129 (1.687) | 0.167** (2.084) | 0.175*** (4.517) | 0.075 (1.644) | 0.154*** (2.826) |
| $\beta_1$ | | 0.003 (0.066) | 0.004 (0.125) | −0.012 (−0.427) | −0.086** (−2.124) | 0.000 (1.365) | −0.014 (−0.822) |
| GDP | 0.141 (0.982) | 0.210 (1.437) | 0.217 (1.460) | 0.201 (1.384) | 0.262* (1.925) | 0.102 (0.699) | 0.163 (1.109) |
| CPI (inflation) | 0.030 (0.696) | 0.015 (0.293) | 0.014 (0.289) | 0.017 (0.359) | 0.016 (0.358) | 0.007 (0.153) | 0.024 (0.544) |
| Adjusted $R^2$ | 0.290 | 0.314 | 0.315 | 0.318 | 0.397 | 0.306 | 0.284 |
| Usable observations | 42 | 38 | 38 | 38 | 38 | 42 | 42 |

$t$-statistics are in parentheses.
* Significant at the 1% level.
** Significant at the 5% level.
*** Significant at the 10% level.

Table 3

OLS estimation results—panel data $R_{f,it} = \alpha_0 + \alpha_{1,it}R_{b,it} + \alpha_2 y_{it} + \alpha_3 p_{it} + \varepsilon_{it}$, $\alpha_{1,i} = \beta_0 + \beta_1 z_i$, $z_i =$ UB1, UB2, UB3, BM, HHI and Gov

| | Linear model | Financial structure | | | | | |
|---|---|---|---|---|---|---|---|
| | | UB1 | UB2 | UB3 | BM | HHI | Gov |
| Constant | 2.788*** (9.877) | 2.422*** (7.577) | 2.553*** (8.182) | 2.573*** (8.456) | 2.630*** (8.668) | 2.746*** (9.805) | 2.715*** (9.650) |
| $R_b$ | 0.047*** (3.692) | | | | | | |
| $\beta_0$ | | 0.108** (1.979) | 0.050 (1.592) | 0.044 (1.581) | 0.054*** (3.301) | 0.020 (1.182) | 0.109*** (3.922) |
| $\beta_1$ | | −0.027 (−1.169) | −0.002 (−0.142) | 0.001 (0.089) | −0.018 (−0.904) | 0.000** (2.338) | −0.023*** (−2.600) |
| GDP | 0.231*** (3.898) | 0.242*** (3.835) | 0.233*** (3.671) | 0.232*** (3.668) | 0.221*** (3.461) | 0.252*** (4.245) | 0.220*** (3.702) |
| CPI (inflation) | 0.038*** (4.248) | 0.054*** (4.231) | 0.047*** (3.982) | 0.047*** (4.176) | 0.046*** (4.131) | 0.032*** (3.520) | 0.028*** (2.998) |
| Adjusted $R^2$ | 0.251 | 0.263 | 0.258 | 0.258 | 0.261 | 0.265 | 0.241 |
| Usable observations | 225 | 200 | 200 | 200 | 200 | 225 | 220 |

$t$-statistics are in parentheses.

** Significant at the 5% level.

*** Significant at the 10% level.

Table 4

Panel fixed effect estimation results $R_{\mathrm{f},it} = \alpha_0 + \alpha_{1,it} R_{\mathrm{b},it} + \alpha_2 y_{it} + \alpha_3 p_{it} + \varepsilon_{it}$, $\alpha_{1,i} = \beta_0 + \beta_1 z_i$, $z_i = $ UB1, UB2, UB3, BM, HHI and Gov

| | Linear model | Financial structure | | | | | |
| | | UB1 | UB2 | UB3 | BM | HHI | Gov |
|---|---|---|---|---|---|---|---|
| $R_{\mathrm{b}}$ | 0.009 (0.643) | | | | | | |
| $\beta_0$ | | 0.094 (0.838) | −0.008 (−0.231) | 0.018 (0.559) | −0.003 (−0.140) | −0.033 (−1.332) | 0.102** (2.558) |
| $\beta_1$ | | −0.040 (−0.834) | 0.004 (0.293) | −0.008 (−0.585) | 0.008 (0.302) | 0.0001** (2.013) | −0.034*** (−2.636) |
| GDP | 0.285*** (4.512) | 0.308*** (4.748) | 0.298*** (4.363) | 0.313*** (4.702) | 0.311*** (4.501) | 0.340*** (4.976) | 0.274*** (4.301) |
| CPI (inflation) | 0.040*** (3.077) | 0.084*** (3.206) | 0.084*** (3.170) | 0.088*** (3.256) | 0.083*** (3.092) | 0.032** (2.384) | 0.029** (2.191) |
| Adjusted $R^2$ | 0.190 | 0.197 | 0.194 | 0.195 | 0.194 | 0.204 | 0.199 |
| Usable observations | 225 | 200 | 200 | 200 | 200 | 225 | 220 |

*t*-statistics are in parentheses.

** Significant at the 5% level.

*** Significant at the 10% level.

Table 5

Panel random estimation results $R_{f,it} = \alpha_0 + \alpha_{1,it} R_{b,it} + \alpha_2 y_{it} + \alpha_3 p_{it} + \varepsilon_{it}$ $\alpha_{1,i} = \beta_0 + \beta_1 z_i$ $z_i =$ UB1, UB2, UB3, BM, HHI and Gov

| | Linear model | Financial structure | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | UB1 | UB2 | UB3 | BM | HHI | Gov |
| Constant | 2.910*** (8.725) | 2.456*** (6.428) | 2.637*** (7.031) | 2.615*** (7.053) | 2.643*** (7.237) | 2.841*** (8.595) | 2.798*** (8.304) |
| $R_b$ | 0.025** (2.059) | | | | | | |
| $\beta_0$ | | 0.104 (1.527) | 0.016 (0.515) | 0.022 (0.779) | 0.021 (1.281) | −0.005 (−0.276) | 0.103*** (3.287) |
| $\beta_1$ | | −0.037 (−1.278) | 0.001 (0.101) | −0.001 (−0.120) | −0.005 (−0.209) | 0.0001** (2.154) | −0.029*** (−2.854) |
| GDP | 0.256*** (4.453) | 0.277*** (4.630) | 0.267*** (4.331) | 0.270*** (4.451) | 0.265*** (4.260) | 0.289*** (4.887) | 0.246*** (4.279) |
| CPI (inflation) | 0.042*** (4.159) | 0.068*** (4.348) | 0.059*** (4.003) | 0.060*** (4.166) | 0.060*** (4.172) | 0.036*** (3.483) | 0.031*** (2.952) |
| Adjusted $R^2$ | 0.209 | 0.216 | 0.210 | 0.210 | 0.211 | 0.223 | 0.208 |
| Usable observations | 225 | 200 | 200 | 200 | 200 | 225 | 220 |

$t$-statistics are in parentheses.

** Significant at the 5% level.

*** Significant at the 10% level.

## 5. Estimation results

### 5.1. Simple average data

Our model is first estimated using the averaged five-year data. Table 2 reports the estimation results using the OLS method. In the first column, the relationship coefficient is equal to 0.1186 and is significant at the 1% level. The two sectors' performances are thus linked when the averaged five-year data are used.

Our four hypotheses are explored in the next stage still using the averaged data. Among the four hypotheses, we only find that the coefficient of BM is significantly negative, implying that, to some extent, a bank-based system tends to decrease the relationship between two sectors' performances, which contradict our earlier supposition. The coefficients for GDP growth and the inflation rate are also insignificant. In brief, it is apparent that the results using the simple average data refute our hypotheses.

### 5.2. Panel data

Table 3 presents the results using pooling time series and cross-section data and is estimated by OLS. The relationship coefficient remains significantly positive at the 1% level, suggesting the performances of the two sectors are indeed linked even in the presence of macro-variables of GDP and inflation rate. Two macro-variables also become significantly different from zero. Among the four hypotheses, only the HHI and GOV coefficients are significant. The positive coefficient of HHI is nevertheless consistent with our hypothesis and suggests that the higher the concentration, the stronger the relationship between the two sectors is. The negative coefficient of GOV suggests that a stronger protection of the creditor mitigates the relationship, which is also highly consistent with our view. What is worth noting is that a previously significant coefficient of BM becomes insignificantly different from zero. Thus, the HHI and GOV hypotheses gain more support by using panel data, whereas UB and BM have less explanatory power when it comes to the same relationship.

Tables 4 and 5 use fixed and random effect of panel models to estimate the coefficients. Similar results to those for OLS are obtained, implying the individual country effect is insignificant. We thus do not discuss this.

## 6. Conclusions

This paper is unique in employing data from 46 countries to demonstrate a positive relationship between the performance of the financial sector and non-financial ones in the presence of GDP growth rate and inflation rates. It is most reasonable to conclude that the two sectors are linked on a global scale. To account for this relationship, we propose four hypotheses. The first argues that the universal bank, and

not the separated bank, intensifies the relationship. The second one stipulates that the bank-based system, in contrast to the market-based system, should strengthen the relationship. The third hypothesis suggests that bank concentration improves the relationship. The fourth hypothesis argues that governance should mitigate the relationship.

The empirical results from this study clearly show that bank concentration strengthens the relationship but that governance weakens the relationship. Restrictions vis-à-vis banks engaging in non-banking activities, i.e., the universal bank hypothesis and a bank-based system, do not influence the relationship. Thus, improving one sector in a high bank concentration system can help to improve the performance of the other. Further, it is evident that good governance can help to insulate the spillover effect from one distressed sector to another sector.

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