EMPIRICAL EVIDENCE ON FIRM-BANK RELATIONSHIPS IN THE G-8 COUNTRIES

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ABSTRACT

This study sets out to explore the relationships between the banking and night-industry types of non-banking sectors of the G8 over the years of 1994-2004—before the Kyoto Protocol was enacted in 2005. Our findings show that these relationships are still conditional upon the financial structure of these countries, including financial systems, regulations on banking activities, bank competition and the protection of the rights of creditors. By extending the Shen and Huang (2003) approach into different industries, this study provides additional information on firm-bank relationships among nine major industries with a longer period analysis. Bank concentrations intensify firm-bank relationships; that is, improving the banking sector through an overall increase in bank concentration can help to improve the performance of the non-banking sector. A bank-based system mitigates the relationship between bank performance and firm performance by bringing the inter-temporal smoothing function into operation. Unlike separated banks, universal banks tend to intensify the relationship between the performance of the firms and the banks as mere myopic investors. One rather unexpected result is the finding that this relationship is intensified by the existence of appropriate methods of protection for the rights of creditors.

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KEYWORDS: Bank-Based Systems, Gramm-Leach-Bliley Act, Bank Concentration, Protection of Creditors' Rights

INTRODUCTION

The global financial crisis, which erupted in 2008, arose initially within the financial sector; however, it rapidly expanded into the real sectors, including the manufacturing, retail and wholesale industries, among others. Despite having occurred so suddenly, this chain effect have had already persisted for over a year, with many firms ultimately announcing their bankruptcy or closure, even those firms with good long-standing reputations, such as Chrysler, General Motors, Macy's, and so on.

Of particular interest to this present study is whether the relationship between bank performance and firm performance is contained within historical data. Shen and Huang (2003) demonstrate a significantly positive relationship between the performance of banks and manufacturing firms in 46 countries, with their findings also showing a positive link between the financial and non-financial sectors in terms of GDP growth and inflation rates. However, the focus in that particular study was solely on the relationship existing between banks and manufacturing firms. In an attempt to provide evidence on the current global financial crisis, a specific aim of the present study is to determine whether, in addition to manufacturing firms, this positive relationship still holds for other industries.

There are several reasons motivating our examination of the firm-bank relationships within the G8. Firstly, each member of the G8 member is at very similar stage of economic development. Secondly, the members of the G8 represent either a market-based system or a bank-based system. Thirdly, these countries exhibit potentially balanced development across the various industries. Finally, the governments and financial authorities in many developing countries are extremely keen in determining exactly what had occurred in the developed countries, so that they may learn from their mistakes.

Two major reasons motivating our research over the 1994-2004 time period are as follows. First, the G7 Finance Ministers and Central Bank Governors Meeting in London on February 4-5, 2005 recognized the critical role and responsibility of developed countries in the challenges and opportunities of the global economy and were committed to providing support for developing countries to build better infrastructure and capacity for worldwide trade transactions. Several issues related to energy, exchange rates, efficient labor markets, willingness to provide debt relief for the heavily indebted poor countries and so on were discussed in this meeting—especially the Kyoto Protocol enacted in year 2005, which were thought at that time to have a significant impact on the 2005 yearly return of real sectors within the G8. Second, the variables used to proxy for financial structure (financial system, regulations on banking activities, bank competition, and the protection of the rights of creditors) within countries in Shen and Hunag (2003) were not continuous variables, and not defined and collected before 1999. These variables are heavily used in empirical studies after year 1999 since researchers believed that the policy related variables might not dramatically change over a short time. However, we still think it might be proper to apply these variables into the recent five year period range. Thus by using year 1999 as the cutoff point, this study arranges the sample period from year 1994-2004.

Extending the methodology adopted in Shen and Huang (2003), we provide a more robust exploration of the overall relationship in the present study by undertaking separate examinations of the relationships in each of the industries of the different G8 countries. We also provide controls for the financial environment within each country, including regulations on banking activities, the financial system, bank competition, and the corporate governance.

Regulations on banking activities have been discussed extensively in many of the prior policy papers and extant literature. Clearly, some relationships must exist between the performance of banks and firms, which is why policymakers seek to regulate the banking activities of non-banking or non-financial institutions, with different countries potentially setting up quite diverse policies on permissible banking activities. Within the US, for example, in order to ensure that banks were unable to take advantage of the protections provided for deposit insurance, and also to ensure the protection of the banks' depositors, the Glass-Steagall Act was passed by Congress in 1933, thereby regulating banking activities, particularly with regard to the underwriting of securities.

The Bank Holding Company Act 1956, and the subsequent Amendments in 1970, further prohibited mergers and acquisitions between banks and commerce as a means of eliminating any potential adverse effects arising from affiliations between banking institutions and either financial or non-financial firms. Subsequent acceleration in technological innovations, combined with increasing competition in traditional borrowing and lending activities, placed significant pressure on the banks by reducing their interest spread income, thereby lowering both the profits and performances of banks.

The debate over the affiliation of banking and financial firms was subsequently resolved by the passage of the Gramm-Leach-Bliley Act of 1999, which was essentially aimed at securing diversification benefits or synergies for financial firms. However, while economic theory stresses the need to examine the costs and benefits of cross-industry combinations, to this day banks in the US are still prohibited from seeking out the potential benefits of diversification or synergies in commercial firms.

The relationship between bank performance and firm performance can also be heavily dependent upon a country's financial system. The two major types of financial systems are bank-based and market-based, with Japan and Germany representing good examples of the former. Firms in both countries have fewer obstacles to obtaining external financing from banks as long as they have good relationships with these banks. On the other hand, any shocks to bank-based systems may have serious knock-on effects for the firms due to the reduced levels of diversification in the external financing of such firms. Furthermore, the relationship between the performance of banks and firms may also be dependent upon the level of

competition amongst the banks, as well as the protections (governance) in place for the rights of creditor within a given country.

This study proceeds along two distinct paths. Firstly, we directly examine the relationship between the performance of banks and non-bank firms—that is, firms within 'agriculture, fisheries, farming and hunting' (AFFH), manufacturing, mining, construction, transportation, wholesale, retail, non-bank financial services and non-financial services industries. Controls are also put in place for a country's GDP growth and inflation rates, as well as industry code dummies and year dummies. Next, the interactive terms between bank performance and the financial environment (including regulations on banking activities, the financial system, bank competition and appropriate protections for the rights of creditors) are separately included within the model to examine the conditional impact of the performance of the banks on that of the firms. Finally, we examine the model by breaking down the sample on the basis of industry codes.

This study provides a number of important findings. Based on the adjusted R2 and slope coefficients, the impact of bank performance is found to be significantly associated not only with manufacturing firms, but also with firms in the mining, transportation, retail, non-bank financial services and services industries—wherein bank concentration is found to intensify performance and relationships between banks and corporations.

Finally, we find that bank-based systems have a strongly negative impact on the firm-bank relationship, a finding which contradicts the results of Shen and Huang (2003). We surmise that this effect comes as a result of the inter-temporal smoothing function of bank-based systems (Allen and Santomero, 2001). A somewhat unexpected result is the finding that the firm-bank relationship is intensified by the existence of good levels of protection for the rights of creditors.

The remainder of this paper is organized as follows. Following on from this Introduction, an explanation of the link between the bank and non-bank sectors is provided in Section 2. Section 3 describes the Shen and Huang (2003) econometric model adopted in the present study, and Section 4 presents the empirical results. Section 5 provides a summary and some concluding remarks related to research limitations and future study.

LITERATURE REVIEW AND HYPOTHESIS TESTING

Universal Banks versus Separated Banks

Banks within a universal banking system play a very active role with regard to the monitoring of firms, since these banks are block shareholders that essentially obtain proxy-voting power over the firms (Saunders and Walter, 1994). Therefore, since the banks represent long-term investors providing staged financing for the firms, the firm-bank relationship tends to be intensified within a universal banking system. Canals (1997) nevertheless proposes a contrary view of the impact of universal banks on firm performance based upon conflicts of interest, noting that as larger important equity holders, such banks may actually run the firms in their own best interests, thereby hindering the performance of the firm by failing to pursue, or essentially ignoring, the maximization of firm value.

The present studys examine the net effect of universal banking systems on firm performance, following the approach of Shen and Huang (2003) to examine the indirect impact on firms attributable to universal banks. Shen and Hunag (2003) note that distinguishing banks within universal and separated banking systems should not prove to be dichotomous; and indeed, Barth, Capiro and Levine (2004) successfully classified the two systems by measuring the extent to which banks can engage in three 'non-bank activities', as a proxy for 'freedom' in banking activities. The extent to which the three 'non-bank

activities' are permitted is measured by the composite index of the restrictions on banks engaging in non-bank financial services (securities, insurance and real estate), the ownership of any non-financial firms, and whether non-financial firms are able to both own and control banks. Those countries in which banks are allowed more freedom to become involved in non-bank financial services and commerce tend to be characterized by universal banking systems.

The restriction index variables proposed by Barth et al. (2004), which range from 1 to 4, describe the degree of freedom to engage in permissible activities, with financial intermediaries eliminating risk by investing in short-term liquid assets. The above discussion gives rise to the following hypothesis:

Hypothesis 1*: Unlike a separated bank, a universal bank tends to intensify the relationship between the performance of both banks and firms*

Bank-based versus Market-based Systems

Stulz (1999) notes that the financial system of a country will influence the financing channels within that country, highlighting two major forms of financial systems: 'bank-based' versus 'market-based' systems. The primary function of a good financial system is the efficient allocation of capital; therefore, the differences in the cost of financing are attributable to the differences in the development of the banking system and the development of the stock market (Demirguc-Kunt and Huizigna, 2000).

Stulz (1999) also points out that banks provide important staged financing for the real sector, particularly for start-up businesses within an uncompetitive stock market, and with no established reputation; the importance of banks or bank-based systems may, therefore, intensify the relationship between bank performance and firm performance. However, Rajan and Zingales (1998) argue that those stock and capital markets that have become well developed over the years can provide an efficient resource allocation function, thereby effectively alleviating the funding shortages among firms arising from bank crises or ineffective bank loan pricing.

With regard to inter-temporal smoothing, Allen and Gale (1997) demonstrate that market- and bank-based financial systems may have different effects, arguing that as well-established financial institutions, banks can effectively ensure inter-temporal smoothing as long as they are not subject to substantial competition from the financial markets. Therefore, the relationship between the performance of banks and firms may well be mitigated under a bank-based system, as compared to a market-based system, since the operation of the inter-temporal smoothing function under a bank-based system reduces the impact on firms in the real sector.

We follow the approach of Shen and Huang (2003) to examine the indirect impact of bank-based systems on firm performance. By using the classification data proposed in Demirguc-Kunt and Levine (1999), we can separate the G8 countries into two specific groups, those operating under a bank-based system and those operating under a market-based system. As noted in Shen and Huang (2003), countries with universal banking systems tend to have bank-based systems; however, this does not operate in the reverse, since countries with bank-based financial systems do not necessarily have universal banking systems. This study therefore follows Shen and Huang (2003) to provide an alternative measure of a bank-based system.

Hypothesis 2*: Banking institutions within a bank-based financial system tend to intensify or mitigate the relationship between the performance of banks and firms*

Competition between Banks

Bank concentration can have either positive or negative indirect impacts on the availability of credit to firms, and ultimately, on their overall performance. For example, 'market structure theory' states that monopoly power within the banking sector may hinder the efficiency of the resource allocation function, whereas 'efficiency theory' states that competition between banks may actually promote bank efficiency, thereby giving rise to efficient resource allocation. Nevertheless, Cetorelli (2001) argues that the effects of bank market structure are not so obvious, since monopoly power within the banking sector may well prove to be beneficial to the availability of funds to firms, particularly with regard to new start-up firms. Cetorelli (2001) therefore demonstrates that bank concentration may actually enhance industry concentration. As a result, a country with a high bank concentration may provide indirect positive impacts on firm performance. We follow the approach of Shen and Huang (2003) to examine bank concentration and its indirect impacts on firm performance.

The Herfindahl-Hirschman index (HHI) measure of competition in the banking sector is defined as the sum of the squares of the market shares of the three largest banks, ranging from 0 to 10,000. An increase in the HHI measure indicates a reduction in competition and an increase in monopolistic power, and vice versa. If the HHI is greater than 1,800, then this is regarded as a high concentration of banks; if it is between 1,000 and 1,800, then the banks are seen as being moderately concentrated; and if it is below 1,000, then there is no bank concentration (Saunders, 2000).

Hypothesis 3: A high bank concentration will tend to intensify the relationship between the performance of banks and firms

Corporate Governance and the Protection of Creditors' Rights

A country with good corporate governance mechanisms and appropriate measures for the protection of the rights of creditors will generally provide better overall protection for investors as a whole (La Porta, Lopez-de-Silances, Shleifer and Vinshy, 1997). Thus, those firms in countries with good levels of protection for creditors can more easily obtain alternative financing, particularly during times when banks are in distress. Firms may therefore be less affected by bank defaults in countries with good governance mechanisms, thereby potentially mitigating the impact of governance on the relationship between the performance of banks and firms.

We follow the approach of Shen and Huang (2003) to examine the indirect effects of the protection of creditors' rights on firm performance. La Porta et al. (1997) surveyed each country's creditor right protection to provide a specific score ranging from 1 to 4, with a higher score indicating better protection for creditors' rights.

Hypothesis 4: Banks with better protection for the rights of creditors will tend to mitigate the relationship between bank and firm performance

Firm Performance across Various Industries

The relationship examined in this study between the performance of banks and firms is not only on those firms in the manufacturing industry, but also across a wide range of other industries, including a sample of firms in AFFH, mining, construction, transportation, wholesale, retail, non-bank financial services and non-financial services. The sample is subsequently broken down on the basis of separate industry codes in order to re-examine Hypotheses 1 to 4.

We surmise that there may be discernible differences in the relationships between the performance of banks and firms conditional upon industry characteristics. The examination of the relationship between banks and firms from 1994 to 1998, undertaken by Shen and Huang (2003), focused purely on manufacturing firms. We expand their study by incorporating other industries and by providing a longer period of analysis (from 1994 to 2004). The impact of bank performance on firms in industries other than the manufacturing industry may also prove to be of interest, since the current global financial crisis clearly indicates that such a crisis can have widespread impacts on virtually the whole real sector, not just manufacturing.

Hypothesis 5: The bank-firm relationship may differ based upon the industry in which the sample firm is located

ECONOMETRIC SPECIFICATIONS AND DATA

We adopt the same econometric model as that proposed in Shen and Huang (2003) to examine the relationship between the performance of banks and firms, with year dummies being adopted to adjust for the fixed effects, as follows:

$$R_{f,it} = \alpha_0 + \alpha_{1,i}R_{b,it} + \alpha_{1,i}R_{b,it} * Z_i + \alpha_2 Y_{it} + \alpha_3 P_{it} + \varepsilon_{it} \tag{1}$$

where i indicates the country, and t indicates the year; $R_{f,it}$ is the weighted average ROA of the listed firms in country i in year t, and $R_{b,it}$ is the weighted averaged ROE of the listed banks in country i in year t; Y_{it} refers to the annual GDP growth rate for country i in year t; P_{it} represents the inflation rate of country i in year t; and Z_i is the hypothesized proxy of *UB*, *BM*, *HHI* and *GOV* for country i. No country dummy is included since each G8 member is essentially regarded as being at the same level of economic development. We also assume that the financial structure within a country is already used to adjust for the specific characteristics of that country.

UB indicates the degree of separation for universal banks and separated banks, with three measures being adopted here: UB1 refers to the composite index restriction on banks, which means that they can engage only in securities activity, real estate, and insurance; UB2 indicates that banks can both own and control non-financial firms; and UB3 indicates direct cross-shareholdings between the banks and the firms. UB1, UB2, and UB3 are all discrete numbers, ranging between 1 and 4, with a higher number indicating a lower degree of freedom. BM is a dummy variable, which is equal to 1 if the system is a bank-based system and 0 if it is a market-based system; GOV indicates the governance index relating to the protection of the rights of creditors, again ranging between 1 and 4, with a higher number indicating stronger protection mechanisms. UB, BM, and GOV variables are not continuous data since policy regulations or financial structure might not easily significantly change within a short time. HHI is a continuous variable and refers to the competition within the banking sector, comprising of the sum of the squares of the market shares of the three largest banks. Thus, as regards the proxy for HHI, since the HHI variable varies with a given year, Equation (1) should be rewritten as follows: $R_{f,it} = \alpha_0 + \alpha_{1,i}R_{b,it} + \alpha_{1,i}R_{b,it} * Z_i + \alpha_2 Y_{it} + \alpha_3 P_{it} + \varepsilon_{it}$

The annual returns of all of the listed firms and banks and HHI examined in the present study are taken from OSIRIS, with our examination focusing on the G-8 countriesG8 and the sample period running from 1994 to 2004. The annual GDP growth rate and inflation rate are taken from the World Bank 2006 indicators, with the composite indices of UB, BM, and GOV being obtained from La Porta et al. (1998), Demirguc-Kunt and Levine (1999) and Barth et al. (2000).

EMPIRICAL RESULTS

The number of banks and the number of firms (by industry group) in each country in the year 2004 are reported in Table 1, with the numbers shown in parentheses being the average number of firms over the 1994-2004 period. By reporting both the total and average number of firms for the year 2004, we can see that there are huge variations in the total number of banks within each country.

Table 1: Basic Statistics of Sample banks in G8 Countries at the Year 2004

Country	Number of Banks	$R_{b,it}$	UB1	UB2	UB3	BM	HHI	GOV
Canada	15 (11)	17.9	2.25	3	3	0	0.119966	1
France	11 (8)	15.03	2	2	2	1	0.374956	0
Germany	18 (11)	4.62	1.75	1	1	1	0.327646	3
Italy	18 (12)	12.31	2.25	3	3	1	0.269481	2
Japan	96 (60)	3.93	3.25	3	3	1	0.087879	2
Russia	37 (12)	11.39	na	na	na	na	0.072313	na
UK	8 (8)	14.53	1.25	1	1	0	0.23475	4
USA	802(412)	13.06	3	3	3	0	0.055818	1

$R_{b,it}$ is the weighted averaged ROE of the listed banks in country i in year t; UB1 refers to the composite index of the restriction that banks can only engage in securities activity, real estate and insurance; UB2 indicates that the banks can both own and control non-financial firms, and UB3 indicates direct cross-shareholdings between the banks and the firms. UB1, UB2, and UB3 are all discrete numbers, ranging between 1 and 4, with a higher number indicating a lower degree of freedom. BM is a dummy variable, which is equal to 1 if the system is a bank-based system, and otherwise 0 if it is a market-based system; HHI refers to the competition in the banking sector, comprising of the sum of the squares of the market shares of the three largest banks; and GOV indicates the governance index relating to the protection of the rights of creditors, again ranging between 1 and 4, with a higher number indicating stronger protection mechanisms. The number in the parenthesis is the average number of total firms or banks of country i during year from 1994-2004.

Our examination of the annual data further reveals that the returns of the banks and listed firms in the G8 also tend to vary considerably over different years; thus, if we were to take the average returns of banks and firms across a longer period (1994 to 2004) and then run the OLS regression, the statistical results may not appropriately capture the true relationship between the performance of the banks and the firms; a panel-data OLS regression is therefore examined in the present study. By pooling the time-series and cross-sectional data, we can examine the firm-bank relationship without ignoring the variations over different years. We also include year dummies in order to adjust for the fixed effects period.

Panel Data OLS Regression Results

Table 2 presents the panel data regression results on the relationship between the performance of banks and firms based upon the whole sample, with Model (1) showing that the coefficient of $R_{b,it}$ has no statistical significance (at the 10 per cent level), thereby suggesting that when controlling for the GDP growth rate and inflation rate macro-variables, the performance of the two sectors is not linked. These two macro-variables are found to be statistically significant at the 1 per cent level.

Following the introduction of the industry code and year control dummies, the slope coefficient still presents similar results, with a significant increase in the adjusted R^2 in Model (2). Models (3) to (8) provide the results of the examination of our four hypotheses, with all of the slope coefficients being significant, with the one exception of UB1. The positive coefficient on HHI is consistent with our hypothesis, which posits that the higher the concentration, the stronger the relationship between the two sectors. The negative coefficients on UB1, UB2, and UB3 are consistent with our hypothesis that, unlike a separated bank, a universal bank tends to intensify the relationship between the performance of the banks and the firms.

However, the coefficient signs on BM and GOV, with respective statistical significance at the 5 and 10 per cent level, are not consistent with our hypotheses. Therefore, those banks in countries with bank-based financial systems do not appear to have any intensifying effect on the relationship between bank

and firm performance through the inter-temporal smoothing function. However, the relationship between bank and firm performance tends to be intensified in those countries with better protections in place for the rights of creditors.

Furthermore, when including the indirect impacts of the UB, BM, HHI and GOV variables, the direct relationship between the performance of banks and firms becomes statistically significant, although there are some side effects related to the industry dummies. For example, the dummy variables for the construction, transportation, non-bank financial services and non-financial services industries reveal statistically negative significance, thereby revealing that the characteristics of these industries clearly have negative impacts on firm performance.

Table 2: OLS Panel Data Regression Estimation Results on Whole Sample Firms, 1994-2004

Variables	Models							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
C	0.75***	0.80	0.42	2.87	3.04***	2.81***	2.81***	2.81***
$R_{b,it}$	0.00	−0.00	−0.05***	0.07***	−0.00	0.08***	0.09***	0.09***
Y_{it}	0.77***	0.77***	0.85***	−0.00	−0.04	0.05	0.06	0.06
P_{it}	0.02***	0.02***	0.01*	−0.03***	−0.01	−0.04***	−0.04***	−0.04***
$R_{b,it} * HHI$	–	–	0.22***	–	–	–	–	–
$R_{b,it} * BM$	–	–	–	−0.05**	–	–	–	–
$R_{b,it} * GOV$	–	–	–	–	0.02***	–	–	–
$R_{b,it} * UB1$	–	–	–	–	–	−0.01	–	–
$R_{b,it} * UB2$	–	–	–	–	–	–	−0.02**	–
$R_{b,it} * UB3$	–	–	–	–	–	–	–	−0.02**
Mining	–	0.16	0.15	−0.74	−0.67	−0.72	−0.71	−0.71
Construction	–	−1.51**	−1.49**	−1.97***	−1.91***	−1.95***	−1.95***	−1.95***
Manufacturing	–	−0.78	−0.74	−1.01*	−0.94	−0.99	−0.98	−0.98
Transportation	–	−2.03***	−2.01***	−2.50***	−2.43***	−2.48***	−2.47***	−2.47***
Wholesale	–	0.46	0.50	−0.47	−0.40	−0.45	−0.44	−0.44
Retail	–	0.29	0.30	−0.33	−0.23	−0.28	−0.27	-0.27
Finance services	–	−1.79***	−1.77***	−2.10***	−2.03***	−2.08***	−2.07***	−2.07***
Services	–	−1.61**	−1.61***	−2.54***	−2.47***	−2.52***	−2.51	−2.51
Adjusted R^2	0.09	0.13	0.14	0.08	0.09	0.08	0.08	0.08
Fixed Effects Period	N	Y	Y	Y	Y	Y	Y	Y
No. of Observations	758	758	758	704	704	704	704	704

*The regressions are based upon the equation: $R_{f,it} = \alpha_0 + \alpha_{1,i} R_{b,it} + \alpha_{1,i} R_{b,it} * Z_i + \alpha_2 Y_{it} + \alpha_3 P_{it} + \varepsilon_{it}$ with $R_{f,it}$ with $R_{f,it}$ as the dependent variable; where $R_{b,it}$ is the weighted averaged ROE of the listed banks in country i in year t; UB1 refers to the composite index of the restriction that banks can only engage in securities activity, real estate and insurance; UB2 indicates that the banks can both own and control non-financial firms, and UB3 indicates direct cross-shareholdings between the banks and the firms. UB1, UB2 and UB3 are all discrete numbers, ranging between 1 and 4, with a higher number indicating a lower degree of freedom. BM is a dummy variable, which is equal to 1 if the system is a bank-based system, and otherwise 0 if it is a market-based system; HHI refers to the competition in the banking sector, comprising of the sum of the squares of the market shares of the three largest banks; and GOV indicates the governance index relating to the protection of the rights of creditors, again ranging between 1 and 4, with a higher number indicating stronger protection mechanisms. Y_{it} is the annual growth rate of GDP in country i in year t; and Pit is the inflation rate of country i in year t. * indicates significance at the 10% level; ** indicates significance at the 5% level; and *** indicates significance at the 1% level.*

The panel results on the relationship between the performance of banks and firms, separated by industry codes, are presented in Table 3 (Panels A to I). Model (1) provides the direct impact of bank performance on firm performance by controlling for annual GDP growth and inflation rates, and by the inclusion of

year dummies. Most of the coefficients on $R_{b,it}$ are found to be insignificant, with the exception of the retail and non-financial services industries. The two macro-variables are found to be statistically significant in Model (1) at the 5 per cent and 1 per cent level, respectively. For consideration of space, the results are not reported here; however, they are available upon request.

Models (2) to (7) in Table 3 report the results for each industry with the inclusion of the variables relating to the financial structure within a country. The slope coefficient of $R_{b,it}$ on bank performance is found to have statistically significant impacts on the performance of firms in the mining, manufacturing, transportation, retail, non-bank financial services and non-financial services industries, suggesting that within these six industries, when controlling for the macro-variables of GDP growth rate and inflation rate, and with the inclusion of year dummies, the performance of the two sectors remains linked. The subsequent discussion of the empirical results in this study is limited to the six industries of mining, manufacturing, transportation, retail, non-bank financial services and non-financial services.

Table 3: OLS Panel Data Regression Estimation Results by Industry Codes, 1994-2004

	Models						
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Coeff	Coeff	Coeff	Coeff	Coeff	Coeff	Coeff
Panel A: AFFH							
C	4.65	4.89***	4.39***	4.57***	4.72***	4.82***	4.82***
$R_{b,it}$	0.01	0.04	0.03	0.03	0	−0.01	−0.01
Y_{it}	−0.02	−0.13	−0.04	−0.04	−0.10	−0.13	−0.13
P_{it}	−0.08	−0.02	−0.03**	−0.03**	−0.02	−0.01	−0.01
$R_{b,it} * HHI$	–	−0.12	–	–	–	–	–
$R_{b,it} * BM$	–	–	−0.05	–	–	–	–
$R_{b,it} * GOV$	–	–	–	−0.01	–	–	–
$R_{b,it} * UB1$	–	–	–	–	0	–	–
$R_{b,it} * UB2$	–	–	–	–	–	0.02	–
$R_{b,it} * UB3$	–	–	–	–	–	–	0.02
Adjusted R^2	−0.01	−0.01	−0.01	−0.02	−0.03	−0.01	−0.01
No. of Observations	88	88	88	88	88	88	88
Panel B: Mining							
C	−0.19	−0.94	2.2	3.18	2.81	2.35	2.35
$R_{b,it}$	−0.06	−0.15**	−0.21**	−0.06	0.06	0.19	0.19
Y_{it}	0.83**	0.99***	−0.88	−1.51**	−1.46	−1.41	−1.41
P_{it}	0.06**	0.04	1.39**	1.03	1.13	1.25	1.25
$R_{b,it} * HHI$	–	0.39	–	–	–	–	–
$R_{b,it} * BM$	–	–	0.3***	–	–	–	–
$R_{b,it} * GOV$	–	–	–	0.04	–	–	–
$R_{b,it} * UB1$	–	–	–	–	−0.01	–	–
$R_{b,it} * UB2$	–	–	–	–	–	−0.07	–
$R_{b,it} * UB3$	–	–	–	–	–	–	−0.07
Adjusted R^2	0.21	0.23	0.23	0.3	0.13	0.16	0.16
No. of Observations	88	88	88	77	77	77	77
Panel C: Construction							
C	−0.44	0.4	−0.25	−0.47	−0.22	−0.38	−0.38
$R_{b,it}$	0.03	0.1	0.09	0.04	−0.05	0.01	0.01
Y_{it}	0.06	−0.13	−0.08	0.07	0.06	0.06	0.06
P_{it}	0.72	0.63	0.64	0.73	0.69	0.7	0.7
$R_{b,it} * HHI$	–	−0.32	–	–	–	–	–
$R_{b,it} * BM$	–	–	−0.08	–	–	–	–
$R_{b,it} * GOV$	–	–	–	−0.00	–	–	–
$R_{b,it} * UB1$	–	–	–	–	0.03	–	–
$R_{b,it} * UB2$	–	–	–	–	–	0	–
$R_{b,it} * UB3$	–	–	–	–	–	–	0
Adjusted R^2	−0.01	0	−0.00	−0.03	-0.02	-0.03	-0.03
No. of Observations	77	77	77	77	77	77	77

Table 3: OLS Panel Data Regression Estimation Results by Industry Codes, 1994-2004 (continued)

Panel D: Manufacturing							
C	−1.33	−1.82	0.31	0.47	−0.38	−0.56	−0.56
$R_{b,it}$	−8.13	−0.11**	0.08**	−0.10	0.21***	0.22***	0.22***
Y_{it}	1.44***	1.33***	0.15	0.26	0.35	0.4	0.4
P_{it}	−0.15***	−0.11**	0.34	0.31	0.5	0.6**	0.6**
$R_{b,it}*HHI$	–	0.68***	–	–	–	–	–
$R_{b,it}*BM$	–	–	−0.09**	–	–	–	–
$R_{b,it}*GOV$	–	–	–	0.05***	–	–	–
$R_{b,it}*UB1$	–	–	–	–	−0.07***	–	–
$R_{b,it}*UB2$	–	–	–	–	–	−0.09***	–
$R_{b,it}*UB3$	–	–	–	–	–	–	−0.09***
Adjusted R^2	0.33	0.44	0.07	0.21	0.12	0.27	0.27
No. of Observations	85	85	77	77	77	77	77
Panel E: Transportation							
C	−0.09	−0.47	1.79	1.92	1.16	1.28	1.28
$R_{b,it}$	−0.01	−0.07*	0.08	−0.06	0.21**	0.13*	0.13*
Y_{it}	0.65***	0.73***	0.25	0.34	0.41	0.43	0.43
P_{it}	0.03*	0.02	−0.73*	−0.76	−0.60	−0.58	−0.58
$R_{b,it}*HHI$	–	0.29**	–	–	–	–	–
$R_{b,it}*BM$	–	–	−0.07	–	–	–	–
$R_{b,it}*GOV$	–	–	–	0.04**	–	–	–
$R_{b,it}*UB1$	–	–	–	–	−0.07**	–	–
$R_{b,it}*UB2$	–	–	–	–	–	−0.04	–
$R_{b,it}*UB3$	–	–	–	–	–	–	−0.04
Adjusted R^2	0.26	0.3	0.3	0.34	0.33	0.31	0.31
No. of Observations	87	87	77	77	77	77	77
Panel F: Wholesale							
C	−1.22	-1.3	0.42	0.53	0.28	0.32	0.32
$R_{b,it}$	−0.00	-0.02	0.04	0	0.09	0.06	0.06
Y_{it}	1.37***	1.35***	0.45	0.43	0.46	0.47	0.47
P_{it}	−0.01	-0.01	0.09	0.05	0.11	0.11	0.11
$R_{b,it}*HHI$	–	0.11	–	–	–	–	–
$R_{b,it}*BM$	–	–	0	–	–	–	–
$R_{b,it}*GOV$	–	–	–	0.01	–	–	–
$R_{b,it}*UB1$	–	–	–	–	-0.02	–	–
$R_{b,it}*UB2$	–	–	–	–	–	-0.01	–
$R_{b,it}*UB3$	–	–	–	–	–	–	-0.01
Adjusted R^2	0.14	0.13	-0.01	0	-0.01	-0.01	-0.01
No. of Observations	85	85	85	77	77	77	77
Panel G: Retail							
C	0.57	0.91	1.66**	1.24	0.82	0.39	0.94
$R_{b,it}$	0.06***	0.10***	0.25***	0.04	0.21***	0.14***	0.14***
Y_{it}	0.42*	0.33	-0.05	0.35	0.37	0.39	0.39
P_{it}	0.43***	0.45***	-0.04	0.12	0.2	0.21	0.21
$R_{b,it}*HHI$	–	-0.21*	–	–	–	–	–
$R_{b,it}*BM$	–	–	-0.22***	–	–	–	–
$R_{b,it}*GOV$	–	–	–	0.01	–	–	–
$R_{b,it}*UB1$	–	–	–	–	-0.05**	–	–
$R_{b,it}*UB2$	–	–	–	–	–	-0.02	–
$R_{b,it}*UB3$	–	–	–	–	–	–	-0.02
Adjusted R^2	0.46	0.47	0.66	0.24	0.28	0.25	0.25
No. of Observations	80	80	77	77	77	77	77
Panel H: Financial Services							
C	−0.01	-0.15	0.4	0.23	−0.15	0	0
$R_{b,it}$	0.11	0	0.12***	-0.01	0.13*	0.05	0.05
Y_{it}	0.39	0.42***	-0.06	0.15	0.18	0.18	0.18
P_{it}	0.01	0.01	0.07	0.15	0.22	0.21	0.21
$R_{b,it}*HHI$	–	0.11	–	–	–	–	–
$R_{b,it}*BM$	–	–	-0.12***	–	–	–	–
$R_{b,it}*GOV$	–	–	–	0.01	–	–	–
$R_{b,it}*UB1$	–	–	–	–	−0.04*	–	–
$R_{b,it}*UB2$	–	–	–	–	–	-0.01	–
$R_{b,it}*UB3$	–	–	–	–	–	–	-0.01
Adjusted R^2	0.05	0.06	0.17	0.05	0.06	0.03	0.03
No. of Observations	87	87	77	77	77	77	77

Table 3: OLS Panel Data Regression Estimation Results by Industry Codes, 1994-2004 (continued)

Panel I: Services							
C	−1.09	−1.69	0.21	0.29	-0.48	−0.64	−0.64
$R_{b,it}$	-0.11**	-0.18**	0.07	-0.11	0.17	0.18**	0.18*
Y_{it}	0.14	0.32	0.62	0.77	0.85	0.9	0.9
P_{it}	1.17***	1.10***	-0.71	-0.71	-0.55	−0.46	−0.46
$R_{b,it}*HHI$	–	0.39	–	–	–	–	–
$R_{b,it}*BM$	–	–	0.11	–	–	–	–
$R_{b,it}*GOV$	–	–	–	0.05**	–	–	–
$R_{b,it}*UB1$	–	–	–	–	-0.07	–	–
$R_{b,it}*UB2$	–	–	–	–	–	−0.08**	–
$R_{b,it}*UB3$	–	–	–	–	–	–	-0.08**
Adj. R^2	0.31	0.32	0.21	0.24	0.22	0.26	0.26
No. of Observations	81	81	77	77	77	77	77

The regressions are based upon the equation: $R_{f,it} = \alpha_0 + \alpha_{1,i} R_{b,it} + \alpha_{1,i} R_{b,it}*Z_i + \alpha_2 Y_{it} + \alpha_3 P_{it} + \varepsilon_{it}$ with $R_{f,it}$ as the dependent variable; where $R_{f,it}$ ($R_{b,it}$) is the weighted average ROA (ROE) of the listed firms (banks) in country i in year t; UB1 refers to the composite index of the restriction that banks can only engage in securities activity, real estate and insurance; UB2 indicates that the banks can both own and control non-financial firms, and UB3 indicates direct cross-shareholdings between the banks and the firms. UB1, UB2 and UB3 are all discrete numbers, ranging between 1 and 4, with a higher number indicating a lower degree of freedom. BM is a dummy variable, which is equal to 1 if the system is a bank-based system, and otherwise 0 if it is a market-based system; HHI refers to the competition in the banking sector, comprising of the sum of the squares of the market shares of the three largest banks; and GOV indicates the governance index relating to the protection of the rights of creditors, again ranging between 1 and 4, with a higher number indicating stronger protection mechanisms. Y_{it} is the annual growth rate of GDP in country i in year t; and P_{it} is the inflation rate of country i in year t. * indicates significance at the 10% level; ** indicates significance at the 5% level; and *** indicates significance at the 1% level.

As regards manufacturing firms (Panel D), the coefficients on all four of the hypotheses relating to the financial structure within a country are found to be statistically significant. Both bank concentration (HHI) and universal banks (UB) intensify the relationship between the performance of banks and firms. Unexpectedly, however, findings show that a bank-based system (BM) can mitigate the bank-firm relationship, while the protection of creditors' rights (GOV) may well intensify the relationship within the manufacturing industry.

The results on BM and GOV in the present study differ from those of Shen and Huang (2003). Although Shen and Huang were able to provide evidence to show that in the 46 countries examined, GOV was capable of mitigating the bank-firm relationship in manufacturing firms, they could provide no evidence in support of the BM and UB variables. We surmise that the difference between the results of Shen and Huang (2003) and those presented here are attributable both to the sample of firms included in the present study and the longer time period. One of the specific aims of the present study was to include only G-8 countries within the sample, since it was felt that it would be far more appropriate to compare the impact of the financial structure of a country on the bank-firm relationship based upon a sample of countries with virtually the same levels of bank development.

As for mining firms (Panel B), only the hypothesis coefficients on BM are found to have any statistical significance, albeit with a positive sign, while in transportation firms (Panel E), the hypothesis coefficients on HHI, GOV, and UB1 relating to the financial structure within a country are all found to have statistical significance. As regards retail firms (Panel G), the hypotheses coefficients on HHI, BM, and UB1 relating to the financial structure within a country are again found to be statistically significant, although HHI has only a negative impact, suggesting that bank concentration can mitigate the relationship between the banking and retail sectors.

Turning to non-bank financial services (Panel H), the hypothesis coefficients BM and UB1 are found to be statistically significant at the 1 per cent and 10 per cent level, respectively. Finally, for non-financial services (Panel I), the hypothesis coefficients on GOV, UB2 and UB3 are all found to have statistical significance at the 5 per cent level. Therefore, based upon the sub-sample results presented above, we provide evidence in this study to show that the financial structure within a country can have mixed

influences on the relationship between the performance of banks and firms, and that this is essentially conditional on the industry within which the sample firm is located.

Check for Robustness

Since no significant results and a low adjusted R2 are found for the AFFH, construction, and wholesale industries, we drop these from the sample and then subsequently re-estimate the model; the results are reported in Table 4, which reveal very little changes from the previous results. HHI and GOV are again found to have positive impacts on the relationship between the performance of banks and firms, while BM is still found to have a negative impact on firm-bank relationship.

Table 4: OLS Panel Data Regression Estimation Results on Selected Sample Firms, 1994-2004

Variables	Models						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Coeff	Coeff	Coeff	Coeff	Coeff	Coeff	Coeff
C	0.36	0.62	0.02	1.89*	2.01**	1.42	1.35
$R_{b,it}$	-0.00	−0.01	−0.09***	0.06**	−0.05*	0.16***	0.15***
Y_{it}	0.86***	0.88***	1.00***	0.00	0.06	0.11	0.15
P_{it}	0.03***	0.04***	0.02*	0.05	0.02	0.15	0.2
$R_{b,it} * HHI$	–	–	0.35***	–	–	–	–
$R_{b,it} * BM$	–	–	–	-0.05*	–	–	–
$R_{b,it} * GOV$	–	–	–	–	0.03***	–	–
$R_{b,it} * UB1$	–	–	–	–	–	-0.05***	–
$R_{b,it} * UB2$	–	–	–	–	–	–	-0.05**
$R_{b,it} * UB3$	–	–	–	–	–	–	–
Manufacturing	–	−0.92	−0.84	−0.27	−0.27	−0.27	−0.27
Transportation	–	-2.18***	-2.14***	-1.75***	-1.75**	-1.75***	-1.75***
Retail	–	0.2	0.23	0.44	0.44	0.44	0.44
Finance services	–	-1.94***	-1.90***	-1.36**	-1.36***	-1.36**	−1.36**
Services	–	-1.72**	-1.71***	-1.80***	-1.80***	-1.80***	-1.80***
Adjusted R^2	0.11	0.15	0.18	0.08	0.1	0.09	0.11
Fixed Effects Period	N	Y	Y	Y	Y	Y	Y
No. of Observations	508	508	508	462	462	462	462

*The regressions are based upon the equation: $R_{f,it} = \alpha_0 + \alpha_{1,i} R_{b,it} + \alpha_{1,i} R_{b,it} * Z_i + \alpha_2 Y_{it} + \alpha_3 P_{it} + \varepsilon_{it}$ with $R_{f,it}$ as the dependent variable; where $R_{b,it}$ is the weighted averaged ROE of the listed banks in country i in year t; UB1 refers to the composite index of the restriction that banks can only engage in securities activity, real estate and insurance; UB2 indicates that the banks can both own and control non-financial firms, and UB3 indicates direct cross-shareholdings between the banks and the firms. UB1, UB2 and UB3 are all discrete numbers, ranging between 1 and 4, with a higher number indicating a lower degree of freedom. BM is a dummy variable, which is equal to 1 if the system is a bank-based system, and otherwise 0 if it is a market-based system; HHI refers to the competition in the banking sector, comprising of the sum of the squares of the market shares of the three largest banks; and GOV indicates the governance index relating to the protection of the rights of creditors, again ranging between 1 and 4, with a higher number indicating stronger protection mechanisms. Y_{it} is the annual growth rate of GDP in country i in year t; and P_{it} is the inflation rate of country i in year t. * indicates significance at the 10% level; ** indicates significance at the 5% level; and *** indicates significance at the 1% level*

The statistical significance of most of the proxy variables for the financial structure within a country may be caused by omitting the direct impact variables. These financial structure variables are therefore included as direct impact variables, with the empirical results revealing that the significant findings still hold. Finally, we also use the 'return on assets' (ROA) for the banks and again find that there are no significant changes in the results. Again, for consideration of space, the results are not reported here; however, they are available upon request.

CONCLUSIONS

A unique feature of this study is the examination of firm-bank relationships within the real sector of the G8 before the enactment of the Kyoto Protocol in 2005, which had heavily influenced real sector

development in these countries. Beck, Dermirguc-Kunt, and Levine (2006) indicated the importance of financial structure related to bank competition and concentration on bank system fragility. The impact of bank fragility on the performance of the real sector depends on whether the firm-bank relationships statistically hold in each industry. Thus, here we try to demonstrate firm-bank relationships first and also controlling for the financial structure of these countries in the OLS panel regression model. In addition, through running the PLS panel regression separately by the industry codes, we also provide evidence to show that the firm-bank relationship statistically holds in the six industries of mining, manufacturing, transportation, retail, non-bank financial services and non-financial services, thereby providing some evidence on the events leading up to the current global financial crisis. The mixed findings on the impact of a country's financial structure on firm-bank relationships are essentially based upon the industries in which the firm is located. This may provide important insights for policymakers intending to promote firm performance within specific industries.

As regards our hypothesized variables, firstly, the negative coefficients on UB1, UB2, and UB3 are consistent with our hypothesis that unlike a separated bank, a universal bank will tend to intensify the relationship between the performance of banks and firms. Secondly, bank concentration (HHI) can generally intensify the relationship between bank and firm performance—whereas this relationship is mitigated by bank concentration for those firms in the retail industry. Here we also support the concentration-stability theories proposed by Beck, Dermirguc-Kunt, and Levine (2006) that national bank concentration tends to reduce the likelihood that a country will suffer a systematic banking crisis. Thirdly, a bank-based system has a strongly negative impact on firm-bank relationships, which runs contrary to the finding of Shen and Huang (2003); we attribute this mitigating effect to the inter-temporal smoothing function of a bank-based system (Allen and Santomero, 2001). The findings here might also support the theoretical model of Chakraborty and Ray (2006) that a bank-based system might benefit countries with a higher per capita GDP, since the efficient resource allocation through bank monitoring resolves some agency problems and provides firms or entrepreneurs with stage-financing. Finally, a rather different outcome is the finding that firm-bank relationships are intensified by good protection of creditors' rights within the G8.

The sample in the present study is limited to the members of the G8, since these countries are essentially regarded as being at the same level of economic development and may also have better banking sector development than other countries. Thus the empirical results on the G8 can provide more consistent conclusions on firm-bank relationships. Besides, the findings from advanced nations may also provide early insight for developing/emerging economies. This study can also lend support to Koutsomanoli-Filippaki, Mamatzakis, and Staikouras (2009) who stated that reforms in the banking market relate to liberalizing the banking sector, in turn reducing state-ownership and improving regulation—which is of critical importance for profitability in Central and Eastern European countries.

This study represents only a first attempt at providing evidence on the impact of financial structure on the relationship between banks and firms, resulting in the presentation of some interesting findings. Any future studies setting out to further explore this relationship could attempt to provide explanations of the direct links to specific industry characteristics. One limitation of this study is that the variables related to financial structure within a country are not continuous, and the data is not updated. Another direction for future study might begin by using updated data and explore firm-bank relationships after the Kyoto Protocol was enacted in 2005. Columba, Gambacorta, Mistrulli (2010) explored the benefits of mutual guarantee institutions financing on small business, while later, Bartoli, Ferri, Murro, and Rotondi (2013) examined Italian firms during the crisis period of 2007-2009 and found that private guarantee institutions called Mutual and Guarantee Institutions (MGIs)—which were created by small and medium-sized enterprises (SMEs) within the European Union—continue to play critical roles in the scoring and rating systems of bank-firm relations. Future study could also try to further explore the relationships between firm-nonbank institutions during a period of financial crisis.

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