Bank Leverage and Credit Risk: What do fair values tell us?

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**INTRODUCTION**

The FASB and IASB are actively working on projects to improve and simplify the accounting for financial instruments. The FASB expects to issue an Exposure Draft by the end of this year or early 2010 that would replace its standards on accounting for financial instruments with a new standard that would also be common to the IASB. The FASB has tentatively decided that the Exposure Draft will call for recognizing all financial instruments at fair value, with a limited exception for some companies’ own debt (FASB 2009).

This decision to move towards recognizing more financial instruments at fair value is highly controversial, especially within the banking industry. There are many within the banking industry, most notably the American Bankers Association (ABA), that oppose fair value accounting for financial instruments. The ABA arguments include 1) fair value accounting is not relevant given banks’ business model, 2) fair values are unreliable for deposit and loan accounts, and 3) fair value accounting is very costly and complex (ABA 2006). Most recently the ABA (2009) also has argued that fair values contribute to the pro-cyclicality of the financial system and is, therefore, one of the root causes of the recent financial crisis and a move towards more fair value accounting would be harmful to the economy. On the other hand, there are others that argue in favor of more fair value accounting. The CFA Institute Centre for Financial Market Integrity (CFA Institute), the Center for Audit Quality, the Consumer Federation of America, and the Council of Institutional Investors (2008) all jointly support fair value accounting because they believe it provides more accurate, timely, and comparable information to investors than amortized costs.  A survey of CFA Institute members’ worldwide (2,006 responses) also indicates 79 percent of respondents believe that fair value requirements improve transparency and contribute to investor understanding of financial institutions’ risk and 74 percent think full fair value accounting will improve market integrity (CFA 2008). Presumably if fair values can provide more timely information then fair value accounting may mitigate rather than exacerbate financial crises (Financial Crisis Advisory Group, 2009).

We currently understand little about how fair value accounting information provides early warning signals of financial distress. Accordingly, in this study we examine the extent to which fair value accounting information relative to information provided under other accounting models helps users assess credit risk (i.e., counterparty payment risk) within the banking industry. Specifically, we focus on how balance sheet leverage measured under various accounting measurements for financial instruments including fair value, current GAAP, and Tier 1 capital correlate with TED spread, which is a commonly used measure of the credit risk within the commercial banking industry. We focus on balance sheet leverage and credit risk because it is widely believed that excessive leverage of banks and an underestimation of credit risk contributed to the recent financial crisis (GAO 2009).

Our tests on a sample of 1,046 publicly traded bank holding companies with 8,759 bank-year observations between 1992 and 2008 demonstrate that leverage measured using fair values of all financial instruments (both assets and liabilities) is six times more strongly correlated with TED spread than the reported GAAP measure. In addition, we find the Tier 1 capital leverage measure is uncorrelated with TED spreads. We further demonstrate that the fair values of loans, securities, and liabilities all play a critical role in improving the informativeness of the leverage ratio. In addition, we find that also including the fair value of the core deposit intangible in the leverage measure that is based on the fair values of all financial instruments has no impact on the association between fair value leverage and TED spread.

This paper proceeds as follows. The second section develops our hypothesis that leverage measured under full fair vales should be more strongly associated with credit risk than other measures of leverage. The third section describes our measure of credit risk and our various measures of leverage. The fourth section presents our tests on the association between our leverage measures and the TED spread while the last section concludes.

1. **HYPOTHESIS DEVELOPMENT**

As discussed by Landsman (2007) the prior literature fairly robustly suggests that the fair values of banks’ investment securities, loans, and derivatives are incrementally informative to their cost counterparts in explaining share prices. This suggests that investors find fair values useful in pricing bank equity. Our focus, however, is not on equity pricing but rather on the extent to which fair values inform on credit risk. The management of credit risk is at the center of a bank operating model. The recent financial crisis highlights the consequences to the banking sector of an unexpected shock to credit markets.

The only study to date that has considered the link between fair values of bank financial instruments and risk is Hodder et al. (2006).[[1]](#footnote-1) The focus in their study is how different measures of income volatility are associated with various measures of market-based risk, especially those tied to interest rate risk. Specifically, they assess the extent to which the volatility in reported net income, comprehensive income, and a full fair value income are associated with four stock-market-based risk factors (i.e., market-model beta, short term and long-term interest-rate betas, and stock-return volatility) and two disclosed measures of banks’ exposure to market-based risk (i.e., total exposure to derivatives and the gap between fixed-rate interest bearing assets and fixed-rate interest-bearing liabilities that reprice within one year). Their findings indicate that the volatility of reported net income appears to be the performance measure most robustly and consistently associated with their risk measures and it is the measure that correlates most strongly with the standard deviation of stock returns. The volatility in full fair value income, however, is incrementally informative over both reported net income and comprehensive income in explaining the standard deviation of stock returns, market model beta, and long-term interest rate beta. These findings suggest that a fair value measure of net income can inform on systematic, interest, and total risk. They do not, however, specifically consider credit risk.

In our study, rather than focusing on fair value measures of net income and interest rate risk, we consider fair value measures of balance sheet leverage and a measure of credit risk specific to the banking industry. Leverage, measured as assets divided by equity, is generally considered to be the elasticity of equity value with respect to the value of assets. A leverage ratio signifies how much equity will change given a one-percentage point of return on assets. For example, if a bank has a leverage ratio of 10 then if assets fall (rise) in value by one percentage point, the value of equity will fall (rise) by 10 percentage points. The higher a bank’s leverage ratio the larger impact a fall in asset prices will have on the solvency of the bank. Since the 1980s, bank regulators have monitored leverage ratios to help restrict the risk taken on by banks.[[2]](#footnote-2)

To calculate leverage, one needs to choose a measurement system for assets and liabilities (note that equity equals assets less liabilities). For example, assets and liabilities could be measured based on a historical (amortized) cost basis. Alternatively, they could be measured using the mixed attribute model currently prescribed under US Generally Accepted Accounting Principles (GAAP) or they could be measured using a full fair value model where all financial instruments, both assets and liabilities, are measured at fair value. Given that fair values of financial instruments have the potential to better reflect current economic value than historical costs, we hypothesize that leverage ratios of banks calculated with all financial instruments at fair value will be more highly associated with the credit risk of the banking industry than leverage calculated with relatively less fair values and more historical cost measures.

Fair values reflect both credit and interest rate risk. If interest rate risk swamps credit rate risk in the fair value measurements then it may be the case that including fair value measures in leverage reduces the ability of leverage to inform on credit risk. Furthermore, as the ABA argues, if fair values are less meaningful than amortized costs or if fair values are too unreliable, we would not expect full fair value leverage to be more highly associated with credit risk than GAAP leverage.

1. **DATA**

**Measuring Credit Risk**

To proxy for credit risk we rely on the TED spread, which we denote as TED. TED is the difference between the three-month interest rates by the London Interbank Offered Rate (LIBOR) and the U.S. government debt (T-bills).[[3]](#footnote-3) LIBOR in US dollars is calculated by the British Bankers’ Association as the average interest rate that the middle two quartiles of the top 16 world-wide banks believe they would be charged for borrowing unsecured US dollars on a short-term basis in the London wholesale money market. TED is usually denominated in basis points (bps). For example, if the T-bill rate is 5.20% and LIBOR is at 5.45%, the TED spread is 25 bps.

TED is an indicator of perceived credit risk in both the banking sector as well as the general economy because T-bills are considered risk-free while LIBOR reflects the credit risk of lending to commercial banks. For example, if the risk of default on interbank loans increases, interbank lenders demand a higher rate of interest resulting in an increase in TED. Therefore, an increasing TED is a sign that lenders believe the risk of default on interbank loans (also known as counterparty risk) is increasing. Alternatively, if the risk of bank defaults is considered to be decreasing, the TED spread decreases.

We obtained TED from Bloomberg.[[4]](#footnote-4) Figure one reports month-end TED from 1984 through June 2009. It shows that TED fluctuates over time but is generally in the range of 0.1% and 0.75% (10 and 75 bps). TED spikes in times of a financial crisis. It reached 250 bps during the savings and loan crisis in the late 1980s and over 300 bps during the recent crisis.

**Leverage Measures**

We calculate leverage six different ways using the data provided by the SNL DataSource database. The SNL data is collected from the bank holding company annual reports filed with the SEC and from Y9-C reports filed with the Federal Reserve. First, we calculate leverage based on assets and liabilities as reported in the GAAP financial statements. Under GAAP some financial instruments are reported at amortized cost and some at fair value, so this leverage measure, which we denote as GAAP*LEV*, represents a mixture of fair values and amortized costs.

Second, we calculate leverage consistent with regulators by using the Tier1 leverage ratio from the Y9-C reports, which is Tier 1 capital divided by average adjusted total assets, multiplied by 100. Regulators require that Tier 1 capital divided by average adjusted total assets should be at least between three and four percent to consider the bank to be adequately capitalized. To make a Tier 1 leverage measure comparable to our other leverage measures we first divide the Tier1 leverage ratio by 100 and then invert it. There are several differences between TIER1*LEV* and GAAP*LEV*. First, under TIER1*LEV*, unrealized gains and losses on available for sale securities and derivatives accounted for as cash flow hedges are not recognized. Second, most goodwill and intangible assets are excluded, and for any financial liabilities recorded at fair value by the bank, TIER1*LEV* excludes the portion of the cumulative change in their fair values that is due to changes in the bank’s creditworthiness. Finally, the inclusion of the following items is limited based on various factors (specific to each item): cumulative preferred stock, mortgage servicing assets, deferred tax assets, credit-enhancing interest-only strip receivables, and nonfinancial equity investments. We denote this ratio as TIER1*LEV*.

Third, we calculate leverage using the fair values of all financial instruments, both assets and liabilities, which we refer to as being full fair value and denote as FV*LEV*. To calculate fair values we start with the GAAP reported assets and liabilities and adjust them to fair value using the FAS 107 adjustment on the fair values of financial instruments. This adjustment includes the fair values of held to maturity securities, loans, and debt. In addition, we adjust the deferred tax assets and liabilities for the tax implications of the unrealized gains and losses on the disclosed fair values using the statutory Federal income tax rate.

Fourth, we calculate leverage using the fair values of financial instruments that are assets and the reported GAAP values for liabilities except we adjust the deferred tax liability to reflect the fair value adjustments made to the assets. We denote this calculation as FVASSET*LEV*.

Fifth, we calculate leverage using the fair values for liabilities and the reported GAAP values for assets except we adjust the deferred tax asset to reflect the fair value adjustments made to the liabilities. We denote this as FVLIAB*LEV.*

Sixth, we calculate leverage using historical amortized cost for the available for sale portfolio and using reported GAAP amounts for all other assets and liabilities except reported deferred tax assets and liabilities are adjusted so they do not reflect the deferred tax effects of the unrealized gains and losses on the available for sale portfolio. We denote this more historical cost based measure HC*LEV*.[[5]](#footnote-5) We have fewer observations on historical cost than the other leverage measures because this data isn’t provided by SNL until 1994 when FAS 115 was adopted.

Table 1 reports descriptive statistics on each of our leverage measures for the 1,046 bank holding companies with December 31 fiscal year ends included in SNL Datasource with at least two years of data necessary to calculate FV*LEV*.[[6]](#footnote-6) The mean leverage measures are fairly similar but the standard deviations of the three fair value measures are at least four times greater than that of the other more amortized cost based measures.

1. **TESTS**

To test whether fair values improve the ability of bank leverage ratios to inform on credit risk, we first investigate the informativeness of full fair value leverage relative to the informativeness of two key leverage ratios that are most readily available and relied on: GAAP*LEV* and TIER1*LEV*. We calculate bank-specific Pearson correlations over our sample period for GAAP*LEV,* TIER1*LEV,* and FV*LEV* with TED. As we report in Table 1, our average bank holding company has 8.3 years of data in our sample for estimating the bank-specific correlations.

In the first three rows of Table 2 Panel A we report the distribution of these three correlation coefficients. Contrary to expectations, the mean (median) correlation coefficient between TIER1*LEV* and TED is -0.04 (-0.09). The lack of a significantly positive mean correlation coefficient suggests that one of the primary ratios used by regulators to monitor bank risk doesn’t timely reflect credit risk within the banking industry. The mean (median) correlation coefficient for GAAP*LEV* and TED is 0.04 (0.01), which is significantly positive but quite small in magnitude. Panel B, which reports paired sample t-tests of the differences in the mean correlations reported in Panel A, demonstrates that the relation between GAAP*LEV* and TED is statistically stronger than the relation between TIER1*LEV* and TED (p<0.001). This suggests that the adjustments that bank regulators do to the GAAP reported numbers to calculate Tier 1 capital reduce rather than improve the informativeness of the ratio.

Strikingly, the mean (median) correlation coefficient between FV*LEV* and TED is 0.25 (0.31), which is over seven times larger than the correlation coefficient between GAAP*LEV* and TED*.* As reported in Panel B this difference is highly significant (p<0.001). These results suggest that using full fair values at the bank level are more useful in identifying industry wide credit risk than the two most commonly used metrics.

Given that FV*LEV* appears to be most informative on credit risk we next investigate which components of FV*LEV* play a critical role. Accordingly, we compare the mean correlation coefficients between FV*LEV,* FVASSET*LEV,* and FVLIAB*LEV* with TED. As shown in Table 2 Panel A, FVASSET*LEV* has a mean correlation coefficient of 0.22 and FVLIAB*LEV* has a mean correlation coefficient of 0.15, which are both significantly different from zero. As reported in Panel B, both of these correlation coefficients are statistically smaller than that of FV*LEV* (p<0.001), indicating that full fair value is the most informative.

The gap between FVASSET*LEV* and FVLIAB*LEV* is significantly different from zero (p<0.001) and the correlation coefficient for FVASSET*LEV* is 40% bigger than the coefficient on FVLIAB*LEV.* This suggests that the fair values of financial instruments that are assets and liabilities both inform on credit risk but the fair values of assets are more informative than the fair values of liabilities.

It is not surprising that the fair values of liabilities are not as informative as the fair values of assets given that the largest liability for a bank is the deposits (deposits for the average sample bank are 86% of total liabilities) and the fair value and historical cost of deposits do not differ near as much as that of loans, which is the largest asset of banks. In fact, for non-term non-foreign deposits, which make up 56% of total deposits for our average sample bank, fair values are equivalent to historical cost.[[7]](#footnote-7)

Interestingly, the mean correlation coefficient for FVASSET*LEV* and TED is more than five times greater than that of GAAP*LEV* and TED. This suggests that fair valuing of loans is critically important because the primary difference between FVASSET*LEV* and GAAP*LEV* is that the fair value of loans is included in FVASSET*LEV* and not GAAP*LEV.* The likely next biggest difference between FVASSET*LEV* and GAAP*LEV* is that FVASSET*LEV* includes the fair value of the held to maturity portfolio while GAAP*LEV* does not. The held to maturity component however is likely swamped by the loan component given that for our average sample bank the book value of loans is 15 times greater than the book value of the held to maturity portfolio.

In the bottom row of Table 2 Panel A we report that the correlation coefficient for HC*LEV* and TED is essentially zero and as reported in Panel B the mean correlation coefficient between HC*LEV* and TED is significantly smaller than the mean correlation coefficient between GAAP*LEV* and TED. Given that the difference between GAAP*LEV* and HC*LEV* is that in GAAP*LEV* available for sale securities are at fair value and in HC*LEV* they are at amortized historical cost, it appears that it is useful to recognize available sale securities at fair value.

Our results thus far suggest that it is useful to recognize the fair value of all financial instruments, which include loans. But many, including the ABA, assert that if a bank recognizes the fair value of its loans it is important to also recognize the fair value of the core deposit intangible asset (ABA 2006). The argument is the following.

The core deposit intangible asset is a non financial asset that reflects the value to a financial institution of its long term depositor relationships (similar to customer lists of a non-financial enterprise). Value from these relationships arises because a significant proportion of deposits are non-term such as demand and savings deposits that bear low rates of interest and as shown by Flannery and James (1984) that are also fairly insensitive to interest rate changes. Therefore, a significant proportion of these funds can be expected to remain on deposit for long periods of time allowing the bank to invest the deposits in higher yielding and longer duration loans.

The core deposit intangible serves as a type of hedge against the effect that changes in interest rates have on loans. Specifically, if interest rates rise, the fair value of fixed rate loans held by the bank will fall but this loss will be offset by a rise in the fair value of the core deposit. If the fair value of core deposits is unrecognized but the fair value of loans is recognized then the bank will appear more volatile than it truly is.

We therefore investigate the impact of including the fair value of the core deposit intangible as an asset in measuring leverage. To estimate the fair value of the core deposit intangible we rely on the static discount cash flow approach as described by the Office of Thrift Supervision (OTS) in the Department of Treasury (Hodder et al., (2006) also use this calculation and you can refer to their Appendix for details).[[8]](#footnote-8) We use OTS-provided forward LIBOR rates during the estimation, and because these rates are not provided prior to 1997, we limit our sample to the period 1997 through 2008 for tests involving the fair value of the core deposit intangible.

We calculate leverage that includes the fair value of the core deposit intangible, denoted FVPlusCDI*LEV*, by adjusting FV*LEV* to include our estimate of the core deposit intangible. Table 3 reports the distributions of the 842 bank-specific Pearson correlation coefficients for FV*LEV* and FVPlusCDI*LEV*. The mean correlation coefficient for FV*LEV* is slightly larger than FVPlusCDI*LEV* but the difference is not significant. This suggests that including the core deposit intangible in the fair value leverage measure is not critical for the leverage measure to inform on credit risk.

As our last test, we examine the relation between GAAP*LEV,* TIER1*LEV,* and FV*LEV* at the aggregate level and TED. This test directly assesses the extent to which fair values at the industry level inform on TED, which is also an industry level measure. The results of this test would be of interest to those that have recommended that regulators monitor system wide measures of leverage to enhance the supervision of systemic risks (GAO 2009 p. 68). For each of the 17 years in our sample we sum together the GAAP or fair values of assets and liabilities at year end to calculate GAAP*LEV*Iand FV*LEV*I (we use the subscript I to denote these measures are aggregated). We are unable to calculate an aggregated Tier 1 capital measure because the data on Tier 1 leverage is not sufficiently detailed. So for TIER1*LEV*I we simply use the sample year average of TIER1*LEV*.

Table 4 reports the Pearson correlations as of December 31 of each year. As expected, TIER1*LEV* is highly correlated with GAAP*LEV* (the correlation is 0.74). Also, GAAP*LEV*I and FV*LEV*I are fairly highly correlated (the correlation is 0.52) while TIER1*LEV*I and FV*LEV*I are not significantly correlated with one another. Remarkably, the only aggregate leverage measure that has a statistically significant correlation with TED is FV*LEV*I. The correlation coefficient is 0.53 which is significant at the 3% level. This suggests that if one wants to assess changes in systemic credit risk in the banking industry, aggregate leverage based on full fair values is preferable to aggregating the two most commonly used leverage measures.

**V. CONCLUSION**

In this study we investigate the informativeness of various balance sheet leverage measures that are calculated with the financial instruments measured across a fair value-amortized cost range by examining the association between the various leverage measures and TED spread for 1,046 bank holding companies from 1992-2008. Our study is motivated by the need to understand the extent to which fair values and leverage can inform on credit risk within the banking industry given that standard setters may soon be proposing that all financial instruments be recognized at fair value and regulators are considering related reforms.

Our findings demonstrate that leverage measured using the fair value of all financial instruments, both assets and liabilities, is the most closely aligned with TED spread and significantly more aligned than leverage measured using GAAP reported numbers or Tier 1 capital amounts. Furthermore, our findings suggest that fair valuing loans, securities, and liabilities all play a significant role in improving the association between leverage and TED spread. This provides evidence to standard setters that recognition of fair values of all financial instruments in the financial statements of banks will aid investors that use reported leverage to assess a bank’s credit risk.

In light of our results it is interesting that the ABA concluded based on interviews with bank financial statement user groups that users find the existing mixed-attribute financials useful for their predictive value and reflective of banks’ business models and that these user groups “were generally strongly in favor of mixed-attribute presentation on the face of the financials” (ABA 2009 p. 4). The ABA also reported that some even called for a return to a full historical cost model. Our study should be of interest to the ABA and the users they interviewed because we provide evidence that leverage calculated with the fair values of financial instruments is more informative on credit risk than leverage calculated with the currently reported mixed-attribute measures.

Our analysis also is relevant to the current debate over regulatory reform. The Financial Stability Board (2009) has called for standard setters to evaluate the benefits of requiring more forward looking measures of credit loss impairments, including expected loss and full fair value measures. In addition, regulators in only two of the thirty member countries of the Organisation for Economic Co-operation and Development (the United States and Canada) currently consider non-risk based leverage in regulating banks while officials at the World Bank are encouraging more widespread use of a non-risk based leverage ratio as a supplement to the risk-weighting of assets (World Bank 2009). Lastly, in response to the perceived problems with financial regulation, the US Department of the Treasury recently released a roadmap for regulatory overhaul (Department of the Treasury 2009). This overhaul includes consideration of a systemic risk regulator. The relationship between leverage and credit risk is potentially a critical input into any systemic risk analysis and it has been suggested that Congress asks any new systemic risk regulator to identify the best way to measure system wide leverage (GAO 2009 p. 72). Our results suggest that bank regulators seriously consider using leverage ratios that reflect the fair values of all financial instruments for credit risk assessment purposes both at the individual bank and macroeconomic level.

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Figure 1



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| **Table 1** |
| **Descriptive Statistics - 1,046 Bank Holding Companies, from 1992 - 2008** |
| **Variable** |  | **N** | **Mean** | **Std Dev** | **P25** | **Median** | **P75** |
| Number of Years (per BHC) |  | 1046 | 8.374 | 4.248 | 5 | 7 | 12 |
| Total reported assets (in millions) |  | 8759 |  10,385  |  80,287  |  345  |  677  |  1,889  |
| Total reported liabilities (in millions) |  | 8759 |  9,535  |  74,066  |  312  |  619  |  1,726  |
|  |
| **Leverage Measures****Assets/(Assets-Liabilities)** | **Variable Name** |  |  |  |  |  |  |
| Reported  | GAAP*LEV* | 8759 | 11.942 | 4.196 | 9.982 | 11.485 | 13.335 |
| Fair Value (FV) all financial instruments  | FV*LEV* | 8759 | 11.597 | 24.272 | 9.407 | 10.973 | 13.024 |
| FV financial instrument assets only  | FVASSET*LEV* | 8759 | 11.891 | 18.119 | 9.600 | 11.152 | 13.039 |
| FV financial instrument liabilities only  | FVLIAB*LEV* | 8759 | 11.439 | 33.971 | 9.671 | 11.216 | 13.241 |
| Tier 1  | TIER1*LEV* | 8759 | 11.842 | 3.459 | 10.152 | 11.521 | 13.106 |
| Historical Cost  | HC*LEV* | 8131 | 11.876 | 3.422 | 9.972 | 11.460 | 13.309 |

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| **Table 2****Panel A****Distribution of Bank-Specific Pearson Correlations between Various Leverage Measures & TED Spread** |
| **Variable** | **n** | **mean** | **std** | **P25** | **median** | **P75** | **t-statistic** |
| TIER1*LEV* | 1046 | **-0.0435** | 0.51036 | -0.43813 | -0.08594 | 0.3344 | -2.76 |
| GAAP*LEV* | 1046 | **0.0355** | 0.52608 | -0.39388 | 0.00649 | 0.46052 | 2.18 |
| FV*LEV* | 1046 | **0.2515** | 0.5077 | -0.12644 | 0.30772 | 0.672 | 16.02 |
| FVASSET*LEV* | 1046 | **0.2165** | 0.51782 | -0.17838 | 0.27749 | 0.64414 | 13.52 |
| FVLIAB*LEV* | 1046 | **0.1538** | 0.51398 | -0.24584 | 0.16053 | 0.56707 | 9.68 |
| HC*LEV* | 1027 | 0.0053 | 0.58205 | -0.48832 | -0.04969 | 0.50062 | 0.29 |

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| **Table 2****Panel B****Paired Sample t-test of Difference in Mean Correlations****t-statistic****p-value** |
|  | GAAP*LEV* | FV*LEV* | FVASSET*LEV* | FVLIAB*LEV* | TIER1*LEV* |
| HC*LEV* | **-2.9800** | **-14.37** | **-13.39** | **-8.94** | **2.46** |
|  | 0.003 | <.0001 | <.0001 | <.0001 | 0.0142 |
| GAAP*LEV* |  | **-16.77** | **-16.49** | **-11.07** | **5.93** |
|  |  | <.0001 | <.0001 | <.0001 | <.0001 |
| FV*LEV* |  |  | **5.36** | **11.85** | **16.76** |
|  |  |  | <.0001 | <.0001 | <.0001 |
| FVASSET*LEV* |  |  |  | **5.85** | **15.63** |
|  |  |  |  | <.0001 | <.0001 |
| FVLIAB*LEV* |  |  |  |  | **12.16** |
|  |  |  |  |  | <.0001 |

The variables are defined in Table 1. The t-statistics in Panel A test whether the mean is significantly different from zero. The t-statistics in Panel B test whether the means of the two relevant leverage measures are significantly different from each other.

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| **Table 3****Distribution of Bank-Specific Pearson Correlations between TED Spread and Leverage measured using the Fair Values of All Financial Instruments and Leverage measured using Fair Values of All Financial Instruments and the Fair Value of the Core Deposit Intangible** |
| **Variable** |  | **n** | **mean** | **std** | **P25** | **median** | **P75** |  | **T-stat** |
| FV*LEV* |  | 842 | **0.2063** | 0.51845 | -0.19277 | 0.25209 | 0.64849 |  | 11.55 |
| FVPlusCDI*LEV* |  | 842 | **0.1905** | 0.52136 | -0.20435 | 0.24583 | 0.60644 |  | 10.60 |

FVPlusCDI*LEV* is calculated similarly to FV*LEV* except the estimate of the fair value of the core deposit intangible is included in assets.

The difference in the mean correlation coefficients are not statistically different (paired sample t-statistic is -1.57 p=0.12)

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| **Table 4** |
| **Correlations between 17 Year-aggregated Leverage Measures and TED Spreads from 1992-2008 for 1,046 Bank Holding Companies** |
|  |  | FV*LEV*I |  |  | TIER1*LEV*I | TED SpreadI |
| GAAP*LEV*I |  | **0.52282** |  |  | **0.73774** | -0.16206 |
|  |  | 0.0313 |  |  | 0.0007 | 0.5343 |
| FV*LEV*I |  |  |  |  | 0.27818 | **0.52688** |
|  |  |  |  |  | 0.2796 | 0.0298 |
| TIER1*LEV*I |  |  |  |  |  | -0.19256 |
|  |  |  |  |  |  | 0.459 |

The variables are defined in Table 1 with the I subscript denoting that the variable is aggregated at the sample-year level with the exception of TIER1*LEV*I, which is the sample year mean.

1. Another exception is Barth et al. (1995), which includes a related analysis but the fair value information in this study is limited to only investment securities making the analysis too weak to draw meaningful conclusions. [↑](#footnote-ref-1)
2. A limitation of focusing on how a change in total assets would affect equity is that it does not provide information on the probability that such a change in assets will occur. Therefore in 1988 the notion of risk-based capital was also implemented as part of the Basel Accord. As discussed by the GAO (2009), regulators in the US continue to use non-risk based leverage ratios along with risk-based capital requirements to provide a cushion against risks not explicitly covered in the risk-based capital requirements. [↑](#footnote-ref-2)
3. The TED spread gets its name from the fact that initially it was the difference between the interest rates for three-month U.S. Treasuries contracts and the three-month Eurodollars contract as represented by LIBOR. TED is an acronym formed from *T-Bill* and *ED*, the ticker symbol for the Eurodollar futures contract. Because the Chicago Mercantile Exchange dropped T-bill futures, TED is no longer based on futures. [↑](#footnote-ref-3)
4. We used the 3-month LIBOR in US dollars (US0003M index) minus the 3-month US T-bill (GB03 Govt). [↑](#footnote-ref-4)
5. We do not include the historical costs of trading securities because they are not a required disclosure so they are not available in the SNL database. [↑](#footnote-ref-5)
6. SNL only collects the FAS 107 disclosures, which are need to calculate FV*LEV*, for firms classified by SNL as primarily operating as a bank or thrift [↑](#footnote-ref-6)
7. SNL does not provide the detail on foreign deposits to separate out those that are non-term. [↑](#footnote-ref-7)
8. There are still several assumptions that we needed to make in performing this calculation, details of which we can provide upon request. [↑](#footnote-ref-8)