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Effect of Risks on Earnings and the US Bank Share Valuation

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ABSTRACT

The financial crisis of 2008 had a great impact on the banking industry of the United States. This paper looks at the impact of the financial risks on the share revaluation of commercial banks in United States. It is expected that the earnings announcements will affect investors' decisions to trade in bank shares. The Earnings Response Coefficients (ERCs) are applied in this paper to ascertain whether the estimated financial risks have incremental information content beyond the reported earnings. The findings support the notion that investors in the United States do look beyond the reported numbers and look for credit, market and price risk significantly in the earnings response valuation among other financial risks variables.

Keywords: Bank earnings, financial risks, market risks, price risks, abnormal returns

INTRODUCTION

There are about 150 top financial institutions in the United States of America, of which 50 play an important role in facilitating economic growth. This is in line with the long-established theory that financial intermediation plays a critical role in the allocation of resources, mobilisation of savings, and diversification of risk and, therefore, has an important impact on the economy (Francis & Hunter, 2004). The previous "credit crunch" of 2006 and the more recent 2008 financial crisis caused a serious problem for the US economy and seriously affected its banking sector's net income, market valuation, shareholder equity and capital market liquidity.

This paper investigates the impact of the risk structure of commercial banks on share revaluation in the United States and uses the Earnings Response Coefficients (ERC) to measure the impact from changes to the financial risk and market and price risks of these banks.

Credit risk, interest risk, solvency risk and liquidity risk are used as measurements

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of financial risk with the addition of a market and price risk. The analysis uses abnormal returns and the unexpected annual earnings model.

Credit risk is the probability of not receiving cash flows from assets (loans and investments) as promised. Interest rate risk refers to the negative impact on the net cash flows and the values of assets and liabilities originating from changes in interest rates, while liquidity risk indicates the ability of a banking institution to fund its financial needs. Liquidity risk is actually the by-product of the aforementioned risks since liquidity problems originate from credit and interest rate risks. Finally, solvency risk relates to the capital cushion that the bank has to offer to protect its depositors and borrowers from declines in assets values.

There is no question that some risks have to be taken to gain adequate returns. The trade-off between risks and returns is an important decision in the assets-liabilities management of banks. Managers may sacrifice risks to gain better performance. The big question is: How much risk should the bank take in order to gain extra earnings? Additionally, how much value is in the earnings per risks trade-off?

In the past, banks have developed risk-return models that allow more sensitive assessment of the relationship between risk and earnings/profit that leads to shareholder value in terms of share price. One of the models is the risk adjusted returns model. Therefore, this study tries to link the traditional earnings response model to returns to measure investors/shareholders valuation on assets. The earnings response measures the magnitude and direction of the valuation. This study includes risks as the additional control variables.

This study, hence, is an extension of many previous studies on ERC which aims to investigate the earnings response query to banks in the US. It follows the established risk-adjusted returns and regression methodology in measuring the effect of financial risk on shares revaluation for US-based banks. The assessment summarises the impact of risks on US banking institutions on different levels before crisis that indirectly reflect the recovery ability of these banks after the US financial crisis.

The paper is divided into five sections. The section that follows this first section or the Introduction is Literature Review, which reviews literature on the risks-and-returns relation. Section Methodology deals with the research design, hypotheses and methodology employed in this study. The findings of this study are presented in Findings while this paper ends with conclusions and limitations in Conclusion.

LITERATURE REVIEW

Many studies in the past have documented that earnings levels and earnings changes are associated with positive abnormal returns (Latane & Jones, 1979; Foster *et.al*, 1984; Bernard & Thomas, 1989). Furthermore, Ariff and Cheng (2011) state that there is strong evidence that the earnings response coefficients (ERC) are highly significant in several investigations over 40 years on the relation between abnormal returns of stocks and accounting earnings.

Two latest studies on stock price reaction to earnings announcements are Iqbal and Farooqi (2011) and Johnson and Zhao (2011). Iqbal and Farooqi (2011) study the stock price reaction to public announcement of quarterly earnings after tax profit by listed firms on an emerging market, namely the Karachi Stock Exchange (KSE). The magnitude and timing of the announcements related to earnings provide useful information to investors regarding the financial soundness of the firms. Conducting event studies on emerging markets is quite challenging due to their excessive price volatility which is a consequence of the relatively unstable political and macroeconomic conditions.

Johnson and Zhao (2011) study contrarian share price reactions to earnings surprises. The stock prices tend to rise as the effect from unexpected surprises caused by positive earnings. Moreover, the credibility of analysts and investors increases, hence, share prices either also increase or are maintained, while negative earnings surprises, on the other hand, are believed to evoke a severe share price penalty because the failure to at least meet the market's expectation raises doubt among investors about the firm's underlying strength. Firms tend to fall on impact from a negative earnings surprise. Earnings surprise persistence is obtained from a time-series regression model that controls for the presence of contrarian returns. The results find that contrarian share price responses to earnings surprises are a prevalent (but overlooked) feature of quarterly earnings announcements of stock return distributions. The direction and magnitude of the earnings surprise are not a reliable indicator of the market reaction to the earnings announcements. The research concludes about factors that influence the incidence of contrarian returns in negative earnings surprise deciles are unchanged by the sample restrictions. But the above studies show only the existence of 'information content' of the earnings announcement. This study attempts to measure the impact in change in the risk structure of the firm on share valuation. Therefore, we proposed to include risk variables in our model.

Several findings of the past show that the ERC is volatile when affected by some factors. For example, Miller and Rock (1985) examine the unexpected earnings and returns affected by the information. Soh *et al.* (2009) defines ERC as the coefficient that measures unexpected accounting earnings in regressions of abnormal share market returns on that and other variables. The ERC is influenced by other financial risks factors as well. Therefore, some research findings point to an increase in significance of the relationship between unexpected earnings and returns in the middle of time periods. Myring (2006) uses the earnings-returns relationship to examine how market reaction to earnings varies across countries, and the stability of this relationship over time as well as the factors that influence market response to earnings.

The newly raised question is: Can the above ERC studies be extended to US banks with the incorporation of risks factors? The

US subprime crisis that happened at the end of 2007 eventually affected the global economy in the following year. The global crisis started with the collapse of Lehman Brothers. The result of it was a large decline in the capital of many banks, and the US government had to sponsor enterprises, tightening credit around the world. The main issue was about an increase in mortgage rate and loan incentives and the value of the house mortgage that began to dip in 2006 and 2007. Thus, refinancing became more difficult. As a result, most financial institutions as well as the stock market reported huge losses.

The US banking industry has undergone considerable changes over the last two decades in response to major deregulation, financial innovation and technological advancement. The well-known Riegle-Neal Act of 1994 allowed banking and branching on a nationwide scale. Strahan (2003) summarises the fundamental changes in bank operation as an effect of the deregulation period which altered the competitive dynamics of the industry and directly impacted economic outcomes across US states.

One of the effects of deregulation pointed out in prior literature was an increased bank risk which can be mitigated with better risk management (Houston & Stiroh, 2006). In another sense, though, deregulation will increase competition, causing increased bank risks as banks seek out more risky high-yielding investments in order to maintain profit margins (Bundt *et al.*, 1992; Park, 1994; Galloway *et al.*, 1997). It may also allow banks to diversify, resulting in reduced risks (Craigh & Santos, 1997). Having an integrated financial structure among the European banks may have resulted in reduced operating risk through decreased foreign exchange risk exposures, decreased differences in legislation and accounting and in regulation simplification. The recent Greek Sovereign Crisis, however, highlights another contagion effect of this risk diversification as risk is being shared among the European Union countries.

Therefore, this paper concentrates on the six types of risk in the banking industry. The first four types of financial risk are credit risk, interest risk, solvency risk and liquidity risk and the other two are market risk and price risk. This study first tests whether there exists a relationship between stock pricing and returns from banks, and then extends the study to risks factors. Bystrom, Worasinchai and Chongsithipol (2005) study the relationship between default risk and firm size, book-to-market ratio and stock returns during a severe crisis. They find a significant increase in market-based default probabilities around the crisis and a fairly slow return to pre-crisis levels. The first sector to suffer deterioration in creditworthiness was the sector of banking, finance and securities institutions. However, they conclude that default risk is non-systematic. Cheng and Ariff (2007) examine whether four financial risk factors correlated with the abnormal returns of bank shares, while Wong (1997) shows that the optimal bank interest margin reacts positively to the increase in credit risk and interest rate risk.

Finally, Hartmann (2010) reviews five new research papers, which shed light on various aspects of the relationship between market and credit risk and illustrate why they matter, particularly for risk management, and also for financial supervision and regulation. He further recommends future research in bilateral interaction between market and credit risk to other trilateral interaction.

METHODOLOGY

Research Design

This study examines the impact of several risk factors on the performance of commercial banks by using ratios computed from the financial statements of 122 selected banks from the period 2004 to 2009. The first four types are financial risks such as credit risk, interest risk, solvency risk and liquidity risk. The other two are market risk and price risk. The ratios are defined in Table 1. The reason is that we wanted to determine whether these factors would impact the selected banks' shares in terms of direction and magnitude and the revaluation effect from earnings changes during that period.

There are two main ways to calculate unexpected returns, which are:

i. The return series is regressed against the lagged return series. The residual is then used as an unexpected return. This method is commonly used in economics and finance.

ii. The difference in accounting returns between current year and previous year, which is commonly used in accounting literature

In this study, the second method was adopted.

Analysis of Abnormal Returns

Sharpe Market Model (1963) as a standard general equilibrium relationship for asset returns was used. The Abnormal Returns (AR):

$$AR_{it} = R_{it} - (\alpha + \beta_i R_{mt}) \quad (1)$$

where,

$R_{it} = Ln(P_{it}/P_{it-1})$ and,

$R_{mt} = (Ln\ I_t/I_{t-}\ )$.

In addition to the terms already defined, Ln is natural logarithm and i refers to markets composite index. Hence, we took the changes in bank share prices as R_{it} and changes in market index as indicating the R_{mt}. We regressed the R_{it} and R_{mt} to compute the beta (β) and alpha (α) to complete the model for each bank. We also computed Cumulative Abnormal Return (CAR) from the summation of Abnormal Return (AR) for the period of 12 months.

Analysis of Unexpected Annual Accounting Earnings

Unexpected annual earnings were computed using the naive expectation model, which assumes that the next period's expectation is simply the current period's annual earning. This is also consistent with the design of the study to analyse the contemporaneous effect of price at a point in time.

Unexpected annual earnings (UEs) were computed using the naive model:

$$UE_{it} = (EPS_{it} - EPS_{i(t-1)})/ EPS_{i(t-1)} \quad (2)$$

We computed the unexpected earnings from annual earnings per share of each sample bank as shown above in equation (2). However, only five years' annual earnings per share were available for the selected banks, thus allowing us to compute only four years of UE_{it}. The UE_{it} depends on earnings per share of the bank. Therefore, the individual bank's profit and performance determine the movement of its share prices, and are directly related to earnings per share[1].

Risk Determinant Factors

In this study, four financial risk factors were considered. We included two additional risk factors as mentioned above. They were price risk and market risk. The financial risks and their ratios are stated in Table 1, which gives the financial risk factors and their ratios.

This study used four financial ratios calculated from the balance sheets sourced from Bankscope. The additional two risk variables were added according to price risk (P) as derived from the yearly standard deviation (σ_t) of the bank share price from 2005 to 2009. The market variable was computed from the yearly standard deviation (σ_i) of the share market index.

Relationship Between Abnormal Returns, Unexpected Earnings and Risk Factors

The relationship between abnormal returns as dependent variable and unexpected earnings and the six risk factors, namely, interest rate risk, liquidity risk, credit risk, solvency risk, market risk and price risk as independent variables was tested in the regression:

$$CAR_i = \delta_1 + \delta_2 UE_I + \delta_3 Mr_i + \delta_4 Pr_i + \delta_5 Sr_i + \delta_6 Ir_i + \delta_7 Lr_i + \delta_8 Cr_i + \varepsilon_i \quad (4)$$

where,

CAR_i = Cumulative abnormal return over a 12-month window

UE_i = Unexpected Annual Earnings,

Mr = Market risk factor,

Pr_i = Price risk,

Sr_i = Solvency risk factor,

Ir_i = Interest risk factor,

Lr_i = Liquidity risk factor, and

Cr_i = Credit risk factor

Eight regressions were performed according to the following specification:

$$CAR_i = \delta_1 + \delta_2 UE_i + \varepsilon \quad \text{Model 1}$$

$$CAR_i = \delta_1 + \delta_2 UE_i + \delta_3 Mr_i + \varepsilon \quad \text{Model 2}$$

$$CAR_i = \delta_1 + \delta_2 UE_i + \delta_4 Pr_i + \varepsilon_i \quad \text{Model 3}$$

$$CAR_i = \delta_1 + \delta_2 UE_i + \delta_5 Sr_i + \varepsilon_i \quad \text{Model 4}$$

$$CAR_i = \delta_1 + \delta_2 UE_i + \delta_6 Ir_i + \varepsilon_i \quad \text{Model 5}$$

$$CAR_i = \delta_1 + \delta_2 UE_i + \delta_7 Lr_i + \varepsilon_i \quad \text{Model 6}$$

$$CAR_i = \delta_1 + \delta_2 UE_i + \delta_8 Cr_i + \varepsilon_i \quad \text{Model 7}$$

[1]Earnings per share computed by net income / number of the shares outstanding

TABLE 1
Financial Risk Factors and Ratios

Label	Financial Risk Factors	Financial Ratios
Ir_i	Interest risk	Loan / Deposit
Cr_i	Credit risk	Non-performing loans / Total assets
Lr_i	Liquidity risk	Liquid assets / Total deposit
Sr_i	Solvency risk	Equity / Deposit and short-term funding
**Additional Risk		
Pr_i *	Price risk	Yearly Standard deviation of P (σ_t)
Mr_i *	Market risk	Yearly Standard deviation of Market index (σ_i)

$$CAR_i = \delta_1 + \delta_2 UE_I + \delta_3 Mr_i + \delta_4 Pr_i + \delta_5 Sr_i + \delta_6 Ir_i + \delta_7 Lr_i + \delta_8 Cr_i + \varepsilon_i$$

Model 8

We examined whether these four identified "accounting –financial factors" had information content over and above the information from unexpected earnings (UE) in the US banking industry. Additionally, we examined whether the two new risk factors would have an impact on the US banks earning response. The regressions used the panel Ordinary Least Square regression following Wooldridge (2001). A priori, we expected some of the key factors to significantly add more information to the price determinants.

OBJECTIVES

This paper examines the relationship between risk-adjusted abnormal returns and the unexpected annual earnings changes. It also ascertains whether six factors i.e. market risk, price risk, interest rate risk, liquidity risk, credit risk, and solvency risk affect the return-to-earnings relationship.

Data

The data set initially contained 132 US commercial banks from the Bankscope financial database. A final sample of 122 banks was available for analysis for the period 2005 to 2009. Table 2 shows the summary of the statistics related to the 122 sampled banks in terms of their total assets, total equity, total loans, total deposit and total income in 2009.

The difference between the largest and the smallest bank in terms of total assets of the banks is USD11,056 million. Wilmington Trust Corporation had the highest assets value. MB Financial Inc. was the second largest bank in assets, followed by Virginia National Bank. The smallest bank was Bank Reale, which had the lowest asset, equity and loan and deposit value.

The data above show that US banks had more deposits compared to loans in the year 2008. This indicated that US banks were giving attractive interest rates to the public, which resulted in an increase of bank savings deposits. The banks had a good cash management policy of managing the amount of money inflow and outflow. These banks

TABLE 2
The Total Assets, Shareholder Equity, Loans and Deposit of Selected Commercial Banks (in USD million) in 2008

Bank	Asset	Equity	Loans	Deposit	Income
Mean	586.3	66.3	382.5	485.8	-0.4
Standard Deviation	1,435.1	174.8	1,045.6	1,154.7	12.9
Range	11,056.0	1,303.3	8,699.9	8,967.6	147.5
Minimum	41.1	3.8	15.8	27.1	-104.6
Maximum	11,097.1	1,307.1	8,715.7	8,994.7	42.9
Sum	71,524.3	8,084.0	46,668.2	59,271.1	-49.5
Count	122	122	122	122	122

were holding cash more than giving out loans to avoid insolvency risk in times of recession. So the total loan of USD46,668.2 million compared to a total deposit of USD59,271.was at a ratio of 1:1.13. This means that 1 % of loans given out were covered with 1.13 deposits. Hence, during the recession period, US citizens preferred traditional savings than investment in other financial investment instruments. This was encouraged by an attractive deposit interest rate by the banks.

FINDINGS

Descriptive Data

Data such as earnings per share, interest risk (Loan / Deposit), Credit risk (Net loans / Total assets), Liquidity risk (Liquid assets / Total deposit) and Solvency risk (Equity / Deposit and short-term funding) were extracted from Bankscope. Capital IQ was used to extract monthly data such as the banks' share price data and S&P500 index to complete the data set.

Table 3 shows the descriptive statistics of the dependent and independent variables. The average CAR and UE are negative; this indicates that the banks were not doing well in the preceding few years. The SD values for these bank share prices and market index were 9.3% and 5 % respectively. This means that these banks were more risky than the market index.

Returns–to–earnings relationhip between UE and CAR

The regression results are summarised in Table 4. Model 1 indicates that the coefficient for Unexpected Earnings (UE) is positively and significantly related with CAR at a value of 0.050 and with a t-statistic of 5.38. The R-Squared in Model 1 was 0.066, which is the range that was obtained in other studies (Lev 1985). The findings show that US commercial banks had a strong returns-earnings relationship.

The six risk factors were subsequently added one by one into regression of risk adjusted cumulative abnormal returns (CAR) and unexpected annual earnings (UE). Table 3 has all the regression results for the remaining seven models. Initially, the risk factor was regressed one at a time and all the risk factors were then combined in the last regression.

TABLE 3
Descriptive Statistics of the Dependent and Independent Variables

	CAR	UE	Price Risk	Market Risk	Solvency Risk	Interest Risk	Liquidity Risk	Credit Risk
Mean	-0.072	-0.222	0.093	0.050	13.95	90.5	10.93	2.08
S. Deviation	0.309	2.247	0.084	0.028	8.64	33.2	8.95	2.61
Minimum	-0.944	-13.29	0.008	0.014	0.04	28.5	0.55	0.01
Maximum	1.582	17.19	0.944	0.100	89.2	385.9	51.7	9.29
Count	399	399	399	399	399	399	399	399

Each model exhibited a coefficient for UE variables which were significantly and positively related to CAR. All the risk models were insignificant except for market risk, price risk and credit risk factor. The market risk model indicated that the coefficient for share market risk was negatively and significantly related at a value of -2.092 and with a t-statistic of -3.636. The price risk model indicated that the coefficient for share price risk was positively related at a value of 0.485 and with a t-statistic of 2.564, and the credit risk model indicated that the coefficient credit risk was negatively related at a value of -0.011 and with a t-statistic of -2.812. Other risk factors such as interest risk, solvency risk and liquidity risk were all insignificant with the CAR. This is because the above stated risks dealt with the internal financial performance of the banks except for market risk and price risk, which are the returns expected from taking external risks. In terms of credit risks, the finding is consistent with Cheng and Ariff (2007). The changes in the banks' share price were affected negatively by the amount of non-performing loans in the loan portfolios of the banks. The higher the nonperforming loans, the lower the share price reaction to the same amount of earnings.

Where credit risk was concerned, three factors drove the expected and unexpected losses in the UE: (1) The customer default rate given the risks level. (2) The exposure in the loans that is technically at risk, and (3) The potential loss, given default, after allowances were made for security. The non-performing loans that measured the credit risks encompassed all these factors. Therefore, an investor would view the magnitude of earnings with the same level of credit risk as more valuable, or the same level of earnings but lower credit risks as more valuable. With this model investors would measure the credit risk as -0.011 times for the equivalent in credit risk, whereas the ERC is in the magnitude of 0.043 of unexpected earnings. The ratio of differences of credit risks is about one quarter of the ERC.

CONCLUSION

This paper examines the effect of financial risks on the earnings response coefficients for a selected number of 122 commercial banks in the US and focuses on the abnormal returns performance in US banks.

TABLE 4
Regression Results for Returns-to-Earnings Relation for Selected Banks in the US from Period 2005 to 2009

Regression Model: $CAR_i = a_1 + a_2 UE_I + a_3 Mr_i + a_4 Pr_i + a_5 Sr_i + a_6 Ir_i + a_7 Lr_i + a_8 Cr_i + \varepsilon_I$

Dependent Variable: Cumulative Abnormal Returns (CAR), n=256

Independent Variable I	Constant a_1	UE a_2	Market Risk a_3	Price Risk a_4	Solvency Risk a_5	Interest Risk a_6	Liquidity Risk a_7	Credit Risk a_8	Adj R-sq	F-Stat	VIF	Durbin-Watson
Model												
1	-0.058	0.05							0.066	28.94	1.00 - 1.00	1.944
	(-3.571)	(5.380)								(0.000)		
	(0.000)***	(0.000)***										
2	-0.043	0048	-2.092						0.094	17.961	1.138 - 1.138	1.914
	(1.343)	(5.186)	(-3.636)							(0. 000)		
	(0.180)	(0.000)***	(0.000)***									
3	-0.104	0.051		0.485					0.079	21.529	1.14 - 1.14	1.995
	(-4.316)	(5.529)		(2.564)						(0. 000)		
	(0.000)***	(0.000)***		(0.011)*								
4	-0.059	0.05			0.001				0.064	14.43	1.009 - 1.009	1912
	(-1848)	(5.373)			(0.019)					(0. 000)		
	(0.063)	(0.000)***			(0.985)							
5	-0.075	0.051				0.000			0.064	14.51	1.102 - 1.102	1.915
	(-1.573)	(5.386)				(0.370)				(0. 000)		
	(0.117)	(0.000)***				(0.712)						
6	-0.066	0.050					0.001		0.093	14.51	1.022 - 1.022	1.879
	(-2.533)	(5.368)					(0.369)			(0. 000)		
	(0.012)*	(0.000)*					(0.712)					
7	-0.032	0.046						-0.011	0.124	18.68	1.442 - 1.442	1.896
	(-1.722)	(4.864)						(-2.812)		(0. 000)		
	(0.086)	(0.000)*						(0.005)**				
8	0.031	0.043	-2.967	1.144	-0.001	0.000	0.001	-0.016	0.158	11.58	1.279 - 2.391	1.995
	(0.508)	(4.766)	(-4.77)	(5.453)	(-0.699)	(-0.113)	(0.312)	(3.552)		(0. 000)		
	(0.612)	(0.000)***	(0.000)***	(0.000)***	(0.485)	(0.910)	(0.755)	(0.000)****				

Note: Number in each bracket is t-statistic and p-value, significant at (*) 0.01 level.

The findings suggest that accounting earnings is a price relevant variable for banks and earnings has a contemporaneous impact on share prices for banks in the US market. All the risk factors were insignificant except for market risk, price risk, and credit risk. The CAR depended on the earnings of the banks' share price, which was determined by the profit the banks were making at the end of the day.

The profit of the banks was affected by the performance of the banks internally and externally. The internal factors were factors specifically related to the firms such as assets liabilities management. The external factors included the monetary policy executed by the government. The major income of the banks came from the differences in borrowings interest rate and depositing interest rate. For example, the discount rate, interest or bank lending rate which was fixed or imposed by the Federal Reserves on all banks required that each bank had a certain percentage of cash reserved in the Federal Reserves. These factors affected money circulation in the financial market. Therefore, market risk factor was significant in Model 2 and Model 8, which means that the earnings of the bank directly related to economic conditions, historical events, government policies and other macroeconomic factors.

However, the banks realised losses during the recession period due to non-performing loans from high defaults. Therefore, credit risk factor shows up as another risk factor that can affect share price revaluation due to earnings surprises.

This study unearthed no evidence that the other risk factors, namely, interest rate risk, liquidity risk and solvency risk, had information beyond earnings for US commercial banks. This could be due to the fact that these banks had managed this risk well following the BASEL Accords.

Overall, this study has shown a positive returns-to-earnings relationship for banks. The market, price and credit risks have information content beyond earnings changes in the returns-to-earnings relationship. These risk factors are to be cautiously interpreted after the unexpected earnings variables. The other three risk factors were not significant probably due to the fact that firstly, the investors were not concerned with the other factored risk variables, and secondly, the banks were very well managed by their managers so that the other financial risk variables did not vary too much to be significant.

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