

## Assessing Stock Market Volatility for Different Sectors in Malaysia

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### ABSTRACT

The study of stock market volatility has been the focus of market participants primarily because most of the applications in financial economics are concerned with volatility. The economic structure in Malaysia is divided into three sectors: primary, secondary and tertiary. As the stability of the stock market is important for businesses, this paper carefully reviews the concept of volatility and analyses how different business sectors in Malaysia are affected by stock market volatility.

*Keywords:* Historical volatility, stock market volatility, business sector, Malaysia

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### INTRODUCTION

Volatility estimation is important for financial practitioners, researchers and market participants for several reasons. The unexpected conditions such as changes in economic policy, political shocks, competitors and business rivals affect stock prices resulting in stock market volatility. Greater changes in stock prices indicate a high level of volatility. Commonly, higher volatility means more uncertainty in the stock market and this phenomenon has an impact on the financial stability of businesses.

According to Sill (1993), stock market volatility may affect the economy in terms of how people spend and save money, stock and option price and how investors may hedge against investment risks.

There are variety of methods that can be used to measure volatility such as equally weighted average, an exponentially weighted moving average (EWMA), and sophisticated models such as ARCH and GARCH (Cuthbertson & Nitzsche, 2001; Chang, 2014).

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Volatility is commonly used in estimating market risks (Ladokhin, 2009) in addition to valuing financial derivatives. Another important application can be seen in pricing the option since volatility is one of the parameters involved in estimating the option value.

Given the important role of volatility forecasting in the context of finance, this paper analyses volatility on different sectors of business in Malaysia. Economic theories divide economic sectors based on their activity. The main sector, primary sector, refers to industries engaged in the extraction of raw materials. Secondary or manufacturing sector uses raw materials sourced from the primary sector, processes them and produce finished goods. The tertiary sector offers or provides services to customers.

The remaining sections of this paper are organised as follows: Section 2 discusses historical and implied volatility. Definition of preliminary concepts related to volatility and their application in finance are also discussed in this section. Section 3 presents the methodology including data and steps used in measuring volatility. Section 4 provides the result on different sectors' volatility. Section 5 discusses and summarises the paper.

## LITERATURE REVIEW

This section provides a brief discussion of approaches involved in estimating volatility which are historical and implied volatility. It also discusses the application of volatility estimation in the finance sector.

### Measuring volatility

In most cases, the volatility value cannot be observed directly, thus the estimation of its value depends on the judgment by the analyst. There are two approaches in estimating the volatility value. Volatility value extracted from stock market returns is called historical volatility while the volatility value derived from option pricing model is called implied volatility (Koopman, Jungbacker & Hol, 2005). The difference between historical and implied volatility is discussed below.

### Historical volatility

Historical volatility is usually referred to as backward looking volatility and uses past data over some period to estimate the volatility value. The standard and easiest way is by taking the standard deviation  $\sigma$  of the stock price return as below (Chang, 2014):

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (R_i - \bar{R})^2}{n-1}} \quad (1)$$

where  $R_i$  is a continuous return at time  $i$ ,  $\bar{R}$  equals to mean daily return and  $n$  is the number of observations.  $R_i$  and  $\bar{R}$  are computed using formula

$$R_i = \ln \left[ \frac{S_i}{S_{i-1}} \right] \quad (2)$$

and

$$\bar{R} = \frac{\sum_{i=1}^n R_i}{n}. \quad (3)$$

The variable  $S_i$  in (2) denotes the stock price at time  $i$ .

Using historical standard deviation, the only important information is past returns and other information is ignored although it might move the markets (Ederington & Guan, 2006). One may predict the movement of stock in the future since its value is based on how fast it has been moving in recent past.

### Implied volatility

Implied volatility or forward looking volatility shows what the market “implies” about the future stock’s volatility. It is derived by solving the option pricing model e.g. Black Scholes formula for a call option as the equation below (Anoniemi, 2006):

$$C = SN(d_1) - Ke^{-r(T-t)}N(d_2) \quad (4)$$

where

$$d_1 = \frac{\ln \left( \frac{S}{K} \right) + \left( r + \frac{\sigma^2}{2} \right) T}{\sigma \sqrt{T-t}}$$

and

$$d_2 = d_1 - \sigma \sqrt{T-t}.$$

In the equation above,  $C$  is defined as call option value,  $S$  is underlying asset,  $N(\cdot)$  is cumulative standard normal distribution,  $K$  is strike price,  $r$  equals to risk-free interest rate,  $T-t$  is the time to maturity where  $T$  is the date at maturity and  $t$  is the current time, and  $\sigma$  is volatility. In order to compute the volatility value, all other inputs required by Black Scholes formula are known except the volatility value.

### **The implication of volatility in finance**

In the field of finance, volatility is referred to as risk and can be measured as standard deviation (Poon & Granger, 2003). Essentially, standard deviation is used to measure the amount of dispersion of a set of data values. The data points tend to be very close to the expected value or mean if the value of standard deviation approaches zero. The large value of standard deviation means that the data points are far from mean. Another way to measure volatility is by using variance since variance and standard deviation are connected by a simple relationship (Ladokhin, 2009). However, this approach is less common compared with estimation using standard deviation.

Groud, Levy and Lubochinsky (2003) state that the most widely used concept for representing risk is the volatility of returns. However, Poon and Granger (2003) and Ladokhin (2009) do not agree. They believe that volatility is not the same as risk although it is related to it. This is because risk refers to negative outcomes of some event and volatility is about the spread of outcomes which can be positive or negative.

An important factor in valuing the option value using Black Scholes Merton model is volatility of stock prices (Rotkowsky, 2011). Modelling volatility is crucial to option pricing model since it is the only variable that is unobservable (Mitra, 2011). The option value relates to the asset's volatility value. Higher volatility leads to higher option value as the probability of the option to be valuable is higher.

### **METHODOLOGY**

This section provides a detailed analysis of stock market volatility of 867 companies from different business sub-sectors in Malaysia. Data was taken from *Datastream*. The companies are grouped together based on their main business activity. There are 40 different sub-sectors which are furthered categorised into three main sectors - primary, secondary and tertiary. Table 1 shows the distribution of sub-sectors according to the main sector.

#### **Data**

Stock market prices are the source of volatility forecasts. The most common used price for estimating volatility is closing price. In this paper, the closing price is observed every day for 246 trading days. Data used in this paper was taken from the UiTM *Datastream* for the period of January 2014 to December 2014.

Table 1  
*Distribution of the sub-sector*

Primary sector	Secondary sector	Tertiary sector
Mining & quarrying	Chemicals	Water, gas & multiutilities
Oil equipment & services	Tobacco	Non-life insurance
	Pharmaceuticals & biotechnology	Industrial transportation
	Technology hardware & equipment	Healthcare equipment & services
	Personal goods	Real estate investment & services
	Beverages	Financial services
	Food producers	Software & computer services
	Leisure goods	Real estate investment trusts
	General industrials	Life insurance
	Forestry & papers	Travel & leisure
	Construction & material	Food & drug retailers
	Electronic & electrical equipment	Fixed line telecommunication
	General industrials	Banks
	Automobiles & parts	Mobile telecommunication
	Household goods & home construction	Media
	Aerospace & defence	General retailers
	Industrial metal & mining	Non-equity investment instrument
	Industrial engineering	
	Support services	

### Measuring Stock Market Volatility from Historical Data

This sub-section briefly explains in detail the procedure involved in the calculation of stock market volatility. The steps are as follows:

- Calculate the stock market return of each company involved by using the standard logarithmic method as in (2).
- Compute the standard deviation  $\sigma$  of the continuously stock market return by using formula in (1).
- Calculate the annualised volatility  $\hat{\sigma}$  by:

$$\hat{\sigma} = \sigma\sqrt{\tau} \quad (5)$$

where  $\tau$  represents the trading days per year. For this study  $\tau$  is assumed equal to 246 days. Compute the volatility of each sub-sector by taking the average standard deviation of the companies with similar business activities.

The following section discusses the results based on the calculation above.

## RESULT AND DISCUSSION

This section presents the result and discusses the volatility estimation for each sector, starting with the primary sector followed by secondary and tertiary sectors.

For the primary sector, there are only 2 sub-sectors with 24 companies (see Table 2).

Table 2  
*Distribution of the companies in primary sector*

Sub-sector	Number of Companies
Mining & quarrying	2
Oil equipment & services	22
<b>Total</b>	<b>24</b>

Figure 1 shows the volatility in primary sector by sub-sectors.

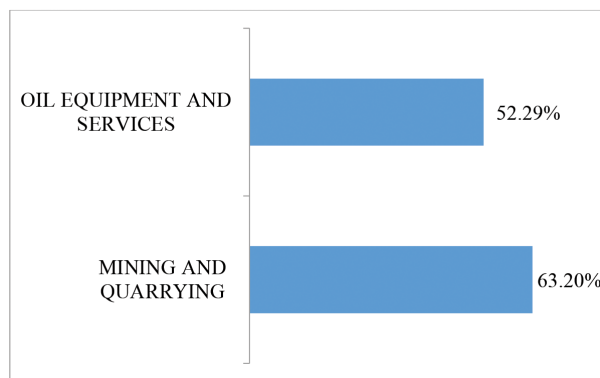


Figure 1. Volatility in primary sector by sub-sector

The volatility of mining and quarrying is 63.20% which is higher than oil equipment and services which is 52.29%. This means the mining and quarrying sub sector is more volatile compared with oil equipment and services. Appendix A presents the volatility value for mining and quarrying sector.

Table 3 shows the distribution of companies based on their sub-sectors. There are 20 sub-sectors with 559 companies.

Table 3  
*Distribution of companies in secondary sector*

Sub-sector	Number of Companies
Chemicals	31
Tobacco	1
Pharmaceuticals & biotechnology	8
Technology hardware & equipment	25
Personal goods	21
Beverages	9
Food producers	77
General industrials	3
Forestry & papers	14
Construction & material	106
Leisure goods	6
Electronic & electrical equipment	40
General industrials	32
Automobiles & parts	19
Household goods & home construction	39
Aerospace & defence	1
Industrial metal & mining	33
Oil & gas producers	8
Industrial engineering	53
Support services	33
<b>Total</b>	<b>559</b>

The volatility for secondary sector is presented in Figure 2. The highest volatility is seen in the technology hardware and equipment sub sector, 63.72% and the lowest volatility in the tobacco sub sector, 20.33%. From the result, it is known that technology hardware and equipment sub sector is more volatile compared with the tobacco sub sector – about three times as volatile.

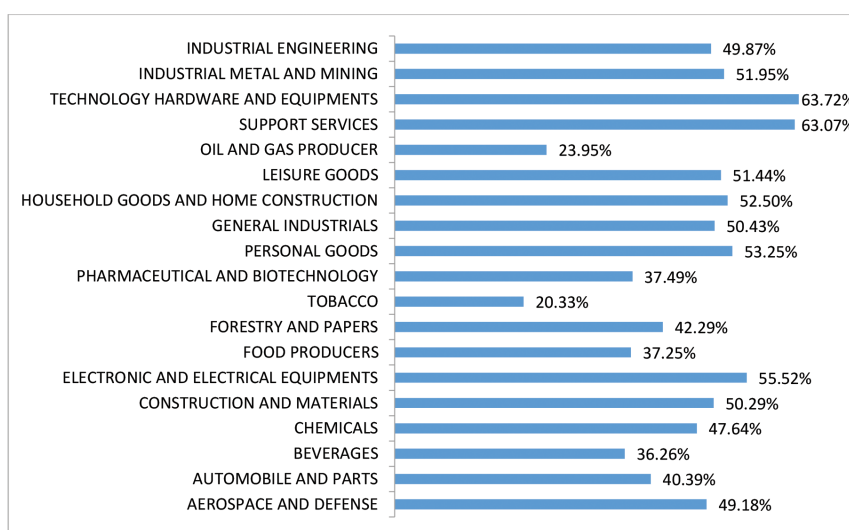


Figure 2. Volatility in secondary sector by sub-sector

The last sector is tertiary which has 18 sub-sectors with 324 companies. Table 4 shows the distribution of companies according to their sub-sectors.

Table 4  
Distribution of companies in tertiary sector

Sub-sector	Number of Companies
Water, gas & multiutilities	9
Non-life insurance	8
Industrial transportation	32
Healthcare equipment & services	13
Real estate invest & services	79
Financial services	16
Software & computer services	57
Real estate investment trusts	15
Life insurance	1
Travel & leisure	29
Food & drug retailers	2
Fixed line telecommunication	4
Banks	10
Mobile telecommunication	8
Media	11
General retailers	23
Non-equity investment instrument	6
Equity investment instrument	1
<b>Total</b>	<b>324</b>



Volatility for the tertiary sector is shown in Figure 3. The fixed line telecommunications industry has the highest volatility, 86.49%, which is about 10 times more volatile than the lowest volatility which is non-equity investment instrument, 8.90%.

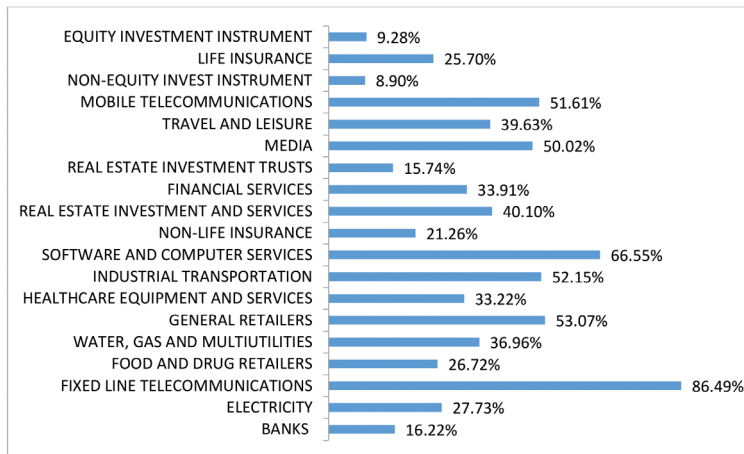


Figure 3. Volatility in tertiary sector by sub-sector

Based on the results, five sectors - mining and quarrying, support services, technology hardware and equipment, fixed line telecommunication, and software and computer services - have a volatility value of more than 60%. Sectors such as equity investment instrument, non-equity investment instrument, banks and real estate investment trusts have a volatility value of less than 20%. The annualised volatility of stocks normally lies between 20% and 60% (Hull, 2006).

The 35 sub-sector have more than 3 companies operating in similar industries except tobacco, aerospace and defence, life insurance, food and drug retailers, and equity investment instrument.

## RESULT AND DISCUSSION

According to the results, the volatility values in different sub-sectors vary substantially. This implies the riskiness of individual company in each sub-sector. The greater the risk, the greater the potential for profits. Thus, investors with different risk portfolios can use these findings in re-creating their portfolio. Researchers may access the volatility of their countries' stock market by using the formula and methods used in this study.

The number of companies in each sub-sector should also be considered. For a meaningful comparison, the number of companies should be between 3 and 10 (Rotkowsky, 2011). Future research may examine company returns in each sector.

## ACKNOWLEDGEMENTS

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## APPENDIX A

1				2			
MINETECH RESOURCES				SINO HUA-AN INTL.			
Day	Date	Closing price	Return	Day	Date	Closing price	Return
1	31-Dec-14	0.12	23.3615%	1	31-Dec-14	0.11	0.0000%
2	30-Dec-14	0.095	0.0000%	2	30-Dec-14	0.11	4.6520%
3	29-Dec-14	0.095	0.0000%	3	29-Dec-14	0.105	-4.6520%
4	26-Dec-14	0.095	0.0000%	4	26-Dec-14	0.11	9.5310%
5	24-Dec-14	0.095	0.0000%	5	24-Dec-14	0.1	-4.8790%
6	23-Dec-14	0.095	0.0000%	6	23-Dec-14	0.105	0.0000%
7	22-Dec-14	0.095	-5.1293%	7	22-Dec-14	0.105	0.0000%
8	19-Dec-14	0.1	10.5361%	8	19-Dec-14	0.105	0.0000%
9	18-Dec-14	0.09	0.0000%	9	18-Dec-14	0.105	4.8790%
10	17-Dec-14	0.09	5.7158%	10	17-Dec-14	0.1	-4.8790%
11	16-Dec-14	0.085	0.0000%	11	16-Dec-14	0.105	-4.6520%
12	15-Dec-14	0.085	-5.7158%	12	15-Dec-14	0.11	-8.7011%
13	12-Dec-14	0.09	-5.4067%	13	12-Dec-14	0.12	0.0000%
14	11-Dec-14	0.095	5.4067%	14	11-Dec-14	0.12	0.0000%
15	10-Dec-14	0.09	0.0000%	15	10-Dec-14	0.12	0.0000%
16	9-Dec-14	0.09	0.0000%	16	9-Dec-14	0.12	-4.0822%
17	8-Dec-14	0.09	-5.4067%	17	8-Dec-14	0.125	0.0000%
18	5-Dec-14	0.095	0.0000%	18	5-Dec-14	0.125	4.0822%
19	4-Dec-14	0.095	-14.6603%	19	4-Dec-14	0.12	-4.0822%
20	3-Dec-14	0.11	0.0000%	20	3-Dec-14	0.125	0.0000%
21	2-Dec-14	0.11	-16.7054%	21	2-Dec-14	0.125	0.0000%
22	1-Dec-14	0.13	0.0000%	22	1-Dec-14	0.125	-3.9221%
23	28-Nov-14	0.13	-3.7740%	23	28-Nov-14	0.13	0.0000%
24	27-Nov-14	0.135	0.0000%	24	27-Nov-14	0.13	0.0000%
25	26-Nov-14	0.135	-7.1459%	25	26-Nov-14	0.13	0.0000%
26	25-Nov-14	0.145	-9.8440%	26	25-Nov-14	0.13	0.0000%
27	24-Nov-14	0.16	-3.0772%	27	24-Nov-14	0.13	0.0000%
28	21-Nov-14	0.165	-2.9853%	28	21-Nov-14	0.13	-3.7740%
29	20-Nov-14	0.17	2.9853%	29	20-Nov-14	0.135	3.7740%
30	19-Nov-14	0.165	3.0772%	30	19-Nov-14	0.13	-3.7740%
31	18-Nov-14	0.16	6.4539%	31	18-Nov-14	0.135	0.0000%
32	17-Nov-14	0.15	-6.4539%	32	17-Nov-14	0.135	-3.6368%
33	14-Nov-14	0.16	-3.0772%	33	14-Nov-14	0.14	0.0000%
34	13-Nov-14	0.165	3.0772%	34	13-Nov-14	0.14	0.0000%
35	12-Nov-14	0.16	6.4539%	35	12-Nov-14	0.14	0.0000%

36	11-Nov-14	0.15	6.8993%		36	11-Nov-14	0.14	0.0000%
37	10-Nov-14	0.14	0.0000%		37	10-Nov-14	0.14	0.0000%
38	7-Nov-14	0.14	3.6368%		38	7-Nov-14	0.14	3.6368%
39	6-Nov-14	0.135	3.7740%		39	6-Nov-14	0.135	0.0000%
40	5-Nov-14	0.13	-20.7639%		40	5-Nov-14	0.135	0.0000%
41	4-Nov-14	0.16	6.4539%		41	4-Nov-14	0.135	0.0000%
42	3-Nov-14	0.15	0.0000%		42	3-Nov-14	0.135	0.0000%
43	31-Oct-14	0.15	3.3902%		43	31-Oct-14	0.135	0.0000%
44	30-Oct-14	0.145	-3.3902%		44	30-Oct-14	0.135	0.0000%
45	29-Oct-14	0.15	0.0000%		45	29-Oct-14	0.135	0.0000%
46	28-Oct-14	0.15	3.3902%		46	28-Oct-14	0.135	0.0000%
47	27-Oct-14	0.145	0.0000%		47	27-Oct-14	0.135	0.0000%
48	24-Oct-14	0.145	0.0000%		48	24-Oct-14	0.135	-3.6368%
49	23-Oct-14	0.145	0.0000%		49	23-Oct-14	0.14	3.6368%
50	21-Oct-14	0.145	3.5091%		50	21-Oct-14	0.135	0.0000%
51	20-Oct-14	0.14	-3.5091%		51	20-Oct-14	0.135	0.0000%
52	17-Oct-14	0.145	0.0000%		52	17-Oct-14	0.135	3.7740%
53	16-Oct-14	0.145	0.0000%		53	16-Oct-14	0.13	-3.7740%
54	15-Oct-14	0.145	-3.3902%		54	15-Oct-14	0.135	0.0000%
55	14-Oct-14	0.15	3.3902%		55	14-Oct-14	0.135	-3.6368%
56	13-Oct-14	0.145	0.0000%		56	13-Oct-14	0.14	0.0000%
57	10-Oct-14	0.145	-3.3902%		57	10-Oct-14	0.14	-3.5091%
58	9-Oct-14	0.15	3.3902%		58	9-Oct-14	0.145	0.0000%
59	8-Oct-14	0.145	0.0000%		59	8-Oct-14	0.145	-3.3902%
60	7-Oct-14	0.145	0.0000%		60	7-Oct-14	0.15	0.0000%
61	3-Oct-14	0.145	0.0000%		61	3-Oct-14	0.15	0.0000%
62	2-Oct-14	0.145	0.0000%		62	2-Oct-14	0.15	0.0000%
63	1-Oct-14	0.145	0.0000%		63	1-Oct-14	0.15	-3.2790%
64	30-Sep-14	0.145	0.0000%		64	30-Sep-14	0.155	0.0000%
65	29-Sep-14	0.145	0.0000%		65	29-Sep-14	0.155	3.2790%
66	26-Sep-14	0.145	0.0000%		66	26-Sep-14	0.15	-3.2790%
67	25-Sep-14	0.145	-3.3902%		67	25-Sep-14	0.155	3.2790%
68	24-Sep-14	0.15	0.0000%		68	24-Sep-14	0.15	0.0000%
69	23-Sep-14	0.15	0.0000%		69	23-Sep-14	0.15	0.0000%
70	22-Sep-14	0.15	3.3902%		70	22-Sep-14	0.15	-3.2790%
71	19-Sep-14	0.145	-3.3902%		71	19-Sep-14	0.155	3.2790%
72	18-Sep-14	0.15	3.3902%		72	18-Sep-14	0.15	-3.2790%
73	17-Sep-14	0.145	0.0000%		73	17-Sep-14	0.155	3.2790%
74	15-Sep-14	0.145	0.0000%		74	15-Sep-14	0.15	0.0000%

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75	12-Sep-14	0.145	-3.3902%	75	12-Sep-14	0.15	-3.2790%
76	11-Sep-14	0.15	3.3902%	76	11-Sep-14	0.155	3.2790%
77	10-Sep-14	0.145	-3.3902%	77	10-Sep-14	0.15	0.0000%
78	9-Sep-14	0.15	0.0000%	78	9-Sep-14	0.15	0.0000%
79	8-Sep-14	0.15	0.0000%	79	8-Sep-14	0.15	0.0000%
80	5-Sep-14	0.15	3.3902%	80	5-Sep-14	0.15	0.0000%
81	4-Sep-14	0.145	0.0000%	81	4-Sep-14	0.15	-3.2790%
82	3-Sep-14	0.145	0.0000%	82	3-Sep-14	0.155	0.0000%
83	2-Sep-14	0.145	0.0000%	83	2-Sep-14	0.155	3.2790%
84	29-Aug-14	0.145	-3.3902%	84	29-Aug-14	0.15	-6.4539%
85	28-Aug-14	0.15	3.3902%	85	28-Aug-14	0.16	3.1749%
86	27-Aug-14	0.145	0.0000%	86	27-Aug-14	0.155	3.2790%
87	26-Aug-14	0.145	0.0000%	87	26-Aug-14	0.15	0.0000%
88	25-Aug-14	0.145	0.0000%	88	25-Aug-14	0.15	-6.4539%
89	22-Aug-14	0.145	0.0000%	89	22-Aug-14	0.16	0.0000%
90	21-Aug-14	0.145	3.5091%	90	21-Aug-14	0.16	3.1749%
91	20-Aug-14	0.14	-6.8993%	91	20-Aug-14	0.155	0.0000%
92	19-Aug-14	0.15	6.8993%	92	19-Aug-14	0.155	0.0000%
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94	15-Aug-14	0.14	0.0000%	94	15-Aug-14	0.155	0.0000%
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98	11-Aug-14	0.14	0.0000%	98	11-Aug-14	0.155	3.2790%
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101	6-Aug-14	0.15	6.8993%	101	6-Aug-14	0.16	3.1749%
102	5-Aug-14	0.14	0.0000%	102	5-Aug-14	0.155	0.0000%
103	4-Aug-14	0.14	-3.5091%	103	4-Aug-14	0.155	3.2790%
104	1-Aug-14	0.145	0.0000%	104	1-Aug-14	0.15	0.0000%
105	31-Jul-14	0.145	-3.3902%	105	31-Jul-14	0.15	0.0000%
106	30-Jul-14	0.15	3.3902%	106	30-Jul-14	0.15	0.0000%
107	25-Jul-14	0.145	3.5091%	107	25-Jul-14	0.15	3.3902%
108	24-Jul-14	0.14	-3.5091%	108	24-Jul-14	0.145	-3.3902%
109	23-Jul-14	0.145	-3.3902%	109	23-Jul-14	0.15	3.3902%
110	22-Jul-14	0.15	0.0000%	110	22-Jul-14	0.145	0.0000%
111	21-Jul-14	0.15	0.0000%	111	21-Jul-14	0.145	0.0000%
112	18-Jul-14	0.15	14.3101%	112	18-Jul-14	0.145	0.0000%
113	17-Jul-14	0.13	0.0000%	113	17-Jul-14	0.145	0.0000%

114	16-Jul-14	0.13	-3.7740%		114	16-Jul-14	0.145	0.0000%
115	14-Jul-14	0.135	0.0000%		115	14-Jul-14	0.145	0.0000%
116	11-Jul-14	0.135	0.0000%		116	11-Jul-14	0.145	-3.3902%
117	10-Jul-14	0.135	3.7740%		117	10-Jul-14	0.15	0.0000%
118	9-Jul-14	0.13	0.0000%		118	9-Jul-14	0.15	3.3902%
119	8-Jul-14	0.13	-7.4108%		119	8-Jul-14	0.145	-6.6691%
120	7-Jul-14	0.14	3.6368%		120	7-Jul-14	0.155	3.2790%
121	4-Jul-14	0.135	-10.5361%		121	4-Jul-14	0.15	0.0000%
122	3-Jul-14	0.15	0.0000%		122	3-Jul-14	0.15	0.0000%
123	2-Jul-14	0.15	0.0000%		123	2-Jul-14	0.15	0.0000%
124	1-Jul-14	0.15	0.0000%		124	1-Jul-14	0.15	3.3902%
125	30-Jun-14	0.15	-3.2790%		125	30-Jun-14	0.145	0.0000%
126	27-Jun-14	0.155	0.0000%		126	27-Jun-14	0.145	-3.3902%
127	26-Jun-14	0.155	0.0000%		127	26-Jun-14	0.15	0.0000%
128	25-Jun-14	0.155	3.2790%		128	25-Jun-14	0.15	0.0000%
129	24-Jun-14	0.15	6.8993%		129	24-Jun-14	0.15	0.0000%
130	23-Jun-14	0.14	0.0000%		130	23-Jun-14	0.15	0.0000%
131	20-Jun-14	0.14	-3.5091%		131	20-Jun-14	0.15	0.0000%
132	19-Jun-14	0.145	-3.3902%		132	19-Jun-14	0.15	0.0000%
133	18-Jun-14	0.15	0.0000%		133	18-Jun-14	0.15	0.0000%
134	17-Jun-14	0.15	0.0000%		134	17-Jun-14	0.15	3.3902%
135	16-Jun-14	0.15	14.3101%		135	16-Jun-14	0.145	0.0000%
136	13-Jun-14	0.13	0.0000%		136	13-Jun-14	0.145	0.0000%
137	12-Jun-14	0.13	-3.7740%		137	12-Jun-14	0.145	0.0000%
138	11-Jun-14	0.135	0.0000%		138	11-Jun-14	0.145	0.0000%
139	10-Jun-14	0.135	7.6961%		139	10-Jun-14	0.145	0.0000%
140	9-Jun-14	0.125	-3.9221%		140	9-Jun-14	0.145	0.0000%
141	6-Jun-14	0.13	3.9221%		141	6-Jun-14	0.145	0.0000%
142	5-Jun-14	0.125	-3.9221%		142	5-Jun-14	0.145	-3.3902%
143	4-Jun-14	0.13	3.9221%		143	4-Jun-14	0.15	0.0000%
144	3-Jun-14	0.125	0.0000%		144	3-Jun-14	0.15	3.3902%
145	2-Jun-14	0.125	-3.9221%		145	2-Jun-14	0.145	0.0000%
146	30-May-14	0.13	0.0000%		146	30-May-14	0.145	0.0000%
147	29-May-14	0.13	3.9221%		147	29-May-14	0.145	0.0000%
148	28-May-14	0.125	-3.9221%		148	28-May-14	0.145	-3.3902%
149	27-May-14	0.13	3.9221%		149	27-May-14	0.15	6.8993%
150	26-May-14	0.125	-3.9221%		150	26-May-14	0.14	0.0000%
151	23-May-14	0.13	0.0000%		151	23-May-14	0.14	-3.5091%
152	22-May-14	0.13	-3.7740%		152	22-May-14	0.145	0.0000%

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153	21-May-14	0.135	0.0000%		153	21-May-14	0.145	0.0000%
154	20-May-14	0.135	0.0000%		154	20-May-14	0.145	0.0000%
155	19-May-14	0.135	0.0000%		155	19-May-14	0.145	3.5091%
156	16-May-14	0.135	0.0000%		156	16-May-14	0.14	-3.5091%
157	15-May-14	0.135	-3.6368%		157	15-May-14	0.145	-3.3902%
158	14-May-14	0.14	0.0000%		158	14-May-14	0.15	6.8993%
159	12-May-14	0.14	0.0000%		159	12-May-14	0.14	0.0000%
160	9-May-14	0.14	-3.5091%		160	9-May-14	0.14	-3.5091%
161	8-May-14	0.145	0.0000%		161	8-May-14	0.145	3.5091%
162	7-May-14	0.145	7.1459%		162	7-May-14	0.14	-6.8993%
163	6-May-14	0.135	0.0000%		163	6-May-14	0.15	3.3902%
164	5-May-14	0.135	-3.6368%		164	5-May-14	0.145	-3.3902%
165	2-May-14	0.14	-3.5091%		165	2-May-14	0.15	0.0000%
166	30-Apr-14	0.145	3.5091%		166	30-Apr-14	0.15	0.0000%
167	29-Apr-14	0.14	-3.5091%		167	29-Apr-14	0.15	-3.2790%
168	28-Apr-14	0.145	-3.3902%		168	28-Apr-14	0.155	-3.1749%
169	25-Apr-14	0.15	0.0000%		169	25-Apr-14	0.16	6.4539%
170	24-Apr-14	0.15	0.0000%		170	24-Apr-14	0.15	-6.4539%
171	23-Apr-14	0.15	3.3902%		171	23-Apr-14	0.16	9.8440%
172	22-Apr-14	0.145	-3.3902%		172	22-Apr-14	0.145	0.0000%
173	21-Apr-14	0.15	0.0000%		173	21-Apr-14	0.145	-3.3902%
174	18-Apr-14	0.15	0.0000%		174	18-Apr-14	0.15	3.3902%
175	17-Apr-14	0.15	6.8993%		175	17-Apr-14	0.145	0.0000%
176	16-Apr-14	0.14	-6.8993%		176	16-Apr-14	0.145	-3.3902%
177	15-Apr-14	0.15	-3.2790%		177	15-Apr-14	0.15	3.3902%
178	14-Apr-14	0.155	0.0000%		178	14-Apr-14	0.145	0.0000%
179	11-Apr-14	0.155	3.2790%		179	11-Apr-14	0.145	0.0000%
180	10-Apr-14	0.15	6.8993%		180	10-Apr-14	0.145	-3.3902%
181	9-Apr-14	0.14	7.4108%		181	9-Apr-14	0.15	6.8993%
182	8-Apr-14	0.13	0.0000%		182	8-Apr-14	0.14	-3.5091%
183	7-Apr-14	0.13	-3.7740%		183	7-Apr-14	0.145	0.0000%
184	4-Apr-14	0.135	-3.6368%		184	4-Apr-14	0.145	0.0000%
185	3-Apr-14	0.14	0.0000%		185	3-Apr-14	0.145	-3.3902%
186	2-Apr-14	0.14	0.0000%		186	2-Apr-14	0.15	3.3902%
187	1-Apr-14	0.14	0.0000%		187	1-Apr-14	0.145	0.0000%
188	31-Mar-14	0.14	-3.5091%		188	31-Mar-14	0.145	0.0000%
189	28-Mar-14	0.145	-3.3902%		189	28-Mar-14	0.145	0.0000%
190	27-Mar-14	0.15	3.3902%		190	27-Mar-14	0.145	0.0000%
191	26-Mar-14	0.145	-3.3902%		191	26-Mar-14	0.145	0.0000%

192	25-Mar-14	0.15	0.0000%		192	25-Mar-14	0.145	-3.3902%
193	24-Mar-14	0.15	-3.2790%		193	24-Mar-14	0.15	3.3902%
194	21-Mar-14	0.155	3.2790%		194	21-Mar-14	0.145	0.0000%
195	20-Mar-14	0.15	0.0000%		195	20-Mar-14	0.145	0.0000%
196	19-Mar-14	0.15	3.3902%		196	19-Mar-14	0.145	0.0000%
197	18-Mar-14	0.145	0.0000%		197	18-Mar-14	0.145	3.5091%
198	17-Mar-14	0.145	0.0000%		198	17-Mar-14	0.14	-3.5091%
199	14-Mar-14	0.145	-3.3902%		199	14-Mar-14	0.145	0.0000%
200	13-Mar-14	0.15	0.0000%		200	13-Mar-14	0.145	0.0000%
201	12-Mar-14	0.15	-6.4539%		201	12-Mar-14	0.145	-6.6691%
202	11-Mar-14	0.16	-3.0772%		202	11-Mar-14	0.155	3.2790%
203	10-Mar-14	0.165	0.0000%		203	10-Mar-14	0.15	3.3902%
204	7-Mar-14	0.165	-2.9853%		204	7-Mar-14	0.145	-3.3902%
205	6-Mar-14	0.17	-2.8988%		205	6-Mar-14	0.15	3.3902%
206	5-Mar-14	0.175	2.8988%		206	5-Mar-14	0.145	3.5091%
207	4-Mar-14	0.17	-5.7158%		207	4-Mar-14	0.14	0.0000%
208	3-Mar-14	0.18	0.0000%		208	3-Mar-14	0.14	0.0000%
209	28-Feb-14	0.18	-2.7399%		209	28-Feb-14	0.14	-6.8993%
210	27-Feb-14	0.185	-2.6668%		210	27-Feb-14	0.15	3.3902%
211	26-Feb-14	0.19	-7.5986%		211	26-Feb-14	0.145	0.0000%
212	25-Feb-14	0.205	0.0000%		212	25-Feb-14	0.145	3.5091%
213	24-Feb-14	0.205	2.4693%		213	24-Feb-14	0.14	-6.8993%
214	21-Feb-14	0.2	-7.2321%		214	21-Feb-14	0.15	0.0000%
215	20-Feb-14	0.215	-24.6133%		215	20-Feb-14	0.15	0.0000%
216	19-Feb-14	0.275	-5.3110%		216	19-Feb-14	0.15	3.3902%
217	18-Feb-14	0.29	-8.2692%		217	18-Feb-14	0.145	-3.3902%
218	17-Feb-14	0.315	3.2261%		218	17-Feb-14	0.15	0.0000%
219	14-Feb-14	0.305	5.0431%		219	14-Feb-14	0.15	3.3902%
220	13-Feb-14	0.29	-5.0431%		220	13-Feb-14	0.145	-3.3902%
221	12-Feb-14	0.305	-3.2261%		221	12-Feb-14	0.15	3.3902%
222	11-Feb-14	0.315	6.5597%		222	11-Feb-14	0.145	3.5091%
223	10-Feb-14	0.295	14.5712%		223	10-Feb-14	0.14	0.0000%
224	7-Feb-14	0.255	0.0000%		224	7-Feb-14	0.14	7.4108%
225	6-Feb-14	0.255	10.3184%		225	6-Feb-14	0.13	0.0000%
226	5-Feb-14	0.23	6.7441%		226	5-Feb-14	0.13	0.0000%
227	4-Feb-14	0.215	17.7681%		227	4-Feb-14	0.13	-3.7740%
228	30-Jan-14	0.18	0.0000%		228	30-Jan-14	0.135	0.0000%
229	29-Jan-14	0.18	0.0000%		229	29-Jan-14	0.135	0.0000%
230	28-Jan-14	0.18	2.8171%		230	28-Jan-14	0.135	-3.6368%



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231	27-Jan-14	0.175	-2.8171%		231	27-Jan-14	0.14	0.0000%
232	24-Jan-14	0.18	5.7158%		232	24-Jan-14	0.14	3.6368%
233	23-Jan-14	0.17	-5.7158%		233	23-Jan-14	0.135	-3.6368%
234	22-Jan-14	0.18	-8.0043%		234	22-Jan-14	0.14	3.6368%
235	21-Jan-14	0.195	8.0043%		235	21-Jan-14	0.135	-3.6368%
236	20-Jan-14	0.18	-8.0043%		236	20-Jan-14	0.14	0.0000%
237	16-Jan-14	0.195	-2.5318%		237	16-Jan-14	0.14	0.0000%
238	15-Jan-14	0.2	-9.5310%		238	15-Jan-14	0.14	0.0000%
239	13-Jan-14	0.22	4.6520%		239	13-Jan-14	0.14	-3.5091%
240	10-Jan-14	0.21	10.0083%		240	10-Jan-14	0.145	3.5091%
241	9-Jan-14	0.19	0.0000%		241	9-Jan-14	0.14	0.0000%
242	8-Jan-14	0.19	2.6668%		242	8-Jan-14	0.14	0.0000%
243	7-Jan-14	0.185	0.0000%		243	7-Jan-14	0.14	3.6368%
244	6-Jan-14	0.185	-2.6668%		244	6-Jan-14	0.135	0.0000%
245	3-Jan-14	0.19	2.6668%		245	3-Jan-14	0.135	0.0000%
246	2-Jan-14	0.185			246	2-Jan-14	0.135	
	Volatility (day)		5.12%			Volatility (day)		2.94%
	Volatility (annually)		80.28%			Volatility (annually)		46.12%
		Average (volatility)			63.20%			

