

The Terpins Brothers and the Heinz Takeover

A Case Study of Company Valuation and Insider Trading in Options*

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Abstract

This teaching case study illustrates the illicit insider trades in equity options ahead of the Heinz takeover by Berkshire Hathaway and 3G Capital. The case introduces students to various concepts of option valuation and option strategies. These include option payoff diagrams, put-call parity, arbitrage strategies, the Black-Scholes formula, and option Greeks, as well as an application to company valuation using the Merton model.

Keywords: Case Study; Derivatives; Insider Trading; Mergers and Acquisitions; Methodology; Options; Teaching

JEL Classification: A22; A23; A29; B40; G13, G14, G34, G38, K22, K41

Target Audience: Advanced Bachelor, M.Sc., MBA, Executive MBA

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1 Introduction

On February 14, 2013, Berkshire Hathaway Inc. and 3G Capital announced a deal in which the world famous ketchup maker H.J. Heinz Co would eventually be purchased for USD \$28 billion.¹ This would result in an offer price of USD \$72.50 per H.J. Heinz Co share.² The day after the announcement, the Securities and Exchange Commission (SEC) launched an investigation into a suspiciously large number of call options being placed on H.J. Heinz Co's stock just prior to the takeover announcement from one single foreign trading account.³ The trade corresponded to 2,533 June call options at a strike of USD \$65 when the stock was trading at USD \$60.48. In other words, the trade was a leveraged bet that the Heinz stock price would rise in the near future.

The irregular and suspicious nature of these trades became more and more apparent and attracted the attention of the SEC. The Commission became interested in evaluating the takeover offer and the options trades that had taken place. The investigating officers from the SEC Enforcement Division's Market Abuse Unit would use all their combined knowledge of financial derivatives and option theory to conduct a forensic analysis of the trades and to evaluate whether they were illegal and disguising inside traders and evaluate different trading strategies that could lead to unfair benefits derived from material non-public information. From Warren Buffet and 3G Capital's perspective, they would value the target company, and obtain its probability of default to determine H.J. Heinz Co's suitability as a target using the Merton model.

After proving that insider trading had occurred, the Market Abuse Unit was able to implement judicial action against the culprits. These were ultimately identified as two Brazilian brothers, Michel and Rodrigo Terpins. Initially, following the red flag raised by the unusually high purchase of call options placed on Heinz, the investigators froze the assets of a Swiss-based Goldman Sachs-registered omnibus account used for the illicit trades. No trade in Heinz equity options had been registered for this account over the 6 months preceding the public announcement. Subsequently, the SEC targeted the two aforementioned individuals. The Terpins brothers were sentenced to

¹U.S. Securities and Exchange Commission Press Release, October 10, 2013, "Previously Unknown Insider Traders in Heinz Agree to \$5 Million Settlement", Retrieved from <http://www.sec.gov/News/PressRelease/Detail/PressRelease/1370539873749#.U22Jglfzev8>

²Jargon, J., & Ng, S. (2013, February 15)

³Ibid.

disgorge the USD \$1,809,857 in illegal profits in addition to a financial penalty of USD \$3 million.⁴ The investigating team now wishes to share the approach they had taken in this case and the steps they had used to catch the offenders so as to discourage future inside traders.

2 The Target

The Market Abuse Unit began its investigation by familiarizing itself with the parties involved in the takeover announcement. The target, H.J. Heinz Co, which was founded in 1869, was a diversified foodstuff manufacturer with total liabilities and shareholder equity worth USD \$11.9 billion (see Exhibit 1) in the fiscal year of 2013. While commonly associated with ketchup, H.J. Heinz Co is in fact a food conglomerate with a diverse product mix encompassing condiments and sauces, frozen foods, soups, beans and pasta meals in addition to infant nutrition, among other food products. Ketchup and sauces represented 45% of 2012 sales revenues, meals and snacks accounted for 38%, infant nutrition 11%, and other products the remaining 6%. The company had a global reach, with two-thirds of H.J. Heinz Co's 2012 sales revenues earned outside of the United States.⁵

At the time of the takeover announcement, H.J. Heinz Co had a low level of business risk and very stable operations that had been demonstrated by its stable revenues, despite the recent worldwide economic slowdown. Prior to the takeover announcement, H.J. Heinz Co was rated Baa2 by Moody's Investors Services, and BBB+ by Standard&Poor's Ratings Services.⁶ After the February 13 takeover announcement, credit ratings for H.J. Heinz Co were subject to further drops, as the debt-financed takeover would further raise the company's financial leverage.⁷

⁴Ibid.

⁵Bloomberg (Electronic Database): Bloomberg L.P. (2013) Fitch Adjusts or Withdraws Ratings on Certain Heinz Debt on Deal Closing (2014, June 12). Retrieved May 10, 2014 from Bloomberg terminal.

⁶Cai, D. (2013, February 14). Moody's, S&P Review Heinz's Ratings for Downgrade. Retrieved from <http://online.wsj.com/article/BT-CO-20130214-717367.html>.

⁷Weddington, B., & Abdill, P. (2013, June 19). Moody's lowers Heinz ratings following close of LBO. Moodys.com. Retrieved May 9, 2014, from https://www.moody.com/research/Moodys-lowers-Heinz-ratings-following-close-of-LBO-PR_275875.

3 The Acquisition

The investor consortium assuming control over H.J. Heinz Co included Berkshire Hathaway Inc. and 3G Capital. Berkshire Hathaway Inc. was a holding company that owned many subsidiaries. It was thereby engaged in a wide variety of business activities, including insurance, utility, energy generation and distribution, in addition to many others. At the time of the takeover announcement, Berkshire Hathaway Inc. was rated AAA by Standard&Poor's. The other investing party was 3G Capital, a global private equity firm that placed an emphasis on producing long-term value with a successful investment track record. Its business model was to maximize the potential of the brands and businesses it held in its portfolio.⁸

On February 14, 2013, Berkshire Hathaway Inc. and 3G Capital jointly offered to take over H.J. Heinz Co initially for a value of USD \$23 billion. However at the same time there was an issue of USD\$5 billion worth in debt, leading the offer to be finally valued at USD \$28 billion.⁹ Berkshire Hathaway Inc. and 3G Capital would invest, respectively, USD \$12.25 billion and USD \$4.25 billion of common equity, the rest being financed through debt. Thus, as a result of this takeover, H.J. Heinz Co's stock would be purchased for USD \$72.50 per share via a cash consideration.¹⁰ The price of USD \$72.50 per share reflected a 20% increase above H.J. Heinz Co's closing share price of USD \$60.48 on February 13, 2014 (see Exhibit 2). This acquisition would represent the largest transaction in the food industry to date.¹¹

4 Valuing the Takeover

Interested in the proposition of taking over a very esteemed American brand, Warren Buffet subsequently decided to value the target company using the market information prevailing at the time of the takeover. Deciding against a conventional cash flow analysis that could cause variations

⁸Mullen, M. (2013, June 7). Berkshire Hathaway and 3G Capital Complete Acquisition of H.J. Heinz Company. Heinz Online Newsroom. Retrieved May 9, 2014, from <http://news.heinz.com/press-release/finance/berkshire-hathaway-and-3g-capital-complete-acquisition-hj-heinz-company>.

⁹Tracer, Z. (2013, Feb. 14). Global M&A Review . Bloomberg. Retrieved Dec. 31, 2014, from <http://www.bloomberg.com/news/2013-02-14/berkshire-joins-3g-capital-to-buy-heinz-in-28-billion-food-deal.html>.

¹⁰Jargon, J., & Ng, S. (2013, February 15). Heinz Sold as Deals Take Off. The Wall Street Journal. Retrieved from <http://online.wsj.com/news/articles/SB10001424127887323478004578303733925078030>

¹¹Bloomberg (Electronic Database): Bloomberg L.P. (2013) Fitch Adjusts or Withdraws Ratings on Certain Heinz Debt on Deal Closing (2014, June 12). Retrieved May 10, 2014 from Bloomberg terminal.

in valuation based upon analyst opinions, Buffet and his investment team decided to try use the Merton model instead. The Merton approach, which interprets the value of equity as a call option on a firm's assets with a strike price equal to the corporation's outstanding debt, would use consensual and publicly accessible information provided by financial markets in order to value the company.¹² In order to carry out the valuation, the following inputs would be needed: the market and book values of equity (see Exhibits 1 and 5), the outstanding debt obligations, the volatility of assets (which would have to be approximated using the volatility of the past year's daily equity returns), the remaining time until the debt would have to be repaid, a riskless borrowing rate and the dividend yield provided by Heinz Co. The number of days used to annualize implied volatility and returns data would be 252.

The time horizon, i.e. the time until debt repayment, that would be used in the valuation would be set to one year. In the valuation, the risk-free rate used would be the one-year Treasury Constant Maturity yield the day before the takeover, in other words its value on February 13, 2013. One simplifying assumption that could be made would be to assume that the book value of debt could be used as a gross estimate of all future debt repayments. Lastly, the dividend yield on H.J. Heinz Co's equity could also be found using options with a strike price of USD \$65.00; the risk-free rate that would apply here, however, would be the one-year swap rate (see Exhibit 3) that the market was using at the time. The dividend yield would be annualized using 365 days.

Using the above methodology to value H.J. Heinz Co would provide a reality check to determine whether whether H.J. Heinz Co's executives and shareholders would be receptive of the offer made by Berkshire Hathaway Inc. and 3G Capital. In addition, Berkshire Hathaway Inc. and 3G capital could later use this information to determine the risk-neutral default probability of H.J. Heinz Co in the year to come and ensure the financial survival of their target.

5 Finding Heinz Co's Risk-Neutral Default Probability

At the time of the takeover, Heinz Co was a highly leveraged company. The balance sheet for the fiscal year ending on January 27, 2013 indicated a total value of liabilities equal to USD \$8,847.986

¹²Hull, J. (2012). 23. Options, futures, and other derivatives (8th ed., pp. 530, 531). Upper Saddle River, NJ: Prentice Hall.

million (see Exhibit 1). These liabilities stood against assets worth USD \$11,929.104 million.¹³ On February 13, the day preceding the takeover, the one-year swap rate that the acquirers would use as an approximation to the riskless borrowing rate represented an annualized rate of 0.33% (see Exhibit 3) assuming an actual/365 day convention.

On February 13, 2013, the market quoted American June call and put options with strike prices of USD \$65.00. These options would expire on June 22, 2013 (see Exhibit 4), retaining a remaining time to maturity of 129 calendar days or 93 trading days. A crucial component of calculating the risk neutral default probability would be an estimate of H.J. Heinz Co's asset volatility. This would be inferable from an estimation of the company's equity volatility using one year's worth of daily equity returns, assuming 252 trading days per year. The equity volatility would be converted into the asset volatility using the firm's total debt and market value of equity. The distance to default and risk neutral default probability would subsequently be calculated using the book values of assets and debt. A dividend yield would also need to be determined as a final input for the Merton model. The dividend yield would be inferable from the premiums of call and put options with strike prices of USD \$65.00 (see Exhibit 4). The risk free rate would be assumed to be 0.33% per annum for the calculation of the expected dividend yield. An estimate of Heinz Co's risk-neutral probability of default would be useful for gauging whether the takeover had been advisable and its riskiness from the perspective of Berkshire Hathaway Inc. and 3G Capital.

6 The Terpins Brothers

The unusually large amount of call options transacted on H.J. Heinz Co prior to its public takeover announcement led the investigators to initiate litigation against the unknown traders. The follow-up investigations would later lead the investigators to Rodrigo and Michel Terpins. The Terpins brothers were Brazilian investors who had obtained private information about the upcoming takeover announcement that was to occur on February 14. According to the SEC, Michel Terpins was first to learn about the H.J. Heinz Co takeover and subsequently informed his brother Rodrigo Terpins. Rodrigo Terpins, who received a call from his brother while on vacation at Disney World

¹³H.J. Heinz Company. (2013). 10-K Annual Report 2013. Retrieved May 10, 2014, from H.J. Heinz Co website <http://www.heinz.com/our-company/investor-relations/shareholder-information/sec-filings.aspx>.

in Orlando, subsequently placed the orders through the Swiss-based brokerage account they had at Alpine Swift, based on this non-public information.¹⁴ Alpine Swift would then execute these trades through an omnibus account at Goldman Sachs & Co's Zurich office, which was supposed to maintain the brothers' anonymity as an omnibus account would transact aggregate positions on behalf of its customers without disclosing its clients' identities.

At the time of the trade, the aforementioned American call and put options with strike prices of USD \$65.00 were trading at mid-values of USD \$0.35 and USD \$5.65, respectively (see Exhibit 4). The analysis would show that the premium of the call option soared by 1700% on the day of the trade and that the illicit transaction placed by the Terpins brothers had produced unrealized profits of approximately USD \$1.8 million on the 2,533 out-of-the-money calls that were placed by the brothers on February 13.^{15,16} The sudden, large number of leveraged bullish trades, purchased through a foreign anonymous account that had not previously been participating in the market for Heinz Co's equity or equity options was highly suspicious, confirming the Market Abuse Unit's hypothesis that inside trading had occurred.

7 Volatility Estimation

Until this point, in all their calculations, the Market Abuse Unit had used one year's worth of daily equity log returns to calculate the historical equity volatility and subsequently to derive the volatility of H.J. Heinz Co's assets. For purposes of comparison, the investigating team decided to use an alternative equity volatility estimate. They would consider the volatility implied by market prices of H.J. Heinz Co's June equity options with a strike price equal to USD \$65.00 (see Exhibit 4).

The time horizon that would be used to determine the implied volatility would be that from February 13, the day of the trades, until the option's expiration date, assuming 252 trading days a

¹⁴U.S. Securities and Exchange Commission Press Release, October 10, 2013, "Previously Unknown Insider Traders in Heinz Agree to \$5 Million Settlement", Retrieved from <http://www.sec.gov/News/PressRelease/Detail/PressRelease/1370539873749#.U22Jglfzev8>.

¹⁵Berkowitz, B. (2013, February 16). SEC sues over Heinz option trading before buyout. Chicago Tribune. Retrieved May 9, 2014, from http://articles.chicagotribune.com/2013-02-16/business/sns-rt-us-heinz-berkshire-secbre91e14r-20130215_1_daniel-hawke-options-sec-s-division.

¹⁶U.S. Securities and Exchange Commission Press Release, October 10, 2013, "Previously Unknown Insider Traders in Heinz Agree to \$5 Million Settlement", Retrieved from <http://www.sec.gov/News/PressRelease/Detail/PressRelease/1370539873749#.U22Jglfzev8>.

year. The assumed risk-free rate would be the one-year swap rate on February 13. The team would use the dividend yield that they had previously determined. Lastly, the mid-price of the observed bid and ask prices would be used as the call premium. The volatility could then be inferred via an iterative process. This implied volatility estimate would be used in subsequent calculations that the Market Abuse Unit would conduct to evaluate the option portfolio of the inside traders.

8 Option Greeks

The Market Abuse Unit decided to investigate the sensitivity of the option portfolio made up of 2,533 long June call options with a strike price of USD \$65.00. They first wanted to analyze the portfolio's delta, i.e. the sensitivity of the portfolio to a small change in the underlying stock price. In their calculations, the unit used the implied dividend yield found earlier, and for the remaining calculations they assumed a 252 day count convention. They would also use a risk-free rate equal to the one year swap rate on February 13 (see Exhibit 3). Finally, they would use the implied equity volatility previously calculated using the Black-Scholes-Merton option pricing model. The portfolio's delta would also inform the investigators about the likelihood that the call option would end up in-the-money. The probability that the call option would end up in the money could also be determined by the cumulative probability distribution function for a standardized normal distribution, based on the Black-Scholes-Merton pricing formulae.

The investigators were also interested in determining how much the option portfolio's value could change in response to a jump in H.J. Heinz Co's equity price. In other words, they were interested in calculating the portfolio's gamma. This could be obtained using the same inputs as for the previously calculated delta along with a spot price that was observed the day before the takeover. In their search for more incriminating evidence, investigators also calculated the omega for these call options, to determine how leveraged the trade was.

Lastly, the investigators were curious about the sensitivity of the portfolio's value due to the passage of time and changes in the interest rate during the period in which the Terpins brothers would be expected to hold on to their 2,533 call options. This would give the team a sense of how much profit the trade could generate simply through the holding of the call options over time.

9 Insider Trading Strategies

While the simple purchase of plain vanilla out-of-the-money call options carried out by the Terpins brothers was a certain strategy through which to benefit from a rise in Heinz Co's stock price in response to the takeover announcement, there exist many alternative strategies that could have been implemented to obtain the same result. The investigators from the SEC were set the task of thinking about alternative option strategies that could have been implemented using the put and call options available on the market (see Exhibit 4). The team would try to come up with as many feasible strategies as possible. Afterwards, they would check whether the options they had used to construct their strategies experienced high trading volumes. Other accounts involved in suspiciously large trades could then potentially be targeted for additional forensic financial analysis.

10 Arbitrage Opportunity

Immediately before the inside trade occurred, some traders spotted a put option on H.J. Heinz Co's stock with a strike price of USD \$65.00 trading at an offer price of USD \$5.50 in the OTC market, as opposed to its exchange-traded value shown in Exhibit 4. Using put-call parity, arbitrageurs could determine whether a risk-free profit could be earned on February 13. Theoretically, any risk-free profit opportunities should only have existed for a short period of time.

Arbitrageurs and traders alike on that day were presented with the following situation. They were faced with a very liquid market and so they could go both short and long on put and call options. For simplicity, the Market Abuse Unit assumed that such arbitrageurs could also borrow or finance any purchases made at the risk-free rate, assumed to be equal to the one-year swap rate on that day (see Exhibit 3). Would a risk-free profit be possible?

To finalize their investigation, the SEC team wished to examine a few additional core issues in more detail. Considering the previous valuation of the company, the risk-neutral probability of default, and the inside information available, what strategies could Rodrigo Terpins and other inside traders have used in order to make a profit? Was the consideration posted by Berkshire Hathaway Inc. and 3G Capital fair for H.J. Heinz Co's stakeholders, given its market value? Lastly, was the risk-neutral probability of default significant enough to warrant the ratings issued on H.J. Heinz

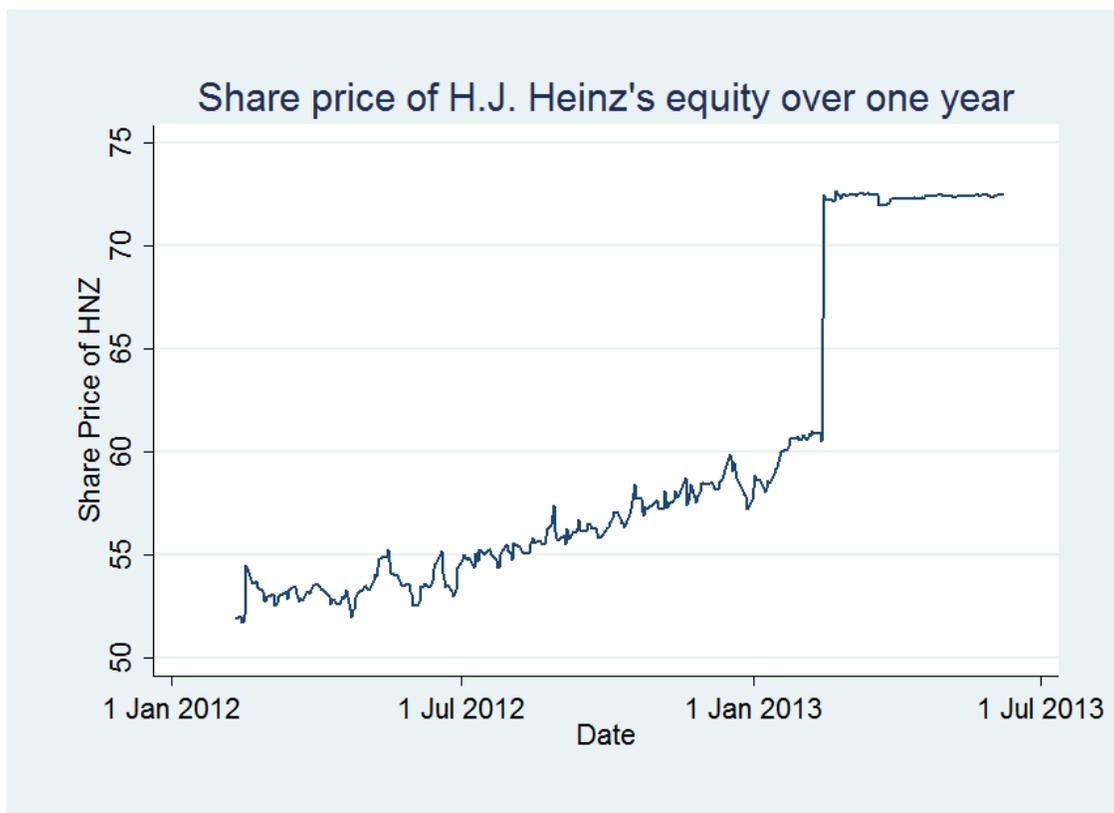
Co by Moody's and Standard&Poor's?

Exhibit 1: Heinz Co. Balance Sheet as of January 27, 2013

This exhibit replicates the Heinz Co unaudited balance sheet for the fiscal year 2013. Panel A represents all assets. Panel B represents all liabilities and shareholder equity. All numbers are reported in units of thousand USD, except the per share data. Source: H.J. Heinz Company. (2013). 10-K Annual Report 2013.

Panel A: Assets (in thousands, except per share data)	
Current Assets:	
Cash and cash equivalents	1,100,689
Trade receivables, net	896,415
Other receivables, net	202,358
Inventories:	
Finished goods and work-in-process	1,135,509
Packaging material and ingredients	312,845
Total inventories	1,448,354
Prepaid expenses	173,045
Other current assets	88,011
Total current assets	3,908,872
Property, plant and equipment	5,319,307
Less accumulated depreciation	2,891,133
Total property, plant and equipment, net	2,428,174
Goodwill	3,104,527
Trademarks, net	1,050,856
Other intangibles, net	383,043
Other non-current assets	1,053,632
Total other non-current assets	5,592,058
Total assets	11,929,104
Panel B: Liabilities (in thousands)	
Current Liabilities:	
Short-term debt	14,747
Portion of long-term debt due within one year	1,038,511
Trade payables	1,129,651
Other payables	158,143
Accrued marketing	320,052
Other accrued liabilities	623,962
Income taxes	91,283
Total current liabilities	3,376,349
Long-term debt	3,930,592
Deferred income taxes	776,660
Non-pension post-retirement benefits	230,919
Other non-current liabilities	504,760
Total long-term liabilities	5,442,931
Redeemable non-controlling interest	28,706
Equity:	
Capital stock	107,834
Additional capital	608,820
Retained earnings	7,877,440
	8,594,094
Less:	
Treasury stock at cost	4,675,844
Accumulated other comprehensive loss	887,669
Total H.J. Heinz Company shareholders' equity	3,030,581
Non-controlling interest	50,537
Total equity	3,081,118
Total liabilities and equity	11,929,104

Exhibit 2: Share Price of H.J. Heinz Co's Equity One Year Prior to and After the Takeover



Source: Center for Research in Security Prices (CRSP).

Exhibit 3: Values of US Treasury Constant Maturity Yields and Interest Rate Swaps

Date	1-year Constant Maturity Treasury yields (% p.a.)	1-year Interest Rate Swap rates (% p.a.)
01-Feb-13	0.15	0.34
04-Feb-13	0.15	0.33
05-Feb-13	0.15	0.34
06-Feb-13	0.15	0.33
07-Feb-13	0.15	0.33
08-Feb-13	0.14	0.33
11-Feb-13	0.15	0.33
12-Feb-13	0.14	0.33
13-Feb-13	0.15	0.33
14-Feb-13	0.16	0.34
15-Feb-13	0.17	0.33

Source: Federal Reserve Economic Data (FRED).

Exhibit 4: Summary of Options Available on February 13, 2013 (all prices in USD)

Type	Strike	Expiration	Bid	Offer	Mid
Call	35	22-Jun-13	23.80	27.30	25.55
Put	35	22-Jun-13	0	0.50	0.25
Call	40	22-Jun-13	19.20	22.10	20.65
Put	40	22-Jun-13	0	0.15	0.075
Call	45	22-Jun-13	14.10	16.90	15.50
Put	45	22-Jun-13	0.05	0.15	0.10
Call	50	22-Jun-13	9.60	11	10.30
Put	50	22-Jun-13	0.15	0.25	0.20
Call	55	22-Jun-13	5.60	5.80	5.70
Put	55	22-Jun-13	0.55	0.70	0.625
Call	60	22-Jun-13	1.85	2.00	1.925
Put	60	22-Jun-13	2.10	2.20	2.15
Call	65	22-Jun-13	0.30	0.40	0.35
Put	65	22-Jun-13	5.50	5.80	5.65
Call	70	22-Jun-13	0.00	0.10	0.05
Put	70	22-Jun-13	9.90	10.80	10.35
Call	75	22-Jun-13	0.00	0.05	0.025
Put	75	22-Jun-13	13.80	15.70	14.75
Call	80	22-Jun-13	0.00	0.05	0.025
Put	80	22-Jun-13	18.50	20.90	19.70
Call	85	22-Jun-13	0.00	0.05	0.025
Put	85	22-Jun-13	23.50	25.90	24.70

Source: Center for Research in Security Prices (CRSP).

Exhibit 5: Summary of Stock Price Data Available on February 13, 2013 (all prices in USD)

Date	Price	Number of Shares Outstanding
01-Feb-13	60.85	320,658,000
04-Feb-13	60.59	320,658,000
05-Feb-13	60.90	320,658,000
06-Feb-13	60.77	320,658,000
07-Feb-13	61.00	320,658,000
08-Feb-13	60.91	320,658,000
11-Feb-13	60.95	320,658,000
12-Feb-13	60.88	320,658,000
13-Feb-13	60.48	320,658,000

Source: Center for Research in Security Prices (CRSP).