A Time Series Study on Marvel from 2000 - 2009: Marvel's Movies Impact Relative to Stock Price

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Abstract: Marvel studios have provided an interesting study for many business students particularly generating more than $1.5 billion box office receipts for the movie "Avengers" last 2012. Disney bought Marvel for $4.24 billion and the question arises from the valuation of the company relative to the acquisition price. The study focuses on Marvel Entertainment's impact from movie releases relative to stock price. A time series analysis was used in gathering Marvel's daily stock price changes from 2000 – 2009. This was also used in parallel to 20 movies released by Marvel within that time period. The behavior of the market was examined using the GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model and the EWMA (Exponentially Weighted Moving Average). A linear regression was used in testing the hypothesis on whether gross sales of movies and movie release (development, pre-production, production, post-production and release) have any significant to changes in stock price. GARCH (1,1) was used to measure the outliers for the signaling effect relative to huge changes on the time series data. The data results provided no empirical evidences due to relatively large p- values; however the spike of increase in changes were identified due to the release of Spider- Man 2 in 2004 and Iron Man in 2008. The conclusion of the study reflected on the impact Marvel has on mainstream Hollywood perhaps not on the valuation, but the future business earnings it may generate in the next decade.

1. INTRODUCTION

"*You become part of a bigger universe, you just don't know yet.*" – Col. Nick Fury

A plethora of Marvel characters have made it to the big screen whether it is Spider-Man spinning webs to Wolverine unsheathing his claws to Iron-Man hovering above the skies to Captain America throwing his mighty shield. Did you ever wondered how it all begun and how interesting would it be to study the Marvel phenomenon? How long can they sustain their box office success? Each time they release a movie does it really affects the company valuation?

There are relatively few who do study a creative industry like Marvel Entertainment and perhaps Disney saw the potential to capitalize on that. Disney group of companies bought Marvel for $4.24 billion with the approved merger of both companies. Essentially Marvel existing shareholders received $30 valuation or about 0.745 Disney shares for each Marvel share they owned. In 2010, the company was officially delisted from the New York Stock Exchange with its ticker MVL no longer trading in the stock market.

Blade was the very first to be released when it was licensed by New Line Cinema. It allowed other studios to license Marvel characters to the big screen. 20th Century Fox gambled on the *X-Men* in 2000 when Marvel's financials were in a doldrums. This allowed them to secure a nexus of contracts in having movie rights to the *X-Men* group in perpetuity as long as they keep on producing on a timely interval from two to three years from the last movie. The gamble paid off and Fox continues to produce them up to this day with *X-Men: Apocalypse* in 2017. *Spider-Man* followed in 2002 with Sony Columbia and had the same contract with Fox.

Each movie tells a story, but what is the story behind the movie story? Do Marvel stocks increase for each Marvel movie announcement or there is simply no significance at all?

2. HISTORICAL BACKGROUND OF THE STUDY

Marvel Comics originally started as Timely Publications in 1939 when it was founded by Martin Goodman along with his brother Abraham Goodman. Their first product was *Marvel Comics* # 1 that sold over 800,000 copies. Their best seller was *Captain America* Comics # 1 that sold over 1 million copies during the onset of World War II.

After the War, a downward trend occurred for the superhero genre and replaced by others from crime, drama, horror, western and more that resulted to the transition of Timely into Atlas Comics. The 1950s Atlas Comics had massive layoffs and title reduction due to the loss of their distribution network with American News Company. Hence they were force to go to their competitor Independent News that is owned by National/DC Comics for distribution.

The 1960s brought back Marvel Comics under the leadership of Stan Lee who rejuvenated the franchise in making the Marvel Comics trademark stamp on their comic books. Their first major breakthrough was the publication of *Fantastic Four* and it heralds the start of the Silver Age with the introduction of other Marvel characters notably the *Hulk, Daredevil, X-Men, Spider-Man, Iron-Man, Avengers, Doctor Strange* and more.

In 1968, Martin Goodman sold Magazine Management Corporation with subsidiaries like Marvel Comics and all of his publishing businesses to Perfect

Film & Chemical Corporation (Cadence) owned by Martin S. Ackerman. He remained with the company as publisher until 1972 when he was replaced by his son Charles "Chip" Goodman. Cadence also owns DePatie-Freleng Enterprises (DFE Films) and later incorporated as Marvel Productions in 1981 with David DePatie as president and CEO until 1984 wherein he was replaced by Margaret Loesch.

In 1986, Cadence sold Marvel Entertainment Group to New World Pictures. *Howard the Duck* was the only license movie in 1986 and actual production was made for *Punisher* in 1989. In 1989, New World Pictures (later New World Entertainment) has financial trouble and was forced to sell Marvel Comics to Ronald Perelman's group of investors under the Andrews Group for $82.5M. Andrews Group's parent company is MacAndrews & Forbes. Ronald Perelman later acquired New World Pictures and absorbed Marvel Productions as well.

In 1991, Marvel Entertainment Group went public with 40% of their stock and forward $40M proceeds to the Andrews Group. This led to the purchase of Fleer by Marvel for $265M in 1992. The following year, Marvel Entertainment Group acquired Toybiz with 46% ownership in exchange for a perpetual royalty free exclusive in the toy production of Marvel Characters. Avi Arad joined Toybiz with 10% ownership after the deal to manage the business, while the rest of ownership still falls on Isaac Perlmutter. Avi Arad also founded Marvel Films in 1993 by becoming the President and CEO.

In 1996, Marvel experienced the comic book bubble and massive layoffs occurred despite earnings made from licensing. Corporate management struggle occurred between the Perelman/Andrews Group and Perlmutter/Toybiz group with Carl Icahn joining the fray for a three way dog fight. Perelman filed bankruptcy for the company, while Icahn blocked the move. When the dust has settled, ownership pointed to the Toybiz group.

In June 1998, Marvel Entertainment Group merged with Toybiz as Marvel Enterprises, while the Fleer/Skybox and Panini were sold separately. With Marvel Enterprises as the parent company, the subsidiaries under the umbrella were Marvel Studios, Marvel licensing and publishing, Toybiz and Marvel Characters Group. Marvel Studios begun licensing Marvel characters for movie production and the very first was *Blade* with New Line Cinema. It was the start for an eventful study for Marvel and our focus would study the "good" or "bad" news potential effects through the movie production to the company's valuation via their stock price.

3. REVIEW OF RELATED LITERATURE

There are relatively few literatures that used the context of creative industries like Marvel into a specific study. However, the best way is to use existing valuation approach in measuring the relationship between stock prices and major related events attributed to accounting research. First, models are articulated in terms of earnings levels, gross sales and other variables in determining scale factors. Secondly, these models consider each stock pricing as an isolated problem and ignore cross-sectional analysis that is tentatively known

to exist among stock price changes. The primary advantage of studying individual investment behavior in an experimental setting opens up the portal of testing hypotheses about the existence of manipulative causality between accounting event and investor behavior (Sunder 1973).

This is connected with Birnberg "focus" as his unit of analysis wherein he postulated that the units range from the study of individuals to the study of the environment that acts upon accounting. It is clustered further in different segments from the behavior of individuals to small groups to organization and finally to environmental conditions (Birnberg 2011). For instance, the behavior of investor affects small groups initially based on "major" events that occur from organization's action, hence creating an implosion from a micro level to a macro level.

In order to understand the dynamics of investor behavior, the best way is to exemplify Eugene Fama's Efficient Market Hypothesis (EMH) that emphasized the efficient information in financial markets. The hypotheses accentuated that efficiency is differentiated from "weak", "semi-strong" and "strong". "Weak" pertains to past public information that is already reflected on the traded assets. "Semi-strong" relates to both past information and relevant current information that promulgated on the traded assets. "Strong" instantaneously reflects on to the traded assets a priori knowledge that may be hidden to the public (Fama 1965, 1998).

In retrospect, the capital market equilibrium model was first used in 1996 to study the relationships of stock prices and stock splits by Fama, Fisher, Jensen and Roll. Other studies that are related to my study involve the relationship between stock price changes and accounting changes with depreciation and investment credit. Even though, their study did not yield significance it however provided empirical results on the changes of accounting that affects stock prices (Kaplan and Roll 1972).

To substantiate further the capital market equilibrium model is the capital asset pricing model that presupposed that the mean and variance are utilized in the selection of portfolios by all investors who are single period risk-averse utility of terminal wealth maximizing investors. With the presumption that there are risk free interest rate, no taxes or transactions costs and all investors have homogeneous views regarding the parameters of all the security returns with a joint probability distribution. Preponderance result yield a relation between the expected risk premiums on individual assets and their so called "systematic risk". Cross-sectional tests are subject to measurement error bias and can be mitigated through clustering procedures with relevance to testing the expanded two-factor form (Jensen, Black and Scholes 1972).

Fischer Black provided an interesting take on the capital market equilibrium. He postulated two assumptions that hampered more than the normative assumptions used in delving for the capital asset pricing model. The first one surmised there is no riskless asset and that no riskless borrowing or lending is allowed. The second assumption pertained that there is riskless assets allowed with restrictions on the short-term riskless assets for borrowing (Black 1972).

Black proliferated further the study of behavioral finance and the key essential contribution he has along with Scholes was the Black-Scholes equation. It provided theoretical estimates of options pricing that is widely used worldwide (Black & Scholes 1973).

There are also other related literatures that provide a varied example of using shocks as templates on analyzing good or bad news. This was attributed via asymmetrical price reaction to bad news at earnings announcements that is most phonated when there is a high ratio for overall market-price earnings relative to a U-shape (Conrad, Cornell & Landsman 2002).

The behavioral BSV model is quite contemporaneous that allows for investor under-reaction (in the intermediate term) as single shocks and investor over-reaction (long term) to a series of shocks. Since this model denotes asymmetry after any news shock in the subsequent returns to value and glamour stocks. Hence, if good news is announced then the market response is relatively small due to anticipation, but a negative shock will generate large negative return since it will surprise many investors more (Barberis, Shleifer &Vishny 1998).

My study would help either validate their theorem of bad news or shed a different perspective when good news does indeed have a marginal to minimal effect.

One of the templates related for the research design is to expand the Veronesi model. It was a study in response to the 1997 Financial Crisis connected later with the dot-com or Internet bubble. Due to the soaring stocks from the Internet related companies sometimes attributed as glamour stocks. It was a rational expectations model in which the investor is uncertain about fundamentals with concerns on the market's overall state and assumption on the market dividends. The generation of market dividends via a process on diffusion would show some drift shifts between high and low rates at arbitrary times, since the underlying drift cannot be measured directly, then investors inferred on past dividends (Veronesi 1999).

After testing shocks as inter-temporal events, the only way to eliminate heteroskedasticity is to apply the ARCH model (Engle 1982) for a time series data and upgraded further for GARCH model (Bollerslev) as the primary component for the framework and research design.

4. THEORETICAL FRAMEWORK

Conceptual Framework Figure 1: Relationships of % change in Stock Price relative to Gross Sales/News

The figure illustrates in testing on whether there is significance or correlation between % change in stock price relative to the gross sales or Marvel news.

This model is a basic assumption that whenever there are movies released by Marvel does it really affect stock price.
Hypothesis 1
Ho1: There is significance between gross sales and % change in stock price
Ha1: There is no significance between gross sales and % change in stock price
Hypothesis 2
Ho2: There is significance between news shocks and % change in stock price
Ha2: There is no significance between news shocks and % change in stock price

The study would provide a better analysis in identifying on whether there is indeed significance. This could be achieved by analyzing the p value as well as the Pearson R via correlation. If the R correlation is closer to one then there is indeed correlation between the independent variable relative to the dependent variable. The R square would provide if the data has a goodness of fit through the correlation coefficients. The time series would provide further analysis via the GARCH model.

5. RESEARCH METHOD

In order to use behavioral finance relative to behavioral accounting, the best way is the fusion of different disciplines into a singular entity. The research would use Marvel as the primary actor in terms of their stock prices from 1999 until 2009. The stock prices would be segmented into four dimensions namely daily, monthly, quarterly and annually. Since the company officially was founded after a nexus of contracts and stipulations in June 1998, the primary starting point of the study would begin in 1999. It also culminate with the very first official license movie property with *Blade* in 1998 that opened the company for various movie licenses. The company was official acquired by Disney in 2009 and the study would end on the last year it was officially traded in the stock market.

The success of a film depends primarily on the movie gross sales, since accounting numbers rely more on the "gross sales" for taxation purposes, the study would use it as a focal point of study for a numerical measure.

Both Marvel daily stock prices and Marvel gross sales for movies are publicly available on various online databases that would be used for the purpose of this study.

The first research design to be used in a simple linear regression that would test Pearson correlation coefficient R and the coefficient of determination R^2. The independent variable would be pegged for the gross of movies that came out while the dependent variable would be the changes in stock price.

The second research design would involve the behavior of stock prices by using the GARCH model for the time series data analysis. Daily changes for opening and closing for stock prices would be used in ascertaining daily market returns. This would provide better analysis for the period of interest consequently that results from a near singular matrix condition.

6. RESEARCH RESULTS

Using the GARCH time series method, we could attribute that Marvel stock prices changes on various Marvel events like Spider-Man 2 (2004) and Iron Man (2008) movies. When the Marvel movies compared to the changes, it provided a very large p value thus proving the hypothesis that there is no significant for the gross sales as well as the Marvel news.

This could verify previous theories that good news has no real significant effects on the volatility of stock prices, but in reality focuses more on bad news. Hence, it could be attributed more to the results by Conrad, Cornell and Lansman "When is Bad News Really Bad News."
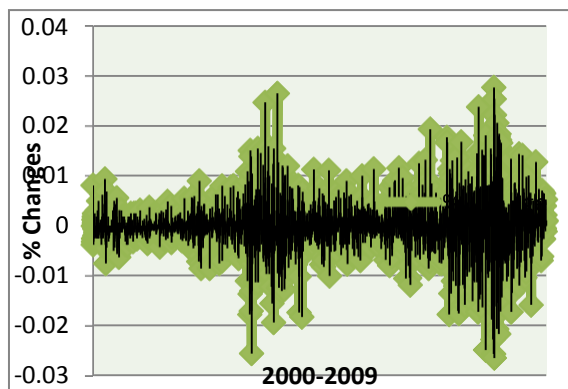
Unless future research could actually verify that good news has more impact in the changes of stock prices or other factors could be determined with empirical proof that there is indeed valuable assumption in changes on stock prices.

Studios could be a mitigating factor (please refer to Appendix) for the frequency results that provided Sony Columbia has impact to the stock prices but not for the Marvel stocks but on Columbia stocks in utilizing Spider-Man in movies. The greatest effect occurred when Spider-Man 2 was shown in 2004. In 2008, when Iron Man was shown it provided a huge change for Marvel stocks, however this could also be attributed to Disney preeminent buyoff of Marvel.

7. DISCUSSIONS

YEAR	MOVIES	Studio	(in millions) Profit	US (Domestic) Sales Budget	Opening	Gross	%
1998	Blade	New Line	$86.2	$45.0	$17.0	$70.1	0.5343
2000	X-Men	Fox	$221.3	$75.0	$54.5	$157.3	0.5309
2002	Blade 2	New Line	$101.0	$54.0	$32.5	$82.3	0.5310
2002	Spider-Man	Columbia	$681.7	$140.0	$114.8	$403.7	0.4913
2003	Daredevil	Fox	$101.1	$78.0	$40.3	$102.5	0.5723
2003	X-Men 2	Fox	$297.7	$110.0	$85.6	$214.9	0.5271
2003	Hulk	Universal	$108.3	$137.0	$62.1	$132.1	0.5385
2004	The Punisher	LGF	$39.2	$15.5	$13.8	$33.8	0.6179
2004	Spider-Man 2	Columbia	$583.7	$200.0	$88.1	$373.5	0.4766
2004	Blade: Trinity	New Line	$63.9	$65.0	$16.0	$52.4	0.4065
2005	Elektra	Fox	$13.7	$43.0	$12.8	$24.4	0.4303
2005	Fantastic Four	Fox	$230.6	$100.0	$56.1	$154.7	0.4679
2006	X-Men: The Last Stand	Fox	$249.3	$210.0	$102.7	$234.3	0.5101
2007	Ghost Rider	Columbia	$118.7	$110.0	$45.4	$115.8	0.5063
2007	Spider-Man 3	Columbia	$632.8	$258.0	$151.1	$336.5	0.3778
2007	Fantastic Four 2	Fox	$159.0	$130.0	$58.0	$131.9	0.4564
2008	Punisher War Zone	LGF	-$24.8	$35.0	$4.2	$8.1	0.7941
2008	Iron Man	Paramount	$445.2	$140.0	$98.6	$318.4	0.5441
2008	Incredible Hulk	Universal	$113.4	$150.0	$55.4	$134.8	0.5118
2009	Wolverine	Fox	$223.1	$150.0	$85.1	$179.9	0.4822
			$4,445.1	$2,245.5	$1,194.1	$3,261.4	0.4875

Table 1: Marvel Movie Summary 1998 – 2009 (box office mojo.com)

There are many limitations for the study since it highlights only % changes of stock prices. However, a log can be used for further research to normalize the data using t − 1 lag for the moving averages of the stocks. This can be done via ARIMA or ARMA and further usage of the ARCH model like EGARCH with log a precursor for computations.

The study showcased an understanding that there could be factors out there that affected stock prices and the information asymmetry occurs since the public use information available like movies produced by the company. Disney however saw something others didn't hence after Marvel generated $4.4B in gross profits from movies, the valuation became $4.24B.

Pre-Disney Marvel embodied a strong indicator towards Spider-Man and X-Men as the company's primary licensed movie products representing more than 75% of gross sales. The Spider-Man franchise has generated over $1.9B, while the X-Men franchise has generated 991M. Hence, both Sony Columbia and 20th Century Fox would continue developing movie under the same franchise segments. Sony Columbia produced a rebooted Spider-Man series with Amazing Spider-Man, while Fox rebooted the X-Men series with X-Men First Class. Future projects include Sinister Six, Deadpool and more for both studios.

Disney bankrolled on other Marvel properties and at the time of purchase, only Iron-Man stood out after its breakthrough success in 2008. This opened up a new business paradigm relatively new in the movie making business. Marvel recreated their Cinematic Universe by interlinking multiple properties into one singular entity. This was done by releasing the Avengers in 2012. That would be a focus on my next research in understanding the Marvel Studios phenomena more in the future via a phenomenology study.

The future of Marvel Studios is enriched by their business model of the Marvel Cinematic Universe. This year, two movies namely Avengers Age of Ultron and Antman are coming out. While next year, we would see Captain America Civil War and Doctor Strange. Alliances are made between Disney's Marvel Studios and Sony Columbia that allow the use of Spider-Man for Disney despite being own by Sony Columbia for movie use. This allows a mutual agreement in the use of Spider- Man as well as the use of other Marvel characters that can be integrated either way for both studios.

8. ACKNOWLEDGEMENT

foundation of my learning in providing action in this research.

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APPENDICES:

Descriptive Statistics	
Mean	-1.30E-05
Standard Error	9.55E-05
Median	-1.00E-04
Mode	0
Standard Deviation	0.004768
Sample Variance	2.27E-05
Kurtosis	5.38995
Skewness	0.017712
Range	0.0541
Minimum	-0.0264
Maximum	0.0277
Sum	-0.03173
Count	2494
Largest(1)	0.0277
Smallest(1)	-0.0264
Confidence	0.000187

Opening		Closing	
Mean	18.65795	Mean	18.65667967
Standard Error	0.231062	Standard Error	0.231352273
Median	19.35	Median	19.35
Mode	5	Mode	5
Standard Deviation	11.53924	Standard Deviation	11.55372419
Sample Variance	133.1541	Sample Variance	133.4885427
Skewness	0.327539	Skewness	0.33140074
Minimum	1.438	Minimum	1.438
Maximum	52.32	Maximum	52.47
Sum	46532.93	Sum	46529.7591
Count	2494	Count	2494

SUMMARY

Regression Statistics	
Multiple R	0.088462
R Square	0.007826
Adjusted R Square	-0.00144
Standard Error	0.037174
Observations	649

ANOVA

	df	SS	MS	F	Significance F
Regression	6	0.007008	0.001168	1.014301	0.414733
Residual	643	0.888579	0.001382		
Total	649	0.895587			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.034559	0.005604	6.166557	1.23E-09	0.023554	0.045564
X Variable 1	0.000135	0.0002	0.674431	0.50028	-0.00026	0.000529
X Variable 2	-0.0095	0.006163	-1.54093	0.123826	-0.0216	0.002605
X Variable 3	0	0	65535	#NUM!	0	0
X Variable 4	-0.00119	0.007009	-0.16951	#NUM!	-0.01495	0.012575
X Variable 5	-0.00545	0.006081	-0.89592	0.370632	-0.01739	0.006493
X Variable 6	-0.0091	0.007267	-1.25169	0.211139	-0.02337	0.005174

Regression Statistics	
Multiple R	0.151810912
R Square	0.023046553
Adjusted R Square	0.011012264
Standard Error	0.035193796
Observations	495

ANOVA

	df		SS	MS	F	Significance F
Regression	6		0.014288058	0.002381	2.307124	0.033101
Residual	489		0.605677009	0.001239		
Total	495		0.619965066			

|	Coefficients		Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.000259231		0.007183904	0.036085	0.971229	-0.01386	0.014374
X Variable 1	-0.000671476		0.00041628	-1.61304	0.107381	-0.00149	0.000146
X Variable 2	0		0	65535	#NUM!	0	0
X Variable 3	-0.000325408		0.007630991	-0.04264	#NUM!	-0.01532	0.014668
X Variable 4	-0.001998563		0.007892153	-0.25323	0.800194	-0.01751	0.013508
X Variable 5	-0.002058595		0.008075859	-0.25491	0.798902	-0.01793	0.013809
X Variable 6	-0.012642042		0.008270928	-1.52849	0.127037	-0.02889	0.003609
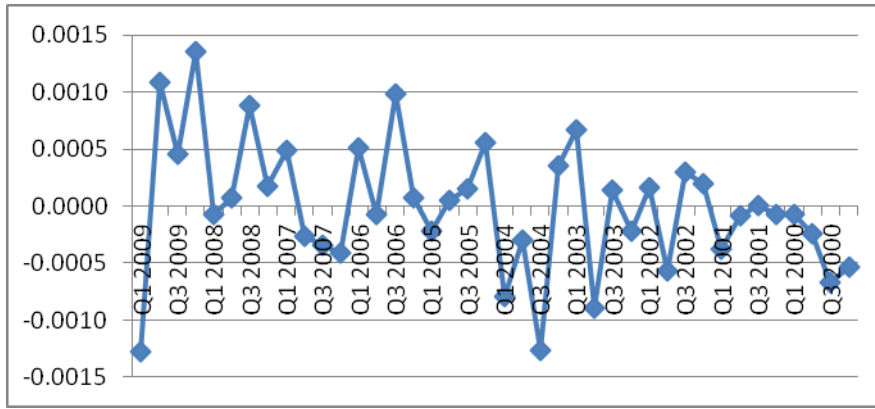
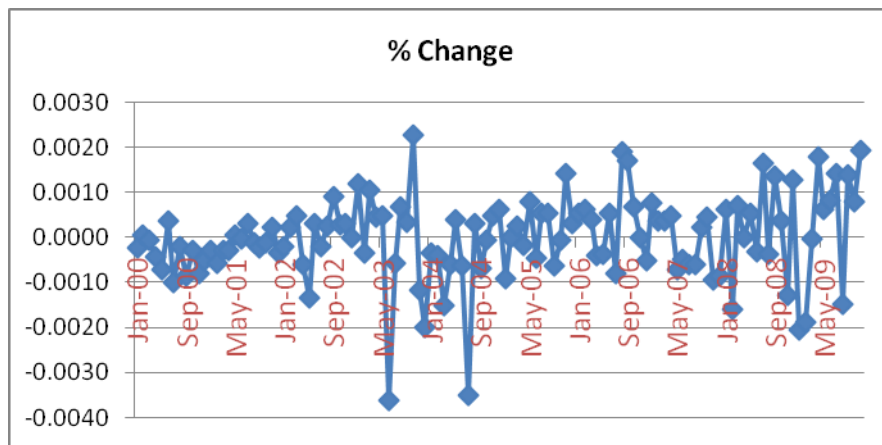Figure 3 - Time Series: Quarterly Stock Changes Marvel 2000 – 2009

Figure 4 - Time Series: Monthly Stock Changes Marvel 2000 – 2009

Date	Price Stock	Period Stock	Return 2	Variance	GARCH
2009	36.93				
2008	30.28	0.1986	0.039444	9.08%	8.80%
2007	26.58	0.1304	0.016992	9.35%	8.93%
2006	21.15	0.2284	0.052145	9.75%	9.47%
2005	18.68	0.1241	0.015406	9.99%	9.50%
2004	20.52	-0.0937	0.008784	10.43%	9.87%
2003	19.95	0.0279	0.000781	10.94%	10.28%
2002	6.46	1.1278	1.271956	11.51%	17.15%
2001	2.66	0.889	0.79033	5.42%	9.26%
2000	4.63	-0.5559	0.309015	1.55%	3.37%

Table 2: GARCH (1, 1) Model table