THE IMPACT OF FINANCIAL CRISIS ON THE ECONOMIC VALUES OF FINANCIAL CONGLOMERATES

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I. INTRODUCTION

The subject of my study concerns the impact of a financial crisis on the economic value of U.S. financial conglomerates. There are many types of business combinations in the financial service industry, but in order to refine the focus, this paper will be limited to the consideration of U.S. bank-based financial services firms because banks in a diversified business portfolio (more than one business segment) are one of the most common, systemically important types of business combinations in the industry.

In recent years, M&A transactions have been completed by several financial institutions for strategic reasons, such as improving market share, profitability, or efficiency. Even with the limited focus on only the U.S. financial service industry in this study, more than 2500 M&A transactions have been completed from 1998 to 2012. Presumably, the primary objective of these transactions is to increase the economic values of the firms involved through so-called synergy effects. Among them, the most important effects are the cost and revenue economies of scope. Through the sharing of IT platforms, overheads, and information, the firm can avoid cost duplication. Revenue economies of scope involve cross-selling activities among subsidiaries under the same top management. Moreover, the systemic importance of diversified (large) banks allows them to benefit from a lower credit spread (funding cost) due to implied public support contingent on their bankruptcy ("too-big-to-fail" guarantees) (Acharya, Anginer, and Warburton, 2013). Other benefits include lower tax burdens due to tax-efficient intra-firm transactions and efficient internal capital funding due to a better coordination across activity lines.

Nevertheless, empirical literature on non-financial firms shows that the firms' decision to diversify is associated with an under-valuation of the firm relative to their apparent breakups (diversification discount) despite expected benefits, even though the effect's causal relationship is controversial (Lang and Stulz, 1994; Berger and Ofek, 1995;

Lins and Servaes, 1999; Campa and Kedia, 2002; Villalonga, 2004). Also, several arguments against diversification have been raised. For instance, cross-subsidization may lead to an inefficient allocation of capital or reduced performance incentives in profitable businesses, and the bad reputation of a subsidiary may hurt other subsidiaries as a result of cross-selling.

Even though the history is relatively short, the studies on diversification strategies employed by financial firms are being actively conducted in recent years, and many of them focused on the strategies' negative effects. Stiroh and Rumble (2006) found that the financial conglomerates' increased exposure to non-interest activities which are quite volatile but not more profitable than their traditional business ruins their risk-adjusted performance. Laeven and Levine (2007) discovered diversification discounts on bank-based financial services firms engaging in multiple activities and attributed (but not confirmed) the result to intensified agency problems of their management. Schmid and Walter (2009) reported a consistent diversification discount on all financial services activity areas with the exception of certain combinations (e.g., commercial banking units combined with insurance companies and/or investment banking activities). Later, Schmid and Walter (2012) found evidence of a significant discount associated with geographic diversification in securities firms; however, the authors discovered a premium in credit intermediaries and insurance companies.

A review of previous studies reveals that diversification strategies employed by firms provide a different cost/benefit structure to different types of stakeholders in the financial market. The debt holders of diversified firms benefit the most from lower funding costs and lower credit risks resulting from an implied public guarantee of their bankruptcy. Net benefits or costs for taxpayers and regulators are unclear. While the firms' large size and systemic importance increase the likelihood for public support, their diversified risk profiles may reduce the possibility of bankruptcy. For their equity holders, costs outweigh benefits; diversification discounts consistently found in studies show that stock investors for financial

conglomerates should bear an undervaluation of their assets compared with the other types of investors. This cost/benefit profile can be considered a redistribution of wealth from equity holders to debt holders; however, models to measure this effect have not been developed yet, and further study is needed.

In order to contribute to the ongoing discussions regarding financial conglomerates, this project will study and measure two relevant topics:

1. "Diversification discount" – this study aims to verify whether or not an investor's undervaluation of U.S. banks employing diversification strategies (diversification discount) really exists as previous literature has proposed.
2. "Crisis premium on diversification" - the study quantifies how much the diversification discount during a financial crisis differs from periods without a crisis. Given the features of them which will be discussed in detail, I assume the economic values of diversified banks may be less hurt by financial crisis in comparison with specialized banks (crisis premium on diversification).

The banks with diversified business portfolios (conglomerates) have characteristics that are more appealing to investors during a financial crisis than during financially stable periods. For example, in the case of financial difficulty, the large size of assets and the significant influence over the entire financial system coerce the central bank or public guarantee agency to support them ("too-big-to-fail" guarantees). Furthermore, the less correlated revenue streams across different functions may reduce their bankruptcy risk during a financial downturn.

To define the diversification variable which will serve as an independent variable in my model for this study, I use two different approaches: a dummy variable which is equal to one if a bank is diversified and a degree of diversity that is a numerical variable ranging from zero to one. My purpose is to examine how the involvement in more than one business by

U.S. banks as well as the extent of the involvement affects the economic values of the banks when evaluated by investors.

To examine impact of the financial crisis and the crisis premium on diversification, I will include two more independent variables: the crisis dummy variable, which is equal to one if the observation takes place during a financial crisis, and the interaction term of the diversification and the financial crisis. This procedure will allow for a better understanding of the role of diversification strategies in cushioning the impact of the financial crisis (crisis premium on diversification) as well as the negative impact of the crisis on the economic value of banks.

Lastly, since my sample period contains three major financial crises, I will divide the crisis dummy into three individual crises dummies and perform additional tests comparing the results for each of the dummies. This will provide an overview of how the crisis premium on diversification as well as the impact of the crisis has dynamically changed over time. The findings from this study will contribute to a better understanding of how the market can view diversification strategies used by financial conglomerates differently as a reaction to macroeconomic conditions.

This paper is proceeds in four additional sections. Section II includes the source of the data, the sample selection procedure, and a detailed description of the models and variables. Section III presents results from the main regression analysis. Section IV explores a variety of explanations to weaken the implications of the previous section, which are followed by robustness checks. Section V presents the conclusions.

II. SAMPLE SELECTION AND VARIABLES

II.1. Sample Selection

The sample consists of U.S. bank-based financial services firms from 1998 to 2012 with total assets of at least $100 million. I constructed a sample of firms from the period of 1998 to 2012 in order to study the impact of the three major financial crises during that period, and the process will be discussed in detail in Section II.2. The source of the sample data is the Compustat Bank Fundamentals Annual data files (Compustat Bank) via Wharton Research Data Services (WRDS), and the Compustat Bank has accounting information for (mostly) U.S. banking firms.

To construct the sample, I filtered the data in several steps. First, in order to focus on major banks in the U.S., I only included NYSE or NASDAQ listed U.S. banks (with headquarters in the U.S.) with total assets of more than $100 million. Second, I excluded observations that lacked the accounting or the stock market information that my model requires. Third, I removed potential outliers that may distort the outcome of the analysis, including observations with values of the degree of diversity outside the range of zero to one and those with more than four standard deviation of the excess value (equations of the degree of diversity and the excess value will be addressed in Sections II.3 and II.4). These procedures reduced sample size by 2,667 (from 7,825 to 5,158), and 99% of the size reduction resulted from the first two steps.

II.2. Definition of crisis

As previously stated, I constructed a sample from the period of 1998 to 2012 in order to study the impact of three major financial crises. Like Berger and Bouwman (2013), I selected the Russian debt crisis and the Long-Term Capital Management bailout (1998), the Bursting of the dot.com bubble and the September 11th terrorist attacks (2000–2002), and the

Subprime lending crisis (2007–2009) as key events representing financial crisis.

To better understand the impact of the crisis, two versions of the equations of financial crisis are adopted in the model. The first equation is the "simple" financial crisis dummy variable (CRISIS), which is equal to one if the time period "t" of the sample is during the financial crisis. The second equation is the three "individual" crises dummy variables (CRISIS1/CRISIS2/CRISIS3), which are equal to one if the time period "t" is during 1998/2000–2002/2007–2009, respectively. This approach is an examination of how the influence of the crisis is dynamically changing over time as well as how the crises affect the economic values of banks on average during the entire period.

II.3. Measures of diversification

Ideally, I would like to measure the diversification of bank activities with detailed segment information of the banks; however, limited availability of segment data for banks restricted my ability to measure in this manner, so an alternative approach was necessary. Laeven and Levine (2007) encountered the same data limitation in their study on bank-based financial services firms and introduced a simplified approach to circumvent this situation by dividing banking activities into two sub-groups: loan-making activities and fee/trading-based activities. They then measured the diversification of banking activities by the extent to which banks engaged in both loan-making activities and fee/trading-based activities.

Laeven and Levine (2007) constructed asset- and income-based measures of diversification in their research. For the asset-based measure, they divided the total earning assets into net loans and the other earning assets (securities and investments). The earning assets included loans, securities, and investments. When the net loans over the total earning assets of a bank was close to one (more than 0.9) or zero (less than 0.1), they assumed that it "specialized" in pure lending or fee-based activities. Otherwise, it was categorized as

"diversified." The degree of diversity based on asset measure is calculated as:

Degree of diversity (asset) = 1 - | (Net loans – Other earning assets) / Total earning assets |.

Likewise, the income-based measure of diversification segments total operating income into net interest income (interest income minus interest expense) and other operating income (net fee income, net commission income, and net trading income). When the net interest income over total operating income is more than 0.9 or less than 0.1, it is assumed to be "specialized." Otherwise, it is assumed to be "diversified." The degree of diversity based on income measure is calculated as:

Degree of diversity (income) = 1 - | (Net interest income – Other operating income) / Total operating income |.

This study focuses on the asset-based measure of diversification since only 5 of the 5,158 observations in my sample were categorized as "specialized" using the income-based measure. As previously noted, this study investigates two versions of diversification measure: a dummy variable, which equals one when the bank is identified as diversified using the asset-based measure, and a numerical variable, which is the degree of diversity. I aim to examine how the degree of diversity as well as the diversification itself affects the economic value of banks independently or combined with a crisis situation.

II.4. Measures of excess value

Like Laeven and Levine (2007), I computed excess values using a modified version of the ''chop-shop'' approach introduced by LeBaron and Speidell (1987) and Lang and Stulz (1994). The idea is to compare the Tobin's q of each observation with the "activity-adjusted" q, which is equal to the weighted average of the sample mean values of Tobin's q for banks specializing in a particular financial activity (e.g.,, lending or fee income generation). The weights are determined by the relative importance of the loans to the total earning assets for

each bank. The logic can be simplified by following formula for bank *i*:

$Excess\ value_i = q_i - (w_i\, q^1 + (1 - w_i)\, q^2)$.

(q_i: actual value of Tobin's q for bank i / w_i : ratio of net loans to earning assets for bank i / q^1: mean value of Tobin's q for banks focused on lending operations / q^2: mean value of Tobin's q for banks focused on non-lending operations, or fee income generation)

II.5. Control variables

The other variables used to control the regression analysis include the size of the total assets, the leverage ratio, and the return on assets for each observation. These control variables were used by Schmid and Walter (2009) for their study on diversification discount for U.S. financial conglomerates and turned out to be statistically significant for the regression analysis. First, the size of the total assets is included to control the possibility that different efficiency between small and large banks rather than the extent of diversification affect the economic values of banks. Like Schmid and Walter (2009), I took the natural logarithm on the size of the total assets since the value ranges over several orders of magnitude.

Second, I included the leverage ratio to control debt financing's potential influence on firm value. Previous studies examined the influence of debt-financing on management and presented it as a positive role; for example, Jensen (1986), Stulz (1990), and Hart and Moore (1995) concluded that debt financing might discourage the overinvestment of free cash flow by self-serving managers, and McConnell and Servaes (1995) found that book leverage is positively correlated with firm value when investment opportunities are scarce. In addition, as Schmid and Walter (2009) hypothesized, leverage might improve the management of financial firms by reducing incentives to engage in excessive risk-taking.

The last control variable used in the model is the return on assets, which is a representative indicator of firm profitability. When a firm utilizes its assets to earn profits more efficiently, the higher profitability may provide incentives for investors to spend more money to invest, so a positive correlation between profitability and the excess value is expected.

II.6. Sample statistics

The procedures led to a final sample of the excess value, the degree of diversity, the natural logarithm of total assets, the leverage, and the return on assets for 5,158 observations, and Table 1 presents the sample statistics. A large gap in the degree of diversity between specialized versus diversified banks implies that the diversification dummy variable may be an effective indicator to differentiate diversified banks from specialized banks. Surprisingly, a simple comparison of the excess value of specialized and diversified banks suggests a potential (but not certain) existence of “diversification premium” rather than “diversification discount,” which is contrary to the findings of previous studies; however, I will not give much credence on this finding in the light of the facts that diversified banks have larger assets, higher leverage, and better profitability in comparison with specialized banks, and this analysis does not consider the effects of these control variables.

Table 1. Descriptive statistics of specialized and diversified banks (based on the diversification dummy)

	Total			Specialized (A)			Diversified (B)			Difference (B - A)	
	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median
Excess value	-0.0026	-0.0141	5,158	-0.0040	-0.0142	450	-0.0024	-0.0141	4,708	0.0015	0.0001
Degree of diversity	0.5180	0.5073	5,158	0.1333	0.1410	450	0.5548	0.5361	4,708	0.4215	0.3951
Natural log of SIZE	7.4127	7.0704	5,158	6.8149	6.6030	450	7.4699	7.1349	4,708	0.6550	0.5319
Leverage	0.8996	0.9067	5,158	0.8968	0.9063	450	0.8999	0.9068	4,708	0.0031	0.0005
Return on assets	0.0068	0.0084	5,158	0.0046	0.0075	450	0.0070	0.0084	4,708	0.0024	0.0010

Notes: The sample is divided into two sub-groups – specialized banks and diversified banks – based on the diversification dummy, which is equal to zero when the degree of diversity is less than 0.1 or larger than 0.9, and one when it is between 0.1 and 0.9. The first column includes statistics of the entire sample, and the fourth column is a comparison of the specialized banks (second column) and the diversified banks (third column).

III. Main results

III.1. Regressions analysis on the overall effect of a crisis

In this section, I present the results of an ordinary least square (OLS) analysis on the economic value of the diversification strategies, the average impact of financial crisis (simple crisis dummy), and the interaction of the diversification strategies and the crisis. The study of the individual crises during the sample period will be discussed in Section III.2. Table 2 can be divided into two sub-studies by the equation of diversification: panel A examines the employment of diversification itself (the diversification dummy that is equal to one when the firm is diversified) and panel B investigates the degree of diversity.

Column (1) in panel A includes the diversification dummy (Diversified) and the simple crisis dummy (CRISIS). The t- test on coefficients states that the employment of diversification strategies is significantly associated with a discount on economic values and that, not surprisingly, we can expect decreased values for firms during the financial crisis.

This result is highly statistically significant and I confirm the existence of diversification discount that have been found in prior studies. Column (2) contains additional variables of interaction between diversification and crisis (Diversified X CRISIS) and presents evidence of a potential "crisis premium on diversification." Although the statistical significance is weak, the positive value of the interaction coefficient shows diversified banks may suffer less from a value discount during the crisis compared to the specialized banks.

Column (3) in panel B examines the relationship between the degree of diversity and the economic value as well as the impact of the crisis. As I expected, the financial crisis is associated with the negative impact on the values of firms. Although the t-statistic is not significant, the negative coefficient value of the degree of diversity leads to the conjecture that not only diversification itself but also the degree of diversification may be negatively associated with the economic values of banks. Column (4) adds the interaction of the degree of diversity and the crisis variable (Degree of diversity X CRISIS) to the model of column (3), and the outcome is more statistically significant than previous models. I can see significant evidence that the degree of diversity is negatively associated with the economic values of bank on average (diversification discount) but positively associated during a financial crisis (crisis premium on diversification) as employment of diversification strategies (the diversification dummy) is.

In conclusion, I present two implications for this study. First, the degree of diversity as well as the existence of the diversification strategies employed by U.S. banks is statistically associated with a discount on their economic value in the financial market. Second, on average, a financial crisis led to a price discount in the U.S. banking sector. Lastly, there is weak evidence supporting the assumption that investors tend to value diversified banks more during financial crises than periods without such crises.

Table 2. Diversification discount and diversification premium during a crisis (based on the simple crisis dummy)

Dependent variable	Excess value		Excess value	
	Panel A. Diversification dummy		Panel B. Degree of diversity	
	(1)	(2)	(3)	(4)
Intercept	-0.23061***	-0.22734***	-0.23476***	-0.22884***
	(-10.96)	(-10.71)	(-11.17)	(-10.86)
Diversified	-0.008750***	-0.011845***		
	(-2.98)	(-3.00)		
Degree of diversity			-0.003169	-0.013040***
			(-0.88)	(-2.76)
CRISIS	-0.005998***	-0.012276**	-0.005996***	-0.018048***
	(-3.60)	(-2.19)	(-3.60)	(-4.45)
ln(Assets)	0.0049071***	0.0049056***	0.0047926***	0.0047960***
	(9.01)	(9.00)	(8.75)	(8.76)
Leverage	0.20462***	0.20418***	0.20316***	0.20243***
	(8.83)	(8.81)	(8.76)	(8.74)
ROA	2.69126***	2.68745***	2.68703***	2.67280***
	(33.15)	(33.07)	(32.80)	(32.61)
Diversified X CRISIS		0.006880		
		(1.17)		
Degree of diversity X CRISIS				0.023336***
				(3.26)
R-Squared (%)	20.1	20.1	19.9	20.1
F-test	258.75***	215.87***	256.72***	216.11***
	(0.000)	(0.000)	(0.000)	(0.000)
Firms	437	437	437	437
N	5,158	5,158	5,158	5,158

Notes: Columns (1) and (3) present the economic value of the diversification strategies employed by U.S. banks and the impact of financial crisis. Columns (2) and (4) include additional independent variables of interactions between the diversification strategies and financial crisis. Regarding the diversification discount, columns (1) and (2) examine the employment (dummy) of the diversification strategies, and (3) and (4) investigate the correlation between the depth of the discount and the degree of diversity. The other control variables are potential decisive factors for the economic value of the firm introduced by Schmid and Walter (2009). The numbers in parentheses of the F-test are p-values and the other numbers in parenthesis are t-statistics. ***/**/* denotes statistical significance at the 1%/5%/10% levels.

III.2. Comparison of effects in an individual crisis

This section addresses the performance of diversified banks when compared with specialized banks during each of the three crises included in this study. As discussed in II.2, the sample period of this study includes the Russian debt crisis and Long-Term Capital Management bailout (CRISIS1, 1998), the Bursting of the dot.com bubble and the September 11th terrorist attacks (CRISIS2, 2000–2002), and the Subprime lending crisis (CRISIS3, 2007–2009) as the key events representing financial crisis. Table 3 is the summary of this study and is comprised of two sub-sections based on the perspectives of diversification; panel A includes the diversification dummy while panel B contains the degree of diversity.

Table 3 shows the statistically significant findings that diversification discount exists when a bank is diversified and that a larger discount is associated with a higher degree of diversity, which are consistent with the outcomes from III.1 (Table 2); however, comparative tests regarding the influence of individual crises on firm values led to interesting results. While the upheaval of crisis is associated with a discount of firm values for the banking industry on average, not all crises over the sample periods negatively affected them. While the Russian debt crisis and the Long-Term Capital Management (LTCM) bailout (CRISIS1) was associated with a price premium (though not completely statistically significant) for banking firms and the dot.com bubble and September 11th terrorist attacks (CRISIS2) was neutral (insignificant effect), the subprime lending crisis (CRISIS3) was associated with a price discount of 1.6 percent to 2.7 percent.

Considering the nature of each crisis may offer an explanation. The Russian debt crisis and the LTCM bailout mostly affected the prime brokers and the fixed-income investors. Even though many LTCM's capital was composed of funds from large banks, the crisis's impact on the overall banking system was limited. Likewise, the dot.com bubble and September 11th terrorist attack mainly affected the stock market. On the other hand, the

subprime lending crisis originated from the excess mortgage expansion of banks and the decline of the housing market which had supported the abnormal expansion of credit. The outburst of bad debts and the declining value of the houses which served as collateral for the loans directly weakened the entire banking system, and these facts may explain why U.S. banks were especially vulnerable to the subprime lending crisis (CRISIS 3).

Another explanation for the result includes technological innovations. Through the development of financial instruments and technologies, financial institutions have become more interconnected. For example, over the past decade, the shadow banking system provided sources of funding for credit through a wide range of securitization and secured funding techniques, such as ABCP, ABS, CDOs, and Repos. The system linked a variety of financial institutions through vehicles such as ABCP conduits, SIVs, credit hedge funds, MMMFs, GSEs, etc. The shadow banking system might have made it more difficult for investors to accurately define their risk exposure and to become more panicked at the burst of the latest crisis. (CRISIS3).

The interpretation of the interaction terms between the diversification and the crisis is quite challenging. The interaction terms between the diversification dummy and the crisis (Diversified X CRISIS1/2/3) were the opposite of the results from the degree of diversity (Degree of diversity X CRISIS1/2/3). As low statistical significance of the results shows, the idiosyncratic, broad nature of each firm's strategies may require a larger, broader sample size for obtaining meaningful implications.

Overall, the outcomes of this study imply that the recent crisis (the subprime lending crisis, CRISIS3) led to larger discounts on the banking sector than the previous crises, and that it is not clear whether or not the diversification strategies provided assistance to banks even in the most recent crisis.

Table 3. Diversification discount and diversification premium during a crisis (based on individual crises dummies)

Dependent variable	Excess value		Excess value	
	Panel A. Diversification dummy		Panel B. Degree of diversity	
	(1)	(2)	(3)	(4)
Intercept	-0.21153***	-0.21055***	-0.21500***	-0.21286***
	(-10.15)	(-10.02)	(-10.33)	(-10.20)
Diversified	-0.010487***	-0.011975***		
	(-3.62)	(-3.08)		
Degree of diversity			-0.008068**	-0.012848***
			(-2.25)	(-2.77)
CRISIS1	0.040212***	0.01678	0.040335***	0.05099***
	(9.40)	(0.90)	(9.41)	(4.26)
CRISIS2	-0.000114	-0.011649	-0.000063	-0.005916
	(-0.05)	(-1.41)	(-0.03)	(-1.01)
CRISIS3	-0.018524***	-0.015945**	-0.018661***	-0.026750***
	(-9.00)	(-2.53)	(-9.04)	(-5.68)
ln(Assets)	0.0055534***	0.0055436***	0.0055185***	0.0055246***
	(10.29)	(10.27)	(10.15)	(10.16)
Leverage	0.18167***	0.18213***	0.17979***	0.18021***
	(7.91)	(7.93)	(7.82)	(7.84)
ROA	2.46153***	2.46706***	2.46813***	2.46075***
	(29.66)	(29.69)	(29.58)	(29.47)
Diversified X CRISIS1		0.02471		
		(1.28)		
Diversified X CRISIS2		0.012418		
		(1.45)		
Diversified X CRISIS3		-0.002920		
		(-0.44)		
Degree of diversity X CRISIS1				-0.01763
				(-0.92)
Degree of diversity X CRISIS2				0.010904
				(1.10)
Degree of diversity X CRISIS3				0.016664*
				(1.90)
R-Squared (%)	22.7	22.8	22.6	22.7
F-test	216.66***	152.14***	215.18***	151.26***
	(0.000)	(0.000)	(0.000)	(0.000)
Firms	437	437	437	437
N	5,158	5,158	5,158	5,158

Notes: Columns (1) and (3) present the diversification discount and the impact of the set of individual crises. Columns (2) and (4) include additional variables of the interactions between the diversification strategies and each of the financial crises. For the diversification discount, columns (1) and (2) / (3) and (4) examine the employment (dummy) of the diversification strategies / the correlation between the depth of the discount and the degree of diversity. The numbers in parenthesis of the F-test are p-values, and the other numbers in parenthesis are t-statistics. ***/**/* denotes statistical significance at the 1%/5%/10% levels.

IV. ROBUSTNESS TESTS

IV.1. Firm-specific effects

Sections IV.1 - IV.3 explore a variety of interpretations of the above-mentioned tests, which may weaken the implications in previous sections and try robustness tests for them. This section evaluates whether or not bank-specific traits other than diversity produce the results. More specifically, though the existence of the "crisis premium on diversification" was discovered in previous tests, a less impact of the crisis on diversified banks compared to specialized banks may be due to bank-specific traits other than diversity. For example, Table 1 in Section II.6 shows that "diversified" sub-group of the sample contains larger, more profitable, and more leveraged banks. These banks may have built better brand equity as reliable investments than other banks, so investors in the banking sector may have considered increasing their investments on the banks during the crises (a.k.a. flight-to-quality).

Table 4 depicts the summary of the OLS regressions, which include firm-specific fixed variables that may affect the values of banks but are omitted from the original regressions models in III.1 and III.2. Focusing on the comparison between the impact of the crisis on specialized and diversified sub-groups, this test divides the sample into two sub-groups and measures the effect of the crisis while considering the control variables of the original models. Since the test studies firm-fixed effect model, the sample is divided into specialized/diversified "banks" (not "observations"). A bank that includes at least one bank-year classified as "specialized" (a degree of diversity larger than 0.9 or less than 0.1) is defined as a "specialized bank." This definition of a specialized bank was the most appropriate for the sample of this study for two reasons: stricter criteria would have resulted in an insufficient sample size for a specialized sub-group, and usually it is difficult for "once focused" banks to dramatically change degree of diversity in their assets without large scale restructuring or an M&A transaction.

Table 4 can be categorized into two sub-sections: panel A analyzes the simple crisis dummy (CRISIS) and panel B analyzes the three individual crises dummies including Russian debt crisis and LTCM bailout (CRISIS1), the dot.com bubble and September11 terrorist attack (CRISIS2), and Subprime lending crisis (CRISIS3). Each panel is composed of two columns (specialized banks versus diversified banks), and the statistics of Chow test for panel A and B shows that the results of both panels are statistically significant.

Although statistically insignificant, the large gap between intercepts for the specialized and the diversified sub-group discovered in both panels indirectly supports the existence of the diversification discount. Less negative value of CRISIS coefficients for the diversified banks than specialized banks in panel A shows clue on crisis premium on diversification. While specialized banks suffer from a reduction in value of 2.4 percent during the crisis, the discount for diversified banks was lower (1.5 percent).

The test including the three different individual dummies in panel B resulted in conclusions that were somewhat inconsistent with the findings from III.2 (Table 3). In Section III.2, the latest crisis (CRISIS3) incurred the deepest discount and it was unclear whether the diversification strategies still worked for weakening negative impacts on firm values during CRISIS3. However, Table4 demonstrates the largest discount during the dot.com bubble and the September 11^{th} terrorist attacks (CRISIS2) and a consistently lower discount for diversified banks through all types of crises (though the outcome for CRISIS1 is a bit insignificant).

In conclusion, the performance of diversified banks consistently shows statistically significant dominance over specialized banks through all types of crises from the standpoint of economic values. For this test, I can no longer claim that the latest crisis (CRISIS3) negatively affects the banking industry significantly more than the CRISIS2, and that the diversification strategies did not help in relieving the shock during the CRISIS3.

Table 4. Firm – fixed effect model analysis

Dependent variable	Excess value		Excess value	
(Firm-fixed effect model)	Panel A. Simple crisis dummy		Panel B. Individual crisis dummy	
	Specialized	Diversified	Specialized	Diversified
Intercept	0.09781**	-0.03049	0.08559*	-0.04996
	(1.98)	(-0.80)	(1.65)	(-1.29)
CRISIS	-0.023634***	-0.015140***		
	(-8.05)	(-10.32)		
CRISIS1			-0.008310	0.005470
			(-0.98)	(1.37)
CRISIS2			-0.029659***	-0.022231***
			(-6.49)	(-10.30)
CRISIS3			-0.022053***	-0.013041***
			(-6.14)	(-7.19)
ln(Assets)	-0.039835***	-0.045339***	-0.040201***	-0.045037***
	(-11.77)	(-25.42)	(-10.08)	(-22.02)
Leverage	0.18854***	0.39099***	0.20491***	0.40966***
	(3.71)	(10.41)	(4.01)	(10.94)
ROA	1.4511***	2.02431***	1.4734***	2.08845***
	(11.52)	(20.95)	(11.64)	(21.42)
R-Squared (%)	50.98	59.48	51.29	60.08
Firms	109	328	109	328
N	1,277	3,881	1,277	3,881
Chow Test	7.6219***		5.7749***	
	(0.000)		(0.000)	

Notes. Panels A and B present the firm-fixed effect model analysis regarding the manner in which the financial crisis negatively affects the economic values for specialized/diversified banks. Firm-specific elements that may affect the values of firms but are not included in this model are treated as fixed variables. Panel A includes a simple "average" crisis dummy, and panel B contains three individual crises dummies (1998/2000–2002/2007–2009). The numbers in parentheses of chow (partial F) test are p-values and the other numbers in parentheses are t-statistics. ***/**/* denotes statistical significance at the 1%/5%/10% levels.

IV.2. Mergers and Acquisitions

The second potential concern to be examined involves the nature of M&A transactions. Graham et al. (2002) suggested that diversification discounts may arise not because diversification destroys value but because conglomerates purchase discounted target firms. In order to verify this argument on the study, I searched for all the completed M&A deals from 1998 to 2012 via SDC Platinum and repeated the same analysis excluding the banks that were involved in the deals from the sample. To eliminate the effect of firm-specific elements omitted from the model, this test uses a firm-fixed effect model.

Table 5 shows the summary of the outcomes of the test, which are mostly consistent with the findings from the primary analysis even after ruling out banks with M&A transactions. Even though the statistical significance of the diversification discount became weaker in panel A (diversification dummy), panel B (degree of diversity) implies a stronger relationship between the depth of the discount and the degree of diversity than the primary analysis. The crisis still decreases the economic values of banks on average, but the depth of the impact was different in the individual events (as discovered in IV.1, CRISIS2 turned out to be possibly the most distressful event for the banking sector, which is different from the findings in III.2). Lastly, the coefficients of the interaction terms in panel B suggest a potential positive correlation between the degree of diversity and the crisis premium on diversification, but the evidence is weak.

Overall, the review of the firm-fixed effect regressions analysis leads to several implications. Although the significance is weaker, the diversification discount and the crisis premium on diversification are present even after removing the banks that engaged in M&A transactions. It is clear that different crises during the sample period have different effects on the firm values and their interactions with diversification strategies, but further research with a larger sample size or a different model are necessary to clarify those relationships.

Table 5. Firm – fixed effect model analysis excluding firms that have involved in the deals during the sample period

Dependent variable	Excess value		Excess value	
(Firm-fixed effect model)	Panel A. Diversification dummy		Panel B. Degree of diversity	
	Simple crisis	Individual crisis	Simple crisis	Individual crisis
Intercept	-0.08697**	-0.10059**	-0.08652**	-0.11258**
	(-1.98)	(-2.28)	(-1.98)	(-2.54)
Diversified	-0.003222	-0.002858		
	(-1.22)	(-1.09)		
Degree of diversity			-0.027725***	-0.025792***
			(-3.18)	(-2.97)
CRISIS	-0.010365***		-0.013878***	
	(-3.39)		(-5.92)	
CRISIS1		0.004098		-0.000740
		(0.49)		(-0.10)
CRISIS2		-0.021908***		-0.023520***
		(-4.54)		(-6.23)
CRISIS3		-0.007355**		-0.011846***
		(-2.13)		(-4.41)
ln(Assets)	-0.045416***	-0.049592***	-0.045785***	-0.049765***
	(-15.53)	(-14.95)	(-15.63)	(-14.96)
Leverage	0.40153***	0.43145***	0.41101***	0.44375***
	(8.58)	(9.25)	(8.81)	(9.54)
ROA	1.8017***	1.8871***	1.8056***	1.8892***
	(14.02)	(14.67)	(14.11)	(14.76)
Diversified X CRISIS	0.001155			
	(0.35)			
Diversified X CRISIS1		-0.005459		
		(-0.61)		
Diversified X CRISIS2		0.006541		
		(1.30)		
Diversified X CRISIS3		0.000618		
		(0.17)		
Degree of diversity X CRISIS			0.017840**	
			(2.08)	
Degree of diversity X CRISIS1				0.00222
				(0.09)
Degree of diversity X CRISIS2				0.02921**
				(2.28)
Degree of diversity X CRISIS3				0.02001*
				(1.95)
R-Squared (%)	53.87	54.87	54.11	55.10
Firms	192	192	192	192
N	1,976	1,976	1,976	1,976

Notes: Panels A and B present the firm-fixed effect model analysis for the diversification discount, the impact of financial crisis, and the interaction between the diversification strategies and the impact of financial crisis after excluding the firms that were involved in mergers and acquisitions deals at least once during the sample period. Panel A includes the employment of the diversification strategies and panel B includes the degree of diversity. The numbers in parenthesis are t-statistics of coefficients. ***/**/* denotes statistical significance at the 1%/5%/10% levels.

IV.3. Alternative measure of diversification

The final limitation to be discussed is the small sample size of the specialized sub-group. In this sample, less than 10 percent of the observations are classified as specialized, so more observations may be necessary for the specialized sub-group in order to measure the difference between the two sub-groups more accurately. In order to address this concern, I adopted the size of the total assets as a proxy variable substituting diversification, which would allow for a more balanced distribution of the sub-groups. Usually, larger banks are more likely to be diversified; their size may be a consequence of diversification strategies, or they may want to diversify in order to sustain their growth when they foresee a limited space for growth in their core business. The relationship between banks' sizes and their focus on core activities has been an interest of researchers and is being studied (e.g., Saunders, Schmid, & Walter, 2014).

Like Saunders, Schmid, and Walter (2014), I divided the banks in the sample into three sub-groups by assets size: Q1(small to medium bank: a bank's size is less than USD 1 billion), Q2 (large bank: a bank's size is more than USD 1 billion and less than USD 10 billion), and Q3 (very large bank: a bank's size is more than USD 10 billion). As a proxy for the diversification dummy, I included two dummy variables (Q2 and Q3), which are equal to one when a bank's size is more than USD 1 billion and less than 10 billion, or more than USD 10 billion. The distribution of the diversified banks by assets size in Table 6 suggests that this approach may be meaningful; although about 9 percent of the observations were classified as specialized in total, and less than 5 percent were categorized as specialized in Q2 and Q3. Observations of the sub-groups Q2 and Q3 may be considered as significantly less specialized in comparison with the Q1 sub-group.

Table 6. Distribution of diversified banks by assets size

	Q1	Q2	Q3	Total
Specialized	330	99	21	450
(%)	(12.70)	(4.86)	(4.01)	(8.72)
Diversified	2,269	1,936	503	4,708
(%)	(87.30)	(95.14)	(95.99)	(91.28)
Total	2,599	2,035	524	5,158
(%)	(100.00)	(100.00)	(100.00)	(100.00)

Notes: Table 6 is a distribution of diversified banks according to their size. The size of the banks are categorized into three sub-groups by the values of the total assets (Q1: ~ USD 1 billion / Q2: USD 1 ~ 10 billion / Q3: USD 10 billion ~). Numbers in parentheses are the percentages of specialized/diversified banks within the sub-group.

Table 7 presents the results from fixed-firm effect regressions with dummy variables that represent bank size. In order to avoid a potential collinearity issue, this model does not include a natural log of assets size as a control variable. For the crisis variable, Panel A includes a simple (single) crisis dummy, and panel B contains three individual crises dummies. Additionally, columns (2) and (4) examine the interactions between the bank size dummies and the crisis dummies.

From both panels A and B, a discount of excess values was discovered for large (Q2) and very large (Q3) banks (essentially less specialized banks), and the discount for Q3 was much larger than Q2. The CRISIS coefficients of panel A present the negative impact during a financial crisis on the economic values of banks. Unlike the previous robustness tests in IV.1 and IV.2, the CRISIS1/2/3 coefficients of panel B resulted in findings that are consistent with the primary analysis (III.2). While the other crises did not weaken the banking industry significantly, the latest sub-prime lending crisis (CRISIS3) resulted in a notable decrease in the economic values of U.S. banks.

The study of the interaction terms between the bank size and the crisis suggests findings consistent with the primary analysis (III.1 and III.2). On average, both Q2 and Q3

benefited from a crisis premium on diversification during financial crises, and the benefit for Q3 outweighed Q2 (see panel A). The interaction terms regarding individual crises in panel B demonstrate that large banks (especially Q3) were less undervalued during the older crises (CRISIS1/2), but the finding was not effective for the CRISIS3.

In summary, larger (essentially less focused on core-activity) banks showed a consistent undervaluation in comparison with smaller banks (diversification discount), but the impact of the financial crisis on their values was alleviated in comparison with smaller banks (crisis premium on diversification). Unlike previous robustness checks, the tests conducted on the individual crises in this section support the implications from main analysis; different crises at different times affected the banks by different degrees, and the latest sub-prime lending crisis (CRISIS3) was the most severe. It is unclear whether or not the crisis premium on diversification existed even during the recent financial downturn.

Table 7. Firm-fixed effect model analysis on the diversification discount, the impact of crisis, and the interaction of them, including a proxy measure of diversification (assets size)

Dependent variable	Excess value		Excess value	
(Firm-fixed effect model)	Panel A. Simple crisis dummy		Panel B. Individual crisis dummy	
	(1)	(2)	(3)	(4)
Intercept	-0.37648***	-0.36473***	-0.35788***	-0.28773***
	(-13.32)	(-12.89)	(-12.80)	(-9.63)
Q2	-0.011100***	-0.012445***	-0.006974***	-0.009201***
	(-7.41)	(-7.63)	(-4.65)	(-5.66)
Q3	-0.037604***	-0.041780***	-0.029549***	-0.033596***
	(-11.46)	(-12.40)	(-9.04)	(-10.04)
CRISIS	-0.005394***	-0.007704***		
	(-7.78)	(-7.89)		
CRISIS1			0.016099***	0.012903***
			(8.92)	(5.15)
CRISIS2			-0.002842***	-0.007007***
			(-2.98)	(-5.35)
CRISIS3			-0.010545***	-0.011640***
			(-12.40)	(-9.71)
Leverage	0.35568***	0.35257***	0.35415***	0.32981***
	(11.24)	(11.17)	(11.37)	(10.55)
ROA	2.21281	2.23150***	2.03844***	2.02247***
	(28.15)	(28.41)	(25.70)	(25.51)
Q2 X CRISIS		0.002692*		
		(1.83)		
Q3 X CRISIS		0.012363***		
		(5.22)		
Q2 X CRISIS1				-0.000121
				(-0.03)
Q2 X CRISIS2				0.004749**
				(2.33)
Q2 X CRISIS3				0.002238
				(1.27)
Q3 X CRISIS1				0.028245***
				(4.74)
Q3 X CRISIS2				0.023583***
				(7.23)
Q3 X CRISIS3				0.001912
				(0.67)
R-Squared (%)	50.89	51.17	52.89	53.60
Firms	437	437	437	437
N	5,158	5,158	5,158	5,158

Notes: This table is a firm-fixed effect model analysis of the diversification discount, the impact of the financial crisis, and the interaction of the diversification discount and the crisis, including a proxy measure of diversification (assets size) in the model. Firm-specific elements that may affect the values of firms but are not included in this model are treated as fixed variables. Columns (1) and (3) present the diversification discount and the impact of crises. Columns (2) and (4) include additional variables of interaction of the diversification strategies and each of the financial crises. Columns (1) and (2)/(3) and (4) include a simple "average" crisis dummy/individual crises dummies (1998/2000–2002/2007–2009) in the model. The numbers in parentheses are t-statistics of coefficients. ***/**/* denotes statistical significance at the 1%/5%/10% levels.

V. CONCLUSIONS

The costs and benefits of the diversification strategies have interested researchers, and findings from a wide range of perspectives have been introduced in previous literature. Among them, the empirical studies focusing on the economic values of non-financial firms have consistently resulted in a diversification discount, and various explanations have been suggested (e.g., an inefficient allocation of capital, reduced performance incentives in profitable businesses, a spill-over of a bad reputation in a subsidiary to other subsidiaries). The relatively recent studies of financial firms resulted in consistent outcomes with non-financial firms and attributed (but not confirmed) the discount to a worsening risk-return profile as well as an intensified agency problem.

This study focuses on three topics including the diversification discount of U.S. banks, the negative impact of financial crises, and the interactions between the diversification strategies and the impact of financial crises, and leads to following findings:

First, as an extension of ongoing debates over diversification, this study reveals not only the statistically significant existence of diversification discounts but also the positive correlation between the degree of diversity and the depth of the discount.

Second, I quantified the impact of the financial crisis that destroyed the economic values of banks on average as well as different impacts depending on the nature of different crises. The primary analysis shows that the subprime lending crisis was the most devastating event for banks during the sample period, but some of the robustness tests show that the biggest discounts were applied during the dot.com bubble and the September 11th attacks. A study with a larger sample size and a different methodology would be helpful in clarifying the impact of each crisis.

Third, this study presents weak evidence supporting the existence of a crisis premium on diversification but also shows the limitations of the premium to justify the discount on

diversified banks. Most coefficients of interaction terms between the financial crisis and the diversification strategies indicated that the amount of a crisis premium on diversification is insufficient to compensate an “initial” diversification discount. In other words, even when considering the crisis premium, diversified banks are still under-valued in comparison with specialized banks. Moreover, inconsistent findings regarding the effect of the crisis premium on diversification during three individual crises imply that their effect has been unstable over time, and it is not clear whether or not the diversification strategies helped banks even during the recent crisis.

This empirical study contributes to ongoing discussions of diversification by presenting that the degree of diversity as well as diversification itself is associated with the amount of diversification discounts for U.S. banks. In addition, the study reveals the existence of a crisis premium on diversification for the banks, but the effect of the premium was not strong enough to draw interest to financial conglomerates’ potential role as a “safe haven” during crises.

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