THE SUBPRIME MORTGAGE CRISIS OF 2007 AND INVESTOR BEHAVIOR

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Bachelor of Arts

By

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THE SUBPRIME MORTGAGE CRISIS AND INVESTOR BEHAVIOR
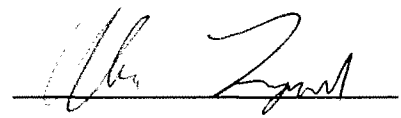
Alexander Lippitt

May, 2008

Economics

Abstract

Since the beginning of 2007, financial markets have encountered a great amount of volatility. This volatility has been caused by fears of massive earnings losses at financial and real estate companies that owned or created Sub-Prime related mortgage products. It has been difficult for the investment community to identify which companies were exposed to the problematic Sub-Prime market and how the losses in the secondary mortgage market would affect other financial sectors. To receive a better understanding of investor behavior during this financial crisis, the present study conducts regression analysis on the effects of stock price changes to rational investor variables (fundamental analysis) and irrational investor variables (intra-industry variables). After careful analysis and running of the empirical model, evidence shows that investors portrayed both irrational and rational behavior during the Sub-Prime market debacle of 2007.

ON MY HONOR, I HAVE NEITHER GIVEN NOR RECEIVED
UNAUTHORIZED AID ON THIS THESIS

Signature

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AKNOWLEDGEMENTS

This thesis has been a very challenging but rewarding experience and I am grateful for all of those who helped me along the way. Special thanks goes to my parents who were willing thesis reviewers late into the night and my thesis advisor, Professor Amit Ghosh, who went above and beyond in helping me complete this study. And finally, to my girlfriend, Karlin, who supported me throughout the thesis process and always lent a shoulder when needed.

CHAPTER I

INTRODUCTION

Since the beginning of 2007, domestic and international stock markets have encountered periods of volatile prices. As news of sub-prime mortgage market problems arose in February of 2007, investors have displayed a great uneasiness about the housing market, credit markets, and the U.S. economy. Massive sell offs on the New York Stock Exchange (NYSE) in the real estate and financial sectors has pushed market indexes to yearly lows. A liquidity crisis in September of 2007 forced the federal reserve to intervene and reduce the federal funds rate 50 basis points (.5%). With the market turmoil, it has been difficult for investors to identify which companies are involved or are exposed to the problematic sub-prime mortgage market.

Given this financial background scenario, this research will study investment behavior and how traditional Fundamental Analysis investment strategies have been affected during the financial crisis of 2007. With little information available on who owned depreciating sub-prime related investment products and the inability to gauge the extent of the sub-prime market problems,

understanding investor behavior and the factors determining stock decisions during this time period is important. This study will provide greater clarity on the sub-prime issue and provide insight into whether investors have used good judgment in valuing sub-prime afflicted stocks or have resorted to using irrational valuation techniques. To better understand the current environment that the research question is addressing, a description of the growth and bust of the sub-prime mortgage industry is needed.

Section 1.1 - Sub-Prime Meltdown

The recent turmoil in the sub-prime and general world markets can be traced back to the recession of 2001. After the tech stock bubble burst, the September 11th attacks, and the highly publicized corporate scandals of Enron, the economy fell into a recession. In response, the Federal Reserve Bank lowered its federal funds rate from 6.5% in January of 2001 to 1% by July, 2003.[1]

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[1] "Fed Funds Target Rate." Money Cafe. 2008. 07 Mar. 2008 <1.
http://www.moneycafe.com/library/fedfunds.htm>.

Figure 1.1

THE FEDERAL FUNDS RATE FROM 1998 TO 2004[2]

Federal Funds Rate

This decrease in the Federal Funds Rate lowered national interest rates and made borrowing cheaper. As the national interest rate fell, rates on all types of mortgages began to fall also. As the Federal Funds Rate approached 1% by the beginning of 2003, mortgages became increasingly inexpensive and the housing market exploded across the country.

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[2] "The Federal Funds Rate From 1998 to 2004." Chart. Money Cafe. 17 Apr. 2008 <http://www.moneycafe.com/library/fedfunds.htm>.

Section 1.2 - Types of Mortgages

There are a variety of mortgage products available to future homeowners but most can be classified into 4 different categories; Prime, Jumbo, Near prime and Sub prime Mortgages.[3] Prime Mortgages are the most prevalent type of home loan in the United States. Prime, also known as, 'Traditional', mortgages are home loans given to people with good credit, documented income, and require regular and consistent interest payments over the life of the loan. Jumbo Mortgages are also home loans with the same characteristics as Prime Mortgages, but are above the $417,000 limit that would allow government enterprises such as Fannie Mae, Freddie Mac, and Ginnie Mae to own. Sub-Prime mortgages, also known as B-Paper or second chance lending, are home loans given to borrowers that have deficient credit histories or other significant financial issues that prohibit them to access and receive market prime interest rates. To compensate for the higher risk of sub-prime borrowers, interest rates are higher than Prime Mortgage rates and have innovative payment plans that allow for lower average payments in the first couple years of the mortgage. These mortgages became popular in the 1990's and by 2006 were worth $600 billion, 1/5 of all originated mortgages. Finally, Near Prime Mortgages are given to buyers with credit ratings and income above Sub-Prime levels but who still cannot qualify for a more traditional home loan. These mortgages have higher interest rates than Prime but do not reach the highest rates found on sub-prime mortgages. Traditionally, mortgages were offered by banks and saving and loan institutions (S&Ls). These companies

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[3] Martino, Danielle D., and John V. Duca. United States. Federal Reserve Bank of Dallas. Economic Letter-the Rise and Fall of Subprime Mortgages. Nov. 2007. 12 Feb. 2008.

would use savings from depositors to fund their home loans and hold the loans on their balance sheets.[4]. As financial markets advanced through the 60s and 70s, mortgages began to be sold to other banks and investors. By the late 1990's, the majority of mortgages in the U.S. were traded on the secondary mortgage market.

Section 1.3 - The Secondary Mortgage Market

The Secondary Mortgage Market is used to trade bundles of mortgages and their future payments. After a mortgage is originated, a bank, S&L, or other mortgage originating thrift would bundle the future payments of the mortgage and combine it with the future payments of other mortgages, creating a Mortgage Backed Security (MBS)[5]. The MBS would then be sold to a third party in the Secondary Mortgage Market. A large buyer of mortgages and MBSs are the Government Sponsored Enterprise's (GSE) Fannie Mae and Freddie Mac. These two companies, owned by private shareholders, but originally created by the U.S. Federal Government to buy mortgages, bundles them into MBSs, and sells them on the Secondary Mortgage Market. In addition to selling the MBSs, the GSEs guaranteed the principal and interest of the MBS's underlying mortgages. These two publicly traded companies are officially sponsored by the U.S. Government and investors have assumed that the government will guarantee the MBSs if Fannie Mae and Freddie Mac were to default or commit bankruptcy. This trust

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[4]Dotsey, Michael. Reforming Deposit Insurance. Federal Reserve Bank of Richmond. Richmond: N/A, 1990. 1-26. 12 Dec. 2007
<http://www.richmondfed.org/publications/economic_research/economic_review/pdfs/er760201.pdf>.

[5]Langley, Paul. "Securitising Suburbia: the Transformation of Anglo-American Mortgage Finance." Competition&Change 10.3 (2006): 283-298.

has allowed Fannie Mae to sell MBSs at lower guaranteed rates and has allowed

investors to increase the finance pool for mortgage origination across the United

States[6]. As a result, the percent of mortgages that were securitized into MBSs

grew drastically during the 1990's and early 2000's.

Figure 1.2

PERCENT OF MORTGAGES ORIGINATED THAT WERE

SECURITISED AND SOLD ON THE SECONDARY MORTGAGE MARKET[7]

Securitised Housing Loans
Per cent of total housing loans

Source: RBA

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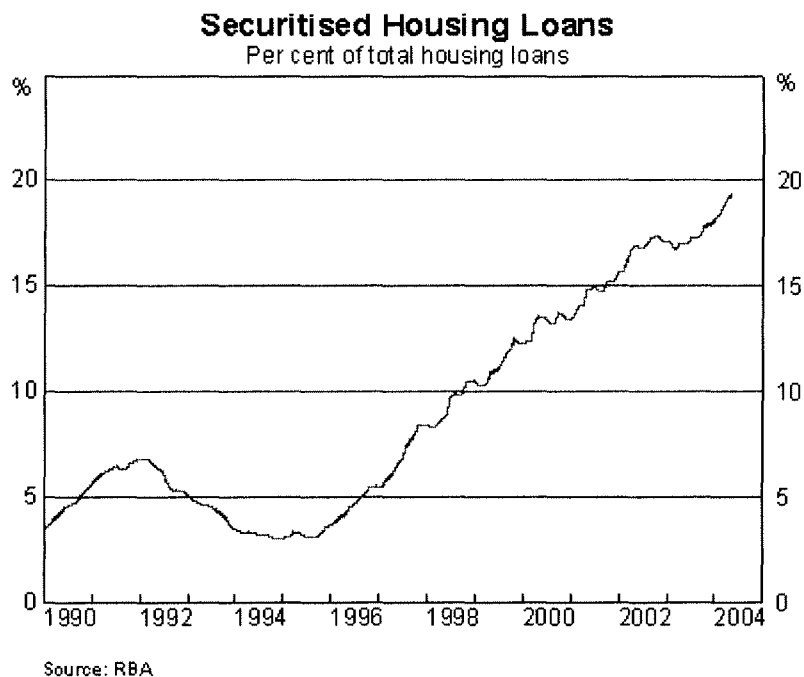
[6] Martino, Danielle D., and John V. Duca "the Rise and Fall of Subprime Mortgages" pg. 2

[7] "Securitised Housing Loans." Chart. Reserve Bank of Australia. 17 Apr. 2008
<http://www.rba.gov.au/Speeches/2004/sp_ag_280704.html>.

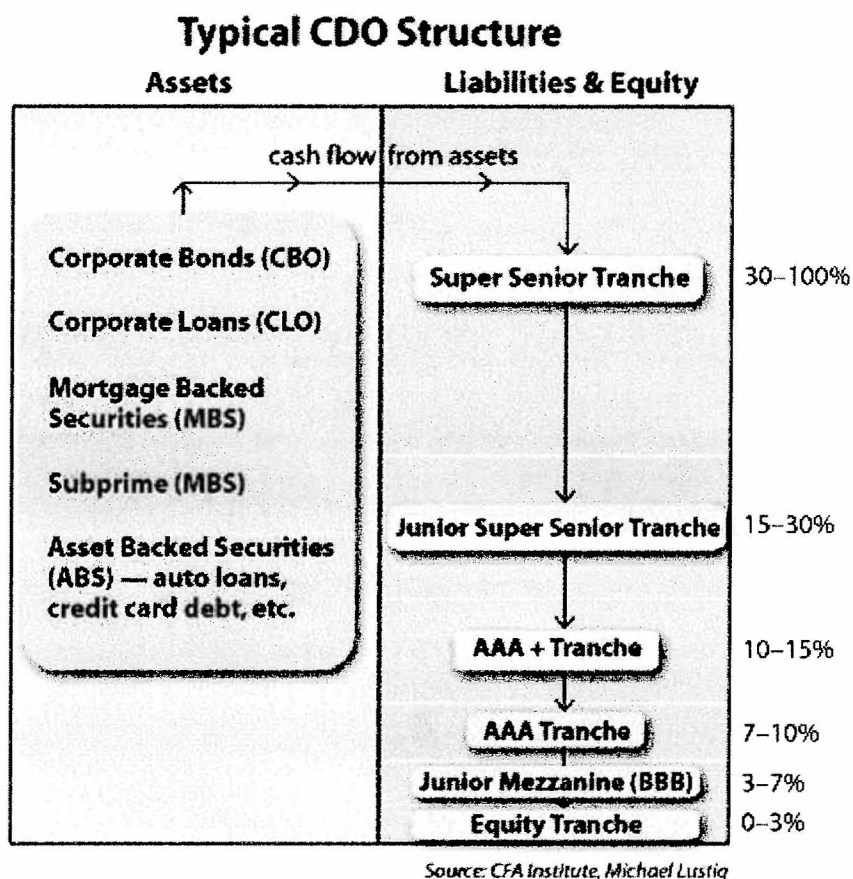Other Financial Institutions unfortunately did not have the chartering of the U.S. Government and would have to sell MBSs at higher guaranteed principal and interest rates compared to the GSEs Fannie Mae and Freddie Mac. These non GSE financial institutions did not have the reserves and capital to guarantee these high rates and could only provide limited amounts of MBSs in the 1990s. It was not until the early 2000s that interest from Wall Street investors allowed financial institutions to offer more MBS in more complex investment products.

Section 1.4 - Complex Investment Vehicles

In the early 2000s, Wall Street investors, disenchanted with the underperformance of stocks over the previous 3 years, sought less risky but high yield investment instruments. MBSs were depicted as low risk and offered high yields compared to the equity and bond markets at the time. Soon, billions of dollars were being invested in MBSs by hedge funds, institutional investors, and wealthy clients. As demand for MBSs increased on Wall Street, non GSE companies were able to creat new investment products that allowed them to bundle MBSs with other debt and asset products such as credit card debt, auto loan debt, and movie revenues. These new investment products, called Collateralized Debt Obligation (CDO) allowed sub-prime mortgages to be bundled with other types of lower risk debt. CDOs were then divided into tranches that were assigned different rates of return. The lowest tranches offered the highest returns but the largest risk since if any of the debt products defaulted, the first losses would be incurred by the lowest tranch. As the amount of defaults

increased, the losses would spread up from the lowest tranches and affect higher

grade tranches.

Figure 1.3

COMPONENTS AND STRUCTURE OF A COLLATERALIZED DEBT

OBLIGATION (CDO)[8]

Typical CDO Structure

Assets	Liabilities & Equity	
cash flow from assets		
Corporate Bonds (CBO)	Super Senior Tranche	30–100%
Corporate Loans (CLO)		
Mortgage Backed Securities (MBS)		
Subprime (MBS)	Junior Super Senior Tranche	15–30%
Asset Backed Securities (ABS) — auto loans, credit card debt, etc.	AAA + Tranche	10–15%
	AAA Tranche	7–10%
	Junior Mezzanine (BBB)	3–7%
	Equity Tranche	0–3%

Source: CFA Institute, Michael Lustig

This new product that sliced risk and return into different tranches

allowed non GSE financial companies to create more MBSs and allowed these

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[8]"Components and Structure of a Collateralized Debt Obligation (CDO)." Chart. Chartered Financial Analyst. 28 Apr. 2008 <www.cfa.com>.

financial institutions to include higher risk sub-prime mortgages into their bundled investment products. Despite the fact that many of the debt products in the CDOs were not investment Grade, the top Bond rating agencies (Standard and Poors, Fitch) assigned top quality ratings to these Investment Vehicles.[9] With returns as great as 8% on a Triple AAA rating, CDOs grew in popularity and Wall Street demanded even more of these products.

Figure 1.4

SIZE OF THE CDO MARKET IN BILLIONS OF DOLLARS[10]
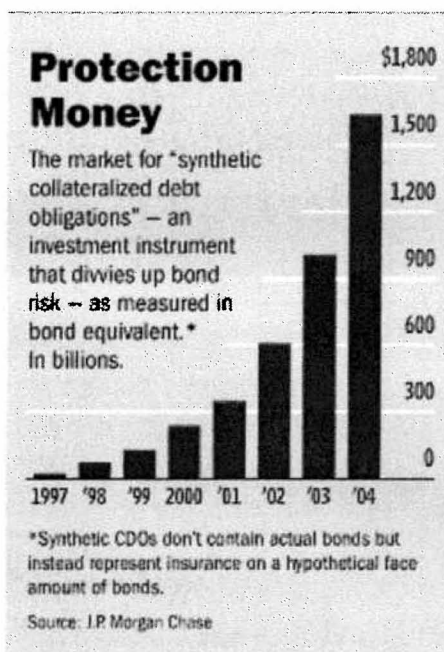
from the Wall Street Journal 9/12/05

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[9] Stracke, Christian. "CDO Ratings Hit Troubled Water." Banker 158 (2008): 40-42.

[10] "SIZE OF THE CDO MARKET IN BILLIONS OF DOLLARS." Chart. The Wall Street Journal. 29 Apr. 2008 <www.wallstreetjournal.com>.

The demand for these investment products consequently turned into a demand for more mortgages. To create more CDOs, more mortgages had to be originated and lucrative opportunities were created for mortgage originators. Non GSE financial institutions such as Investment Banks, specialized mortgage investment companies, and large financial corporations were offering premium interest rates to acquire new mortgages, particularly in sub-prime. To meet this demand, real estate brokers and other mortgage originators began to offer sub-prime mortgages to riskier individuals who did not meet the requirements of a sub prime loan and had little chance of repaying the mortgage. As more sub-prime mortgages were created, sub-prime home loans expanded its capture of the mortgage market from 8% in 2002 to 20% in 2006. [11]

Table 1.1

STATISTICS ON THE SIZE OF THE SUBPRIME MARKET[12]

Year	Total Mortgage Originations	Sub prime Originations	Sub prime Share in Total Mortgage Originations (percent of dollar value)	Sub prime Mortgage Backed Securities	Percent of Sub prime Mortgages Securitized (percent of dollar value)
2001	2215	190	8.6	95	50.4
2002	2885	231	8	121	52.7
2003	3945	335	8.5	202	60.5
2004	2920	540	18.5	401	74.3
2005	3120	625	20	507	81.2
2006	2980	600	20.1	483	80.5
Note - All figures are in billions of dollars unless otherwise noted					

[11]Schloemer, Ellen, Wei Li, Keith Ernst, and Kathleen Keest. Losing Ground: Foreclosures in the Subprime Market and Thier Cost to Homeowners. Center for Responsible Lending. Center for Responsible Lending, 2007. 1-56.
[12]"Statistics on Sub-Prime Mortgages." Chart. The New York Times. 30 Apr. 2008
<http://krugman.blogs.nytimes.com/2007/10/27/some-housing-pictures/>.

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Section 1.5 Sub-Prime Defaults

By the end of 2006, sub-prime mortgage owners began to default at an

alarming rate. By mid 2007, 446,726 homes were foreclosed, up 100.1% from the

year before[13].

Figure 1.5

PERCENT OF SUBPRIME MORTGAGES DEFAULTING AFTER 60

MONTHS[14]

Figure 14: Recent Subprime Vintages Have Performed Poorly
Percent of Loans 60+ Days Delinquent by Year of Origination
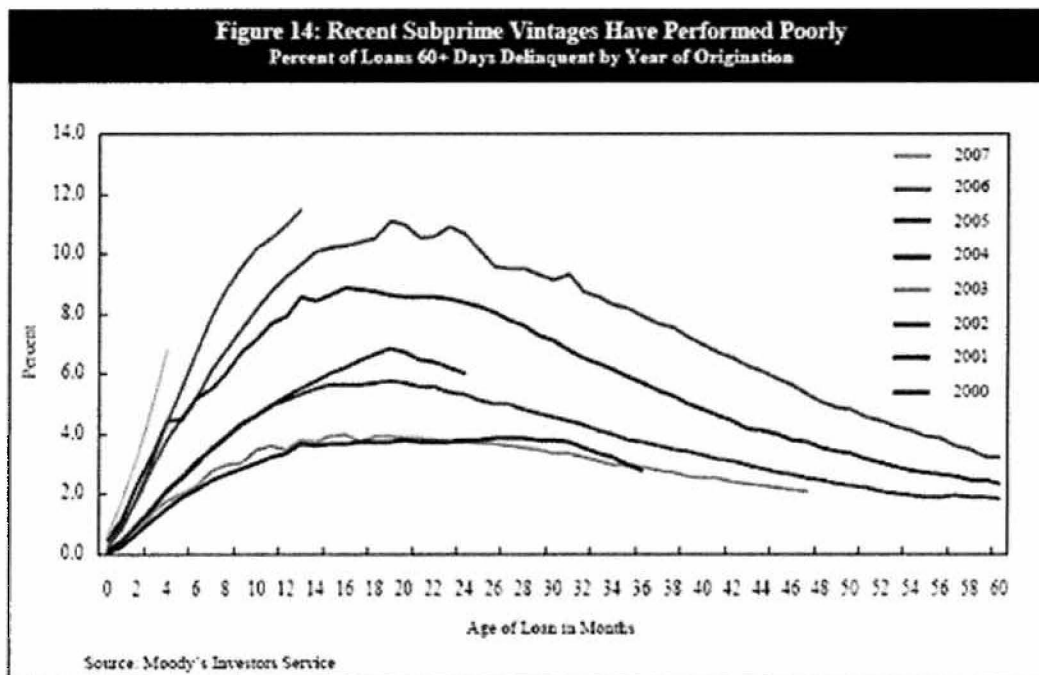
[13]Veiga, Alex. "U.S. Foreclosure Rates Double." Arizona Central 1 Nov. 2007. 6 Mar. 2008
<http://www.azcentral.com/realestate/articles/1101biz-foreclosures01-ON.html>.
[14] "Percent of Subprime Mortgages Defaulting After 60 Months." Chart. The New York Times. 30 Apr.
2008 <http://krugman.blogs.nytimes.com/2007/10/27/some-housing-pictures/>.

As sub-prime borrowers began to default, massive losses were realized by investors in MBSs and the lower tranches of CDOs. Since the sub-prime mortgages were resold countless times and integrated into other investment vehicles such as CDOs it was uncertain which companies were holding these ticking time bomb investments.

Section 1.6 - Shaky Equity Markets

As sub-prime defaults continued to rise, financial markets tried their best to ignore the news and continued buying billions of dollars of CDOs and other mortgage related securities. In 2006, $200 billion in CDOs were issued with an average exposure to sub prime bonds of 70%. It was not until February 2007 that acknowledgement of massive sub-prime mortgage defaults was addressed by investors.

Section 1.7 - Addressing Sub-Prime

As the business community entered the 2007 year, financial markets were experiencing substantial growth. The Dow Jones Industrial Average (DOW) rose from 12,459 to a high of 12,786 between January 1, 2007 and February 20th of that same year.[15] As investors celebrated these gains, sub-prime foreclosures continued to rise. Financial institutions who guaranteed MBS and CDOs did not believe this 'bull' market would end and continued to create these products and

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[15] "Dow Jones Industrial Average." Chart. Yahoo Finance. Yahoo. 08 Mar. 2008
<http://finance.yahoo.com/echarts?s=%5EDJI#symbol=%5EDJI;range=2y>.

provided minimal loan loss capital amounts not seen since 1990.[16] The rapid rise

of market indices would come to an end on February 27th, 2007 as the DOW

would fall 400 points to 12,632, the largest single day drop in 3 years. Many

factors have been cited as the cause of this fall including; slowing growth in

China, warnings from former Federal Chairman Alan Greenspan about a possible

recession, and bloated foreign exchange markets. However the main cause was

worry over sub-prime foreclosures. Financial analysts and some professional

investors acknowledged that rapid foreclosures in the sub-prime market could

affect the secondary mortgage market and losses within investment products

linked to sub-prime mortgages might be realized. Over the next few weeks, the

DOW experienced volatile swings and many investment professionals were

closely studying the sub-prime markets to see if losses were substantial enough to

warrant stock sell offs on the NYSE in the real estate and financial sector. By mid

April 2007, worries over sub-prime losses subsided and the DOW had regained

all losses incurred from the downturn in late February 2007. It was assumed

among investors that the sub-prime losses would have minimal impact on

financial companies' earnings and would be contained. On the contrary, the

secondary mortgage market continued to falter and a former liquid marketplace

for sub-prime related investment products was fast disappearing. By June of 2007,

trading activity of sub-prime MBSs and CDOs significantly dropped and the

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[16] Lien, Kathy. "Dow Down 400 Points." Comtex News Network 27 Feb. 2007: 1-3. Lexis Nexis. Colorado
College Library, Colorado Springs. 9 Mar. 2007. Keyword: Market sub prime.

market for these products dried up within a few weeks.[17] Despite this reality, the

DOW continued its solid growth path and finally broke the 14,000 point marker

on July 19th, 2007. Shortly thereafter, a media announcement would shake up

financial markets in the U.S. and create worry and anxiety among investors not

seen since the recession of 2001.

Section 1.8 - Bear Stearns Collapse

On July 19th, 2007 two hedge funds at Bear Stearns Investment Bank[18]

that had invested heavily in sub-prime mortgage related investment products

announced they were almost worthless. Its 'High-Grade Structured Credit

Enhanced Leverage Fund'[19] was worth $638 million in March, 2007 and realized

substantial losses over the next few months. By mid July, the entire Hedge Fund

was worth nothing. Its other hedge fund, 'High Grade Structured Credit Fund'

was worth $925 million in March, 2007 but also encountered substantial losses

and had lost 91% of its value by mid July. Both funds were highly leveraged and

after realizing losses starting in March 07, large lenders including Merrill Lynch

and JPMorgan Chase demanded collateral for the loans they had given to the two

hedge funds. Without adequate cash reserves on hand, both hedge funds had to

start selling their assets to raise collateral for the lenders. Since the market for

CDOs and MBS had practically stopped, the hedge funds were forced to sell at

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[17]"Current Markit ABX.HE." Markit. Mar. 08. Markit Group. 21 Jan. 2008
<http://www.markit.com/information/products/category/indices/abx.html>.

[18] Bear Stearns is the 5th largest Investment Bank in the United States

[19]Bruno, Joe B. "Hedge Funds Nearly Worthless as Investment Tries to Calm Investors." Associated Press
WorldStream 18 July 2007, sec. B: 1-2. Lexis Nexis. Colorado College Library, Colorado Springs. 07 Mar.
2008. Keyword: Bear Stearns Sub Prime.

large discounts to raise collateral for Merrill Lynch and JPMorgan. By the time

they had raised the collateral for these two banks, the funds were almost

worthless. This news shocked the financial world and many professional investors

began to research the implications of a collapse of the sub-prime market on the

financial sector and the economy as a whole. Despite this news, there was little

information on who owned sub prime afflicted investment products and how

much the sub-prime market woes would extend into the rest of the economy. This

news brought the sub-prime issue back to light and caused a downturn in stock

markets larger than the previous February 2007 downturns. With little knowledge

of who owned these tainted investment products and which companies were

financially involved with the sub-prime mortgage market, investors began a

massive sell off of financial and real estate stocks. On July 19th, the DOW closed

at 14,000, by July 27th; the DOW had fallen 735 points (5.25%) to 13,265[20]. This

6 consecutive day fall was the beginning of many downturns of the 2007 year

caused by the sub-prime mortgage market.

Section 1.9 - Hypothesis

Such great uncertainty in the sub prime market led to wild fluctuations in

the Dow Jones and S&P500 indexes throughout the 2007 financial year. Many

real estate and financial companies' stock prices fell severely. With little

information about the extent of the sub-prime market woes and its integration into

other financial products (CDOs, MBSs) that are owned by public companies,

investors are susceptible to disregarding valuation metrics used in fundamental

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[20]"Dow Jones Industrial Average." Pg. 7

analysis and selling troubled stocks without accurately evaluating the financial situation of that company. To better understand investor behavior and fundamental analysis, a review of relevant literature will be conducted. Concluding that review, empirical research using regression analysis will be conducted to find evidence of fundamental analysis use or irrationality among investors. Following the empirical research section, a review of this paper and future research opportunities will be discussed.

The thesis is organized as follows. Chapter 2 provides a survey on the existing literature of different models and approaches that the investment community uses in picking and valuing investment products. Chapter 2 also reviews relevant literature on behavioral finance and observances of irrational investment behavior by independent studies and research. Chapter 3 follows this up with the basic regression model. In Chapter 3, the variables are discussed and the empirical results are explained. Finally, Chapter 4 concludes the thesis by providing some direction for future research.

CHAPTER II

LITERATURE REVIEW

To receive a better understanding of the effects of the Sub-Prime Market turmoil on stock prices during the July 2007 market downturn, it is important to review related experiments and scholarly articles that will shed light on the investment strategies of investors and theories that explain investor behavior. The following provides a general background to this study and provides methodologies that will be applied to the subsequent empirical model.

Section 2.1 – Investment Strategies

For the last 50 years, mutual fund managers, financial advisors, investment specialists, and other professional investors have tried to accurately predict stock prices and their movements. In often futile efforts, investment managers try to continually beat each other, striving to capture above average returns for their clients and themselves. In an effort to attain this goal, investors have created and developed numerous investment techniques and strategies to accurately predict future stock prices. From predicting future cash flows to

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correlating rises in the stock market to weather events, many investment strategies stretch from the reasonable to the absurd. Despite many attempts by past investment professionals to predict stock market movements by studying the weather or correlating how many times a home run had been hit during Bull Markets, only two investment strategies are regularly used by professional investors in the investment world and are trusted by their clients. These are Fundamental Analysis and Technical Analysis. Both are the two dominating investment analysis strategies used regularly on Wall Street. To understand the ideas and theories behind both strategies, a review of Technical and Fundamental Analysis will be provided.

Sub-Section: 2.1.1 Technical Analysis

Technical Analysis is the study of stock charts and graphs to predict future stock movements. Technical Analysts[1], 'called Chartists', believe past stock price movements are accurate predictors of future stock prices. Originally created by Japanese traders in the 18th century[2], Technical Analysis has developed into a highly used and respected investment strategy. The predicted success of this investment strategy is grounded in the belief that markets are considerably more psychological than logical. It is believed by Chartists that investors conduct trades on the basis of stock price trend directions. If a stock has been rising for the past couple of days, Chartists believe this is a sign of bullishness and warrants a buy

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[1] Malkiel, Burton G. A Random Walk Down Wall Street. New York: W.W. Norton & Company, 2003. 1-396.

[2] Nison, Steve. Japenese CandleStick Charting Methods. 1991. 15-18.

since this trend is expected to continue. Practitioners of Technical Analysis do not study the financials of companies or compare companies within an industry. Within Technical Analysis, all companies are homogeneous and the descriptions and values of the companies do not matter. The important tools of Technical Analysis are graphs and charts of previous stock price movements and the trading volume of that particular stock. Chartists calculate rolling averages, volatilities, and trading volumes to see if a stock is in a growth or reduction phase. Despite strong enthusiasm among chartists for this type of investment strategy, this type of analysis is still only used within a niche group of investors and the overwhelming majority of professional investors use the investment strategy Fundamental Analysis.

Sub-Section: 2.1.2 Fundamental Analysis

In contrast to technical analysis's rejection of company descriptions and financials, practitioners of Fundamental Analysis study a company's financial statements carefully to calculate a fair value[3]. Fundamental Analysis is an investment strategy that analyzes companies' financial reports including income statements, balance sheets, and cash flows to predict a fair value estimate. Nearly 80% of all professional investors use this type of analysis and it has become the staple technique and strategy among professional investors. Not only do users of Fundamental Analysis study the financial statements of a company, but they also review the company's management team and the company's current investments in new products and services. Fundamental Analysis is also used to value

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[3] "A Random Walk Down Wall Street", pg 13

different investment products including Bonds, MBSs, and CDOs. To arrive at a fair value for a company or an investment product related to the company, investment professionals with the collaboration of highly skilled software engineers have created complex stock and market valuation models to accurately determine a fair value. Despite the extreme complexity of many Hedge Fund valuation models, all are a derived from a simple equation called the Gordon Growth Model.[4]

$$P = D *(1 + G)/ (K-G)$$

The Gordon Growth Model calculates an expected dividend (D) multiplied by a growth rate (G) divided by a discount rate (K) (generally cost of equity). After the model is run, a fair price (P) is calculated that can later be manipulated by other models to be compared to that company's stock price. This model is the core component for most stock valuation models used by professional investors. Professional investors also use company financial statements to create valuation ratios. Valuation ratios allow professional investors to more easily compare companies and identify important information. Valuation ratios can determine if a company has relatively large amounts of debt, a high earnings growth prediction, or has excess cash reserves. Some of the most important valuation ratios used by professional investors are:

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[4] Mishkin, Frederic S. Money, Banking, and Financial Market. 8th ed. New York: Pearson Addison Wesley, 2007. 292-299.

Price/Earnings Ratio (P/E)[5] – A highly used and well known valuation ratio used in Fundamental Analysis. This ratio calculates the current share price per share of earnings. Large P/Es generally depict a high earnings growth rate for a company. P/E ratios also demonstrate how much investors are willing to pay for a dollar of earnings. Many investors who use Fundamental Analysis practice a style of investing called Value Investing. In this case, investors believe that the market overlooks some companies and prices them at a discount. Many 'value' investors will invest in companies with low P/Es. Although these companies are not exciting growth oriented firms, value investors believe sooner or later the markets will correct this discount and raise the price of the stock to a fair value.

Earnings per Share Ratio (EPS)[6] – Calculates corporate profit per outstanding share. This ratio is probably one of the most important ratios used to value a company. Many times analysts will use a growth rate of this figure to predict future earnings and future stock prices.

Return On Equity (ROE) – Shows a company's return using the equity investors have invested.[7] ROE helps determine if a company is managing its businesses effectively. A high return on equity can have good implications for management

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[5] "P/E Ratio." Investopedia. Forbes Media. 21 Feb. 2008
<http://www.investopedia.com/terms/f/freecashflow.asp>.

[6] "Earnings Per Share" Investopedia. Forbes Media. 21 Feb. 2008
<http://www.investopedia.com/terms/f/freecashflow.asp>.

[7] "Return on Equity" Investopedia. Forbes Media. 21 Feb. 2008
<http://www.investopedia.com/terms/f/freecashflow.asp>.

but a low one may be a sign of mismanagement. This ratio can also highlight competitive advantages and disadvantages of a company within an industry.

Debt Ratios[8] – The amount of debt on the balance sheets of companies can be portrayed in many different forms including, per share, per equity, etc. These figures provide a good estimation of the outstanding debt a company may hold and is an accurate indicator if a company can stay financially solvent during market downturns. A high debt ratio is an indicator of a lack of financial soundness within a company. For this research's empirical model, a debt ratio will be used.

Cash Flow Ratios[9] – The rate of cash inflows into a company are a useful tool to see if a company can quickly pay off short term debt. Two cash flow ratios will be used in the empirical model – operating cash flow per share (OCF/share) and free cash flow per share (FCF/share).

Fundamental Analysis has been a widely used strategy and tool for investment professionals around the world. It has also been used to value assets and companies for not only market transactions but legal issues and disputes. Since a vast majority of asset managers and other investment professionals use

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[8]"Debt" Investopedia. Forbes Media. 21 Feb. 2008
<http://www.investopedia.com/terms/f/freecashflow.asp>.

[9]"Cash Flow" Investopedia. Forbes Media. 21 Feb. 2008
<http://www.investopedia.com/terms/f/freecashflow.asp>.

this strategy, it can be expected that movements in stock prices can be explained by changes in companies' financials and valuation ratios. This assumption has led many to believe that since valuation metrics are core movers of stock price performance, markets are generally efficient. It is believed that investors will quickly absorb any new financial information, readjust financial ratios and models and buy and sell stocks that would consequently push markets back to a 'fair' value. This logic is supported by many investment professionals and academics and routinely referred to as the Efficient Market Hypothesis. This hypothesis also states that since all information is freely available to all investors, no one can attain an advantage over another and higher than average returns are impossible. This theory emphasizes the overall rationality of investors and their investment decisions based on this symmetry of information.

Despite the belief that markets are efficient and are moved by quick adjustments in a company's financials, a new area of study has arisen in the past two decades that has tried to prove that markets are not fairly valued and that investors can succumb to irrational behavior.

Section 2.2 - Behavioral Finance

Behavioral Finance is the study of investor behavior in the financial world and challenges the accepted assumptions of Economic Utility Theory and the Efficient Market Hypothesis. Behavioral Finance has been used to explain inefficiencies in financial markets and market trends that cannot be explained by

traditional Economic Theory.[10] This subject area has its base in human psychology, particularly cognitive theory. Vast amounts of research in cognitive psychology have reported that humans can display an array of irrational behaviors such as overconfidence and overreaction in certain situations. These psychological studies have also been applied to investors who exhibit these behaviors in their work. Market swings and falls have been studied a great deal and evidence has shown that particular movements in the stock market are a result of irrational behavior due to factors such as overconfidence and overreaction. Although many psychological cognitive behaviors have been used to describe 'unexplainable' situations in the financial world, two behavioral theories are the most suitable and applicable to the stock movements during the Sub Prime Mortgage Crisis; Overreaction Theory and Contagion Theory.

Sub-Section 2.2.1 Theory Based Research

One of the most important ideas concerning investor behavior is overreaction to recent news. Either it be good or bad, many studies have provided evidence that investors overreact in certain environments. The Overreaction Theory states that people over emphasize recent news and disregard long term averages or trends. In a famous study by Werner F.M. De Bondt and Richard Thaler (1985), the authors tested the Overreaction Hypothesis in relation to stock market returns between January 1926 and December 1982.

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[10]Ritter, Jay R. "Behavioral Finance." Pacific Basin Finance Journal 11 (2003): 1-12. 8 Mar. 2008 <http://bear.cba.ufl.edu/ritter/publ_papers/Behavioral%20Finance.pdf>.

Sub-Section 2.2.2 - The Overreaction Theory

Bondt and Thaler (1985) Hypothesized that if the Overreaction Hypothesis was correct, portfolios of stocks that had below average returns for at least three years would attain above average returns the following three years.[11] Also, portfolios with above average returns for the three previous years would then realize below average returns the next three years. Bondt and Thaler recorded monthly returns of 35 stock portfolios from 1926 to 1982. After completing their empirical research, it was found that the results were consistent with Bondt and Thaler's hypothesis. Loser portfolios (portfolios that had below average returns for the previous three years) outperformed the market by 19.6%, 3 years after the portfolio was formed. This was also true for winner portfolios, which underperformed the market by 5%, 3 years after the portfolio was formed. Also surprising is that the majority of returns or losses that were realized occurred two years after the portfolios were formed. After the first year of portfolio formation, the difference in portfolio returns was a mere 5.6% while the final difference after 3 years was 24.6%.[12] This groundbreaking research provided evidence of stocks being unfairly valued. This research provided evidence against the Efficient Market Hypothesis and the assumption that stocks are fairly valued. Although this work was groundbreaking in understanding investor behavior, it was still uncertain how investors reacted to particular crisis and events that may invoke

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[11]De Bondt, Werner F., and Richard Thale. "Does the Stock Market Overreact?" Journal of Finance XL (1985): 793-805. 15 Nov. 2007 <n/a>.

[12] "Does the Stock Market Overreact?" pg 19

irrational behavior. Another study by Simon Hussain in 2006 addressed this question and found further evidence of overreaction in financial markets.

In the investment world, Security Analysts research investment products and provide their advice and recommendations for a fee. Although many brokerage and asset management companies have their own security analysts to pick investments, many investment firms listen closely to independent security analyst to receive a better perspective of the feelings and attitudes amongst the investment community towards a particular investment. Although security analysts are well regarded and highly valuable information providers for many investors, evidence has shown that these experts may also be prone to overreacting in certain situations. Simon Hussain's 2006 study, "Security analysts and bad news, a note on 9/11" provided evidence that security analysts that covered airline stocks overreacted after the September 11th, 2001 terrorist attacks.[13] Using Earnings-per-share (EPS) forecasts from airline security analysts between December 2001 and 2002, Mr. Hussain compared analysts' earnings forecasts before and after 9/11 with the real earnings results revealed later. After running regressions on analyst forecasts, it was found that there was a significant increase in EPS forecast errors from security analysts following the 9/11 attacks. Even more importantly, EPS forecasts returned to pre 9/11 average forecast error rates by the end of 2002. This study provided significant evidence of overreaction among investment professionals after a significant news item was announced

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[13] Hussain, Simon. "Security Analysts and 'Bad News': a Note on 9/11." Applied Financial Economic Letters 2 (2006): 251-256. 12 Nov. 2007 <http://www.informaworld.com/smpp/section?content=a749268209&fulltext=713240928>.

concerning their industry of study. If significant news events like the 9/11 attacks produced over reactive and irrational behavior among investment professionals, it is plausible a similar situation may have occurred with the Sub Prime Mortgage Crisis. As studies have shown that overreaction in the markets may have taken place, there is substantial evidence that another cognitive behavior may have had an impact on financial markets in 2007.

Sub-Section 2.2.3 Contagion Theory

Along with Overreaction Theory, Contagion Theory has been a research focal point for many economists and has been studied with great detail in connection to investing. Although this theory, created and developed by notable sociologists and psychologists including Gustave Le Bon and Sigmund Freud, has primarily been applied to describe social behavior among human crowds, Contagion Theory has been successfully applied to studies in behavioral finance. Contagion Theory states that if an idea is exposed enough times to a society, it becomes part of the culture. This relates to investments since a very popular topic in the news may affect sectors of the economy that are perceived to have a connection to the news item.

A study by Aigbe Akhigbe, Jeff Madura, and Ann D. Martin in 2005 analyzed the effect of news reports of the fall of the energy company, Enron, on other intra-industry oil and gas companies. The study was conducted to determine if investors lowered valuations of related oil and gas companies during the Enron

scandal of 2001[14]. The authors collected data on oil and gas firms including information on prior business relationships with Enron and if other oil and gas companies had similar accounting procedures to Enron. These variables were then regressed against the stock price changes of the oil and gas companies. After the empirical research was conducted, evidence was found that oil and gas companies realized below average returns during the Enron Scandal. Overall, it was found that the accounting scandals at Enron had significant negative effects on other oil and gas industry. Companies that had conducted business with Enron, offered similar products and services, and had similar accounting procedures were negatively affected by the collapse and eventual bankruptcy of Enron. These results are a solid example of contagion behavior within an industry. Since news reports were being released about the inaccurate financial reports of Enron and their other illegal activities, investors began to believe that oil and gas companies with similar businesses and accounting procedures would also see substantial stock loss. The fear of accounting irregularities pushed by the press resulted in the fall of oil and gas stock prices to 'deep value' territories in 2001. This investor behavior seen during this time period does not represent logical behavior but an inability among investors to clearly analyze a situation without being effected by the popular press. Since highly publicized financial news items had affected the investment strategies of oil and gas investors during this time period, it can also be assumed that this type of investment behavior could be seen during the Sub Prime Mortgage Crisis.

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[14]Akhigbe, Aigbe, Jeff Madura, and Anna D. Martin. "Accounting Contagion: the Case of Enron." Journal of Economics and Finance 29 (2005): 187-202. Nov. 2007 <www.academicsearchpremier.com>.

In another work by Elaine Loh in 2006, evidence of contagion behavior was found among investors during the Severe Acute Respiratory Syndrome (SARS) epidemic in South East Asia[15]. In 2003, the SARS virus was infecting hundreds of people in South East Asia. Fears spread that SARS could spread outside of South East Asia into other parts of the world by plane.[16] In this study, Elaine Loh studied stock price movements of airlines during the height of media attention on this subject in 2003. In her findings, it was found that airline stock prices quoted on the Hong Kong, Singapore, Canadian, and Thailand exchanges experienced higher than average volatility and lower than average returns in 2003. Elaine Loh concluded that investors were affected by the highly publicized news coverage of the virus.

Sub-Section 2.2.4 – Asymmetric Information

Investor behavior is also affected when there is little information available concerning an economic or financial problem. This is very apparent in relation to the Sub-Prime Mortgage crisis since little information about who owned sub-prime related investment products is available. This problem of asymmetric information in the marketplace was studied by Frank Zhang (2006) who hypothesized that stock prices would be more volatile when there was

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[15] Loh, Elaine. "The Impact of SARS on the Performance and Risk Profile of Airline Stocks." *International Journal of Transport Economics* 33, no. 3 (10 2006): 401-422.

[16] Starmer-Smith, Charles, and Sara Macefield. "SARS; Thousands Cancel Holidays." The Daily Telegraph 12 Apr. 2003, sec. Pg. 04: 1. LexisNexis. Colorado College Library, Colorado Springs. 10 Mar. 2008. Keyword: Sars Airplane Market.

limited information concerning a negative news announcement.[17] By regressing the momentum of a select group of stocks between 1983 and 2001 against variables such as volatility, amount of news coverage, and security analysts' forecasts, Mr. Zhang (2006) was able to conclude that stock prices fluctuated at higher levels when there was greater uncertainty and minimal information available. Zhang (2006) observed that when there was information uncertainty with a news item regarding a company, prices drifted more aggressively than when their was information certainty in a news item.

After careful review of investment strategies and investor behavior, it is clear that these two areas of study have conflicting views on the rationality of investors and the causes of price movements in financial markets. The Sub-Prime Mortgage crisis has provided an ample opportunity for researchers, academics, and investment professionals to continue their research to provide answers to many of the unanswered questions that have plagued the financial sector. While overreaction, contagion thought, and uncertain information regarding news items have affected markets in certain time periods and industries, it is unclear if these same psychological behaviors will have had an effect on investors of financial and real estate companies during the sub-prime mortgage debacle of 2007. To better understand the effects of investor behavior during this downturn in 2007 and to see if investors were continuing to use fundamental analysis, an empirical model

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[17] Zhang, X. Frank. "Information Uncertainty and Stock Returns." *Journal of Finance* 61, no. 1 (02 2006): 105-137.

has been created to answer this question. The Empirical model and its results are further explained in Chapter 3.

CHAPTER III

EMPIRICIAL MODEL

To analyze investors' behavior during the financial downturn of the

summer of 2007, a regression model will be used in this chapter to determine if

investors used fundamental analysis valuation techniques to determine stock

valuations of financial companies. Many downturns in the S&P 500 and the Dow

Jones Industrial occurred from July to the end of 2007 but the most noticeable and

apparent was the first downturn that began on July 20th, 2007. This downturn was

caused by the announcement of the two Bear Stearns Hedge Funds that had lost

nearly all of its assets and consequently the DOW index would fall for 6

consecutive days. It is during this time period that my hypothesis will be tested to

determine if investors were using fundamental analysis to revalue financial stocks

or if their decisions were affected by the news of the collapse of the two Bear

Stearns Hedge Funds.

This chapter is organized as follows. Section 3.1 introduces the regression

model and discusses the variables. It also provides the data sources. Section 3.2

discusses the a priori expected signs of the variables. Section 3.3 presents the

results for different industries and the corresponding explanations. Finally, section 3.4 provides the composite results after combing the companies into different industries.

Section 3.1 – Regression Variables

The set of regressions ran in this chapter are shown below.

Sub-Section 3.1.1 Regression Equations

1.   Savings and Loans regression-

Stock Price Difference = a_0 + a_1(FCF) + a_2(OCF) + a_3(DEBT) + e_t

2.   Securities and Brokerage regression –

Stock Price Difference = a_0 + a_1(CURRENCY) + a_2(EQUITY) + a_4(FIXEDINCOM) + a_5(ONLINERETA) + a_6(INSTBROK) + a_7(MARKETMAK) + a_8(RETAILBROK) + a_9(FCF) + a_{10}(OCF) + a_{11}(DEBT) + e_t

3.   Banks –

Stock Price Difference = a_0 + a_1(MORTGBANK) + a_2(REGIONAL) + a_3(MONEYCENTER) + a_4(SUPERREGIONAL) + a_5(ONLINEBANKING) + a_6(FCF) + a_7(OCF) + a_8(DEBT) + e_t

4.   Asset Management –

Stock Price Difference = a_0 + a_1(FCF) + a_2(OCF) + a_3(DEBT) + e_t

5. <u>Real Estate</u> –

Stock Price Difference $= a_0 + a_1(FCF) + a_2(OCF) + a_3(DEBT) + e_t$

6. <u>Lending</u> –

Stock Price Difference $= a_0 + a_1(FCF) + a_2(OCF) + a_3(DEBT) + e_t$

7. <u>Composite1</u> –

$a_0 + a_1(\text{more than } 1) + a_2(\text{more than } 2) + a_3(FCF) + a_4(OCF) + a_5(DEBT) + e_t$

8. <u>Composite2</u> –

$a_0 + a_1(\text{more than } 1) + a_3(FCF) + a_4(OCF) + a_5(DEBT) + e_t$

Sub-Section 3.1.2 Dependent Variables

To see if fundamental analysis was being used, I collected the stock price difference between July 19th, 2007 and July 27th, 2007 for 111 financial companies picked at random. The 111 companies were then grouped by industry including; Securities and Brokerage, Savings and Loans Institutions, Banks, Lending, Real Estate, and Asset Management. The change in stock price of these companies is the dependent variable in the regression analysis.

Sub-Section 3.1.3 Independent Variables

To see if investors were not using fundamental analysis and were relying on other methods to buy and sell stocks during this time period, dummy variables indicating how many industries the financial companies were involved in were used. Sub-industry categories were formed within the Securities and Brokerage and Bank Industry categories and were added as dummy variables to those two regressions. Within the Securities and Brokerage regression, I added the following sub-industry dummy variables;

1. CURRENCY – Indicates if a company was involved in providing and trading futures, options, and other contracts on the open market.

2. EQUITY – Indicates if a company was involved in equity trading and related services

3. FIXEDINCOM – Indicates if a company was involved in providing and trading Corporate, Government, and municipal bonds

4. ONLINERETA – Indicates if a company was involved in providing securities trading over the internet or telephone

5. INSTBROK - Indicates if a company was involved in providing equities, fixed income, and other investment products to large capital clients

6.   MARKETMAK - Indicates if a company was involved in

providing trade clearing, trade settlement, and acting as a

middleman between buyers and sellers.

7.   RETAILBROK - Indicates if a company was involved in

providing trade execution, investment advice, and research

Within the Bank Industry regression, the following sub-industry dummy

variables were used;

1. MORTGBANK – Indicates if a company provides consumer

   mortgages, mortgage brokerage, and mortgage investment

2. REGIONAL – Indicates if a company is limited to small regions in the

   U.S. and provide simple banking services such as deposits; loans,

   leases, mortgages, and credit cards; ATM networks; securities

   brokerage; investment banking; insurance sales; and possibly mutual

   funds

3. MONEYCENTER – Indicates if a company has business operations

   nationwide and/or international and provides many banking services

   including deposits; loans, leases, mortgages, and credit cards; ATM

   networks; securities brokerage; investment banking; insurance sales;

   and mutual fund and pension fund management.

4. SUPERREGIONAL – Indicates if a company provides multi-state

   basis banking services such as deposits; loans, leases, mortgages, and

credit cards; ATM networks; securities brokerage; investment

banking; insurance sales; and mutual funds and pension funds

management.

5. ONLINE BANKING – Indicates if a company provides services over

the internet

These sub industry dummy variables will give greater insight into the

possibility that investors were 'guessing' which industries may be affected by

sub-prime losses instead of using fundamental analysis.

Sub-Section 3.1.4 – Composite Regressions

Along with regressing individual industries, all examined companies will

be combined together in the Composite Regression. This will enable an analysis

of the effects of fundamental analysis and the sub-industry dummy variables

across the entire financial sector. Within the Composite Regression, the dummy

variable, *more than 1*, states that the financial company in question was involved

in more than one of the industries named above. The second dummy variable,

more than two, states that the financial company in question was involved in more

than 2 industries. These dummy variables will give greater insight into the

possibility that investors were 'guessing' which industries may have been affected

by sub-prime losses instead of using Fundamental Analysis. To see if investors

were using Fundamental Analysis, I have assigned the following Fundamental

Analysis variables for each regression;

Operating Cash Flow/share (*OCF*) - This calculates cash flow from the operations of the company on a per share basis. Operating Cash Flow is the amount of money available to develop products, merge or acquire companies, pay dividends, and lower the debt burden. This is more useful than earnings since earnings can be manipulated through a variety of accounting techniques and cash flow is a better indicator of financial viability. This is a regularly used ratio among asset managers, traders, and other investors for fundamental analysis[1].

OCF = EBIT + Depreciation - Taxes

Free Cash Flow/share (*FCF*) - Free cash flow is operating cash flow minus capital expenditures. This ratio works the same as operating cash flow but subtracts cash flow that it used to continue the companies year over year growth (capital expenditures)[2].

Net Income
+ Amortization/Depreciation
- Changes in Working Capital
- Capital Expenditures
= Free Cash Flow

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[1] "Free Cash Flow." Investopedia. Forbes Media. 21 Feb. 2008
<http://www.investopedia.com/terms/f/freecashflow.asp>.
[2] "Operating Cash Flow." Investopedia. Forbes Media. 21 Feb. 2008
<http://www.investopedia.com/terms/o/operatingcashflow.asp>.

Debt/Equity (*Debt*) - This is a measure of a companies debt load and how much of its growth and financed by debt or equity of the business. If the Debt/equity ratio is high, this means that the growth of the company was funded by debt and leaves the company in a more dire financial position. This is a good financial ratio to use since many investors during the tested time period will be looking to see if companies have the ability to pay off future debt incurred by sub prime losses[3].

$$= \frac{\textbf{Total Liabilities}}{\textbf{Shareholders Equity}}$$

These are fundamental analysis ratios that are used to determine financial viability of a company and will test to see if investors were using fundamental analysis during this time period.

The difference in stock prices from July 19th – July 27th for each company was found using Yahoo Interactive charts. Data on sub-industries was found at Hoovers.com which provides industry information on thousands of companies. Lastly, the FCF/share, OCF/share, and Debt/Equity data was found at Morningstar.com which provides investment advice and figures on a multitude of investment products.

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[3] "Debt Equity Ratio." <u>Investopedia</u>. Forbes Media. 21 Feb. 2008
<http://www.investopedia.com/terms/d/debtequityratio.asp>.

Section 3.2 - Theoretical Expectations

The null Hypothesis (H$_o$) states that each variable including, CURRENCY, EQUITY, FIXEDINCOM, ONLINERETA, INSTBROK, MARKETMAK, RETAILBROK, MORTGBANK, REGIONAL, MONEYCENTER, SUPERREGIONAL, ONLINE BANKING, *more than 1*, more *than 2, FCF, OCF*, and *Debt* will not influence stock price. The alternative hypothesis (H$_1$) states that each variable including, CURRENCY, EQUITY, FIXEDINCOM, ONLINERETA, INSTBROK, MARKETMAK, RETAILBROK, MORTGBANK REGIONAL , MONEYCENTER , SUPERREGIONAL, ONLINE BANKING, *more than 1*, more *than 2, FCF, OCF*, and *Debt* will influence stock price. It is expected that the sub industry dummy variables including; CURRENCY, EQUITY, FIXEDINCOM, ONLINERETA, INSTBROK, MARKETMAK, RETAILBROK, MORTGBANK, REGIONAL, MONEYCENTER, SUPERREGIONAL, ONLINE BANKING will be negatively affecting stock price. This is due to the fact that investors may have been looking for certain industries that may be the most affected by sub-prime mortgage problems. This 'targeting' by investors would result in a negative effect on stock prices since that sub-industry was assumed by investors to be connected to sub-prime mortgage losses. It is also expected that the dummy variables, *more than 1, more than 2* will be negatively correlated to stock price. This is due to the presumption that the more industries a company is exposed to in the financial sector, the larger the exposure to a possible failing industry linked to sub-prime mortgages is apparent. Quick downturns in markets can also result in minimal

time for research, forcing professional investors to not carefully research large companies with businesses in multiple industries and unreasonably sell or buy those stocks.

It is also expected that *FCF* and *OCF* will have a positive effect on stock price and *Debt* to have a negative effect. If professional investors were using fundamental analysis, a large *Debt* would be a burden to the overall financial sustainability of the company and increase the chance of default or bankruptcy. This results in a negative effect on stock prices. Also, a high *FCF* and *OCF* is a sign of solid cash flow and increases the ability of the company to receive loans, pay off debts, and cover losses caused by the sub-prime market woes. A rise in FCF and/or OCF reflects the fact that more money is available for the company and this would convince investors of their financial soundness. This results in a positive effect on stock prices. Next the regression results are shown in section 3.

Section 3.3 – Industry Focused Regression Results[4]

Table 3.1

Regression – Saving and Loan Industry Stock Price Change N=33

Included Observations = 31, Excluded Observations = 2 after adjusting endpoints

	c	FCF	OCF	Debt	R^2	F-Stat
stock price difference	-6.595***	0.465	0.096	0.321	0.134	1.392
	-4.803	0.963	1.568	0.505		

*** indicates significance at 0.01, ** indicates significance at .05, and * indicates significance at 0.10

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[4] Results shown are coefficients of t-statistics

Table 3.2

Regression – Securities and Brokerage Industry Stock Price Change N=31

Included Observations = 21, Excluded Observations = 8 after adjusting endpoints

	c	CURRENCY	EQUITY	FIXEDINCOM	ONLINERETA	INSTBROK
stock price difference	-6.966***	-4.859	-2.480	-2.471	-5.648	4.514
	-2.803	-1.022	-0.338	-0.311	-1.597	1.183

MARKETMAK	RETAILBROK	FCF	OCF	Debt	R²	F-Stat
5.502	-0.429	0.550	0.025	-0.162	0.319	0.468
0.461	-0.131	1.468	0.234	-0.375		

***indicates significance at 0.01, ** indicates significance at .05, and * indicates significance at 0.10

Table 3.3

Regression – Bank Industry Stock Price Change N=52

Included Observations = 48, Excluded Observations = 4 after adjusting endpoints

	c	MORTGBANK	REGIONAL	MONEYCENTER	SUPERREGIONAL
stock price difference	-9.836***	-0.142	4.468	3.251	1.951
	-1.805	-0.056	0.885	0.534	0.349

ONLINEBANKING	FCF	OCF	DEBT	R²	F-Stat
-7.681*	0.167	0.092**	0.049	0.277	1.868*
-1.862	0.560	2.094	0.158		

*** indicates significance at 0.01, ** indicates significance at .05, and * indicates significance at 0.10

Table 3.4

Regression - Asset Management Industry Stock Price Change N=31

Included Observations = 27, Excluded Observations = 2 after adjusting endpoints

	c	FCF	OCF	Debt	R²	F-Stat
stock price difference	-7.455***	0.299	0.036	0.005	0.105	0.781
	-7.164	1.376	1.032	0.026		

*** indicates significance at 0.01, ** indicates significance at .05, and * indicates significance at 0.10

Table 3.5

Regression – Real Estate Industry Stock Price Change N=31

Included Observations = 22, Excluded Observations = 8 after adjusting endpoints

	c	FCF	OCF	Debt	R²	F-Stat
stock price difference	-5.338***	-0.131	0.000	-0.711	0.193	1.438
	-2.225	-0.253	0.003	-1.477		

*** indicates significance at 0.01, ** indicates significance at .05, and * indicates significance at 0.10

Table 3.6

Regression - Lending Industry Stock Price Change N=31

Included Observations = 28, Excluded Observations = 3 after adjusting endpoints

	c	FCF	OCF	Debt	R²	F-Stat
stock price difference	6.463	0.527	0.064	0.021	0.120	1.100
	4.157	1.358	1.407	0.051		

*** indicates significance at 0.01, ** indicates significance at .05, and * indicates significance at 0.10

The results to the industry regressions are mixed. The Lending, Real Estate, Securities and Brokerage, Asset Management, and Saving and Loan industries all had insignificant F- stat values and insignificant t-values for each variable. Insignificant variables in these industries included *FCF*, *OCF*, *Debt*, CURRENCY, EQUITY, FIXEDINCOM, ONLINERETA, INSTBROK, MARKETMAK, and RETAILBROK. These insignificant results are largely due to a reduced sample size. On the other hand, the Bank Industry results were significant with an F-stat of 1.868, significant within the .1 level. Within the Banking Industry Regression, ONLINEBANKING was significant at the .1 level with a coefficient of -7.681. This negative sign is in accordance with the theoretical expectations stated prior. OCF was significant at the .05 level with a

coefficient of .092. The banking results provide evidence that investors were

predicting large losses for companies with online banking operations and were

possibly using fundamental analysis due to the significance of the OCF variable.

Section 3.4 – Composite Regression Results

Table 3.7

Regression – Composite1 Financial Stock Price Change N=111

Included Observations = 85, Excluded Observations = 26 after adjusting endpoints

	c	More than 1	More than 2	FCF	OCF	Debt	R^2	F-Stat
stock price difference	8.310***	3.551**	-2.510	0.337*	0.051*	-0.118	0.159	2.978**
	-6.797	2.317	-1.496	1.872	1.840	-0.828		

*** indicates significance at 0.01, ** indicates significance at .05, and * indicates significance at 0.10

Table 3.8

Regression - Composite2 Financial Stock Price Change N=111

Included Observations = 85, Excluded Observations = 26 after adjusting endpoints

	c	More than 1	FCF	OCF	Debt	R^2	F-Stat
stock price difference	8.275***	2.547*	0.054*	0.320*	-0.122	0.135	3.114**
	-6.718	1.835	1.947	1.765	-0.850		

*** indicates significance at 0.01, ** indicates significance at .05, and * indicates significance at 0.10

The Composite regressions reveal more significance among the variables

but the results are mixed and it is not conclusive if investors used fundamental

analysis in their investment strategies between July 19th and July 27th. In

Composite1, The industry dummy variable *More than 1* produced significant

results at the .05 level but the companion industry dummy variable *more than 2*

was insignificant. Although *more than 2* was insignificant, its coefficient was negative, as was expected. *More than 1* was unexpectedly positive and will be later discussed in the conclusion. In regards to the fundamental analysis variables *FCF*, *OCF*, and *Debt*; the cash flow variables were positive and were significant at .1 level. *Debt* on the other hand was negatively correlated but was insignificant. This is again in accordance with a priori expectations. The overall regression represented by the F-stat was significant at the .05 level. In Composite2, the industry dummy variable *More than 1* produced significant results at the .1 level and had a positive coefficient of 2.547. *More than 1* was again unexpectedly positive and will be later discussed in the conclusion. In regards to the fundamental analysis variables *FCF*, *OCF*, and *Debt*; the cash flow variables were positively correlated and were significant at .1 level. *Debt* on the other hand was negatively correlated but was insignificant. The overall regression represented by the F-stat was significant at the .05 level. The results from the composite regressions supports the hypothesis that fundamental analysis was used in investor's analysis and research during the 2007 financial year.

CHAPTER IV

CONCLUSION

Amidst the market turmoil of the 2007 financial year, the Sub Prime Mortgage collapse is seen by investment professionals and the popular press as the main cause of the financial markets volatility. Rapid default rates have lowered the ability of homeowners to spend, thereby reducing economic growth in the United States. This presumption has led to a rapidly declining stock market, a significant rise in the unemployment rate, and predictions from economists that a future recession may be looming. Economists are wary that the mortgage meltdown may trickle down to other sectors of the U.S. economy, plunging the country into a recession. The most challenging aspect of this financial and economic downturn has been the lack of information available regarding the ownership of investment products that have been linked to sub-prime mortgage losses. This situation has made it difficult for investors to quickly and accurately value financial and real estate companies that may incur these losses. This situation may have had drastic effects on the use of fundamental analysis by investors and may have led to irrational trading practices by investors. In accordance to the Overreaction Theory and the Contagion Theory, humans will

overreact or act irrationally in certain situations. Previous studies referencing

these two theories have observed this behavior among investors during volatile

market situations and similar irrational behaviors may have occurred during the

sub-prime market turmoil. The empirical model in this research was used to

receive a better understanding of investment behavior during the stated testing

period and to see if investors were continuing to use fundamental analysis or had

overreacted and sold financial and real estate stocks based on assuming which

industries would be affected by Sub-Prime Mortgage losses.

The results provided interesting information on investment behavior

during this time period but did not answer all questions in regards to rational or

irrational behavior among investors. After running all 6 industry focused

regressions, ONLINEBANKING and OCF was found to be significant within the

banking industry. As was expected, OCF had a positive impact on stock prices

and companies with ONLINEBANKING businesses were greatly devalued by

investors. ONLINEBANKINGs devaluation among investors may be seen as

indication of the excessive risk this sub-industry may have. If investors became

overly risk averse during this time period, it may be in part due to the recollection

of the dot come and other 'online' companies' devaluations in 2001. This may

have spurred fear that the value of financial companies with online businesses

may also decline. In the composite regressions which combine all the companies,

there is more clear evidence of investors using fundamental analysis but is not

conclusive. OCF and FCF were significant with expected positive coefficients. On

the other hand, DEBT/EQUITY was insignificant providing evidence that

investors may have been looking at cash flows of companies but not the debt

loads. Although DEBT was insignificant, it did have a negative coefficient which

was predicted in the expectations section. Another surprising result was the *more*

than 1 variable. Despite prior assumptions that companies with more than one

industry would have a greater chance of being exposed to a sub-prime afflicted

industry, the result was significant and had a positive effect on stock price. In

retrospect, investors may have thought companies that were involved in more

industries would be more diversified and more able to handle downturns in the

financial markets. Also, companies involved in more industries may be trusted

more than a smaller company since larger companies have the advantage of

receiving loans and getting aid from the Federal Reserve more effectively and

easily than smaller companies. This results in a smaller default risk and less

overall risk compared to smaller companies.

Throughout the data collection and research process, many challenges

were encountered. Since the Sub-Prime Mortgage Market downturns occurred

very recently, little empirical research had been conducted. Major sources of

information on the Sub-Prime Mortgage Market were provided by newspapers

and periodicals that had analysts trying to explain the situation. Also challenging

was the fact that this situation is ongoing and a conclusive end to the Sub-Prime

issues has not been resolved. Efforts by the Federal Reserve and the Federal

Government to tighten U.S. mortgage lending rules will just be the beginning of

an onslaught of investigations and reform. Most challenging was collecting data on the subject matter. Since there was still little information available on the Sub-Prime Market at the time of this writing, it was difficult to collect a large enough data set to successfully run regressions. It was also challenging to find variables with sufficient amounts of data to test irrationality among investors. Many indirect methods had to be taken to achieve this but a clear numerical value for irrationality is not possible. Fundamental Analysis ratios were also challenging since many different investment research firms calculated these ratios in different ways. One Investment research firms P/E may be different from anothers depending on what they included in the earnings denominator. Also challenging was the differences in firm numbers among the industries. To run successful regression, the companies had to been incorporated and its shares traded on a large exchange (NYSE). Most industries had enough publicly traded companies to attain this goal but a few industries were predominantly privately owned and having sufficient numbers of companies within an industry group to be regressed successfully was sometimes not possible. Many of the insignificant variables in the Industry Regression may be due to this fact. Many challenges were encountered but enough information was available to run a few simple regressions that were able to shed light on the hypothesis in question.

Many future research opportunities are available to expand on this research. As financial markets stabilize and more information is publicly available regarding these investment products, further tests of the Contagion and

Overreaction Theory can be conducted. Regression analysis can be conducted on other market downturn periods and compared among them to receive a better understanding of investment behavior throughout the crisis. Also, as more information is provided, more variables can be added to test investment behavior including stock momentum figures, number of news articles regarding sub-prime mortgages for each company, and security analyst forecast errors. It is expected that continued research in fundamental analysis and investment behavior will be continued and this period in financial history will be a great testing subject for future research.

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