



Are Oil Industry Mergers Becoming Less Profitable?

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ABSTRACT

Are oil industry mergers becoming less profitable? This study evaluates oil industry consolidations that occur during the 16-year time frame between 1998 and 2013 to find out. This quantitative study focuses on the stock price total return performance of acquirer companies over a 4 years horizon for each merger transaction. The portfolios created from these transactions provide for an analysis of the economics of the mergers after full integration of target companies. Four benchmarks are incorporated to provide various economic adjustment factors. There are seven cases presented that show that oil industry mergers are becoming less profitable. Implications are that companies may chase mergers as an easy way to increase returns, but this may not occur. As ever larger companies chase the remaining players and bid up their selling prices, increased returns may not always be the outcome.

Keywords: Oil Industry Mergers, 1998-2013, Brent Crude Oil

JEL Classification: G15, G34, P18

1. INTRODUCTION

The objective of this study is to evaluate the profitability of oil mergers from 1998 through 2013 by using the stock price total return formula of acquirer companies over a 4 years horizon for each merger transaction. This 16-year time frame is further segmented into two 8-year periods and the two time periods are compared against each other. The research question for this study is: Are mergers in the oil industry becoming less profitable? Based on the research methods used and the significance of the results, a confirmation of the hypothesis is warranted. Indeed mergers in the oil industry are becoming less profitable.

Seven cases are presented which are used to assess the performance of various groups of acquirers. There are three cases where the two 8-year groups are assessed against each. There is a case which gauges the acquirers group against the oil market and a case which gauges the oil industry against the oil market. This allows for grading the performance of the acquirers group against the oil industry and shows that the acquirers perform inferior to the oil industry and in a statistically significant manner. There are two size delineated cases which look at the small and large targets relative to the acquirers group. When appraising the performance of the size delineated cases based on the targets/acquirers proportions,

the smaller relative sized transactions perform better than the larger ones and in a significant manner.

Three hypotheses are included which quantify the performance of the acquirers to their merger activity. H_1 : The 1998-2005 period is superior to the 2006-2013 period in the three-factor tests. H_2 : The acquirers perform worse than the oil industry. H_3 : Proportionally smaller oil industry merger transactions outperform the larger ones. All three hypotheses are confirmed and the study results are consistent which document questionable performance of mergers. The performance of some of the mergers is attractive, specifically the proportionally smaller sized target transactions.

There are numerous studies which document the benefits and risks of using mergers for growth as an offensive measure or for consolidating a market position as a defensive measure. The benefits are well documented (Andrade and Stafford, 2004; Hough, et al., 2007; Subeniotis, et al., 2011; Pratt, 2012; Marfo et al., 2013; Vild and Zeisberger, 2014).

The uncertainty surrounding M&A activity is also well documented. There are numerous studies on issues surrounding this uncertainty including the added organizational complexity, increased risk, higher debt loads, and questions on profitability,

which if not resolved will reduce the value of the business enterprise (Bouwman et al., 2003; Sirower and Sahni, 2006; Furfine and Rosen, 2011; Subeniotis, et al., 2011; Ferrer, 2012; Soni, 2014).

2. LITERATURE REVIEW

With the volatile crude oil prices during the 1990s and subsequent fall in prices in 1998, oil companies use efforts in efficiency in order to deliver more consistent shareholder returns (Hough, et al., 2007). To grow, the majors could explore for crude oil reserves in the ground through expensive exploration programs (Arora, 2015). As with any exploration activity, success is not guaranteed, and typically, the bigger the prize, the higher the cost (Mustafa, 2016). The easier alternative to acquire crude oil reserves is to acquire a company that already has the reserves (Pratt, 2012).

With regard to overall efficiency and profitability, “when done for the right reasons and in the right way, mergers and acquisitions can indeed be beneficial” (Marfo et al., 2013). The low stock valuations in the oil industry are triggered by low crude oil prices which have fallen in 1998 both in the US market and in the world market (Hough, et al., 2007). These tie-ups are driven by cost cutting efforts to achieve synergies and by 1998, mergers are coming to the oil industry in a big way (Hough, et al., 2007).

Some of the mergers seem to make a lot of sense in that the two companies fit together where one might have an advantage in one geographical area or one business sector (Marfo et al., 2013). These mergers can lead to increased profitability in the coming years (Andrade and Stafford, 2004). Also, some of the companies that merge have similar business outlooks and it seems obvious that they would merge with little issue because they have a similar mentality (Marfo et al., 2013).

The 16-year time frame from 1998 through 2013 sees major upheavals and consolidations in the oil industry. The changes occur due to the fact that it is cheaper and less risky for oil companies to acquire other companies that have crude oil reserves in the ground than to explore for crude oil reserves themselves (Arora, 2015). Because of changes in the oil industry during this time, it is widely believed in the oil industry that you would either grow or die, and to compete mergers are seen as necessary for continued growth and profitability (Marfo et al., 2013).

Expansion for companies can take place through organic growth where the existing market is expanded, namely when new products are introduced, or through an increasing number of markets (Andrade and Stafford, 2004). Mergers and acquisitions prove their worth when companies need growth to achieve certain economies of scale and economies of scope (Subeniotis, et al., 2011). Combining forces through a merger of equals or a large firm acquiring a small firm have similar dynamics, they are generally seen as a mechanism for growth (Marfo et al., 2013).

M&A activity is not without risk (Furfine and Rosen, 2011). In essence, mergers may create or destroy value depending on how they perform (Ferrer, 2012). In the merger game, results are not

guaranteed (Soni, 2014). Also, the results of mergers are not always immediately known (Bouwman, et al., 2003). Excess premiums paid for the M&A transaction can have negative impacts on company performance for years (Sirower and Sahni, 2006).

There are many reasons behind mergers, but they can be simplified into just a few items: reducing costs, realizing synergies, diversifying product lines, and increasing revenues (Subeniotis, et al., 2011). Strategic bidders usually have the advantage over other acquirers (Vild and Zeisberger, 2014). Strategic bidders that can realize the synergy benefits usually have an advantage over pure financial players not only because they understand the industry better, but also because they can reduce costs and achieve synergies as they digest the merger (Thompson, et al., 2005). In addition, they better understand the markets specifically related to their industry (Vild and Zeisberger, 2014), in the present case the crude oil markets.

As the world economy grows so does the demand for oil (Popescu, 2016). The world demand for crude oil in 1995 is 70 million barrels per day, by 2005 it is 82.5 million barrels per day, and by 2015 it exceeds 95 million barrels per day (IEA, 2016). Along with this growth in demand is a growth in volatility (Popescu, 2016). During the last 20 years, there is an increase of volatility in world crude oil prices, but after the global financial crisis in 2008, already volatile crude oil prices increase their volatility even more (Ural, 2016). Even though the demand for commodities decreases temporarily, volatility remains high (Popescu, 2016). The markets are searching for a supply-demand equilibrium (Mustafa, 2016). This volatility has effects on the overall profitability of the oil industry (Arora, 2015).

The oil industry is generally considered to be a profitable industry, and the larger oil companies are generally more consistently profitable in comparison to the smaller ones (Ford, 2011). That said, the percentage profitability is much less than the general public perceives since the oil companies are so large (Stunda and Voltz, 2010). There is also the potential that particularly low and particularly high prices can actually reduce oil company profitability (Ford, 2011). Oil companies are not always able to capture price increases due to local marketing pressures or global supply issues (Arora, 2015). For example, one study found that oil company acquirers performed worse than the Brent oil market during the 4 years after the transaction (Barrows, 2017).

Long-term growth in the oil industry requires more consistent returns (Baumeister and Kilian, 2016). Consistent returns require more price stability so that more strategic projects can be successful and companies can maintain their goal of continued growth and profitability (Ford, 2011). This is true during the study period from 1998 to 2013 and continues to be the case in the current environment as well.

3. METHODOLOGY

The methodology to collect and evaluate the data is based on an empirical and analytic approach. Since the research question is based on share price performance, data provided enables the

determination of this performance with few ambiguities. This methodological review uses stock price total return performance for the companies selected for the data set. The objective data is accessed using third-party providers, and quantitative methods are used.

To sufficiently evaluate performance over time, proper data collection is needed in order to adequately supply the appropriate measurements to make the necessary analysis required to answer the research question. There are six independent third-party providers in use to assemble the necessary data for this paper. They are Thomson Reuters, Dartmouth College, the US Energy Information Administration, known as the EIA, the US Federal Reserve System, the Bank of Canada, and the Reserve Bank of Australia.

3.1. M&A Transactions

The screening of data through the Thomson Reuters product called Eikon provides data on all transactions for public, private and government transactions in the world market place and selection begins from the MASRCH application in the Eikon product (Thomson Reuters, 2017). With regard to the merger transaction size, based on a study on S&P500 firms from 1980 through 2004, the median size of target company acquisitions is \$478 million and \$163 million for S&P 500 acquirers and non-S&P 500 acquirers, respectively (Vijh and Yang, 2007). Using the average of these two values (\$320.5 million) as a guideline, the limit of \$300 million is used for the merger transaction value. Private and government transactions are excluded as are stock buybacks and exchange offers. This ensures that only publicly-traded, commercial M&A transactions which represent over 50% ownership of the target companies in the oil and gas and petrochemicals industries are chosen, and that each of those transactions exceeds \$300 million.

If there is more than one transaction for each acquirer within the same calendar year, the total deals for that year are aggregated into one record, the last transaction for that year, in order to account for the increased acquirer size. The concern is that multiple transactions within a short time span, which have similar economics, could skew the results of the study. A similar study that examines the post-acquisition returns of stock deals from 1981 through 2007 uses the same method to avoid similar multiple transactions within a short time frame (Mortal and Schill, 2015). This is used as the determining guide in this case. For more information on the selection of records for the data set (Appendix Table 1).

Not all of the acquirers in the data set are listed on US stock exchanges. There are 148 transactions out of the total of 364 in the data set that are listed on non-US stock exchanges on the transaction dates. This represents 41% of the total transactions in the data set. Making deal size comparisons is not an issue since this field is already converted to USD. Making price comparisons is also not an issue since prices within the 4-year horizon are in the same currency. However, the acquirer size is stored in the currency of the stock exchange where the acquirer is listed. For these transactions, the proper currency exchange rates based on the acquirer location and date effective are retrieved. The calculations

for all returns for both the merger data and the comparative benchmarks are made on a before tax basis. Hence, the tax issue is deemed outside of the scope of this study and comparisons are made on a before tax basis.

Through the initial analysis performed for this study, and while fine-tuning the research question, it becomes obvious to the author that a 4-year horizon provides a more stark comparison and show more contrast between mergers that succeed and those that fail. After 4 years, results become clear. Other studies also confirm this and show that premiums paid for an acquisition can reduce the acquirer company returns up to 4 years after the transaction (Sirower and Sahni, 2006), or up to 5 years after a merger announcement (Bouwman, et al., 2003). Hence, the 4-year horizon is chosen as the focus for this study.

This study focuses on the longer-term returns after integration. If extending the term means that the acquirer subsequently changes its standing (through bankruptcy or acquisition), the final price recorded in the 4-year horizon is still the measurement that is used. That said, there are 48 transactions where the acquirers are delisted within the 4-year horizon. There is a risk that this longer-term view could skew the results either to the negative or to the positive, but since the last posted price is used, this risk is seen as limited.

In order to provide a more complete picture of the stock price total return dynamics, the first data point in the 4-year horizon is the price on December 31 or the last trading day for the year, the year before the transaction date. This provides a price before the market expectations of the M&A activity are fully digested. Monthly prices are then aggregated until the final price in the 4-year horizon is taken 4 years after the initial December 31 date. This is done for each transaction, and included into calendar-time portfolios which include monthly returns for all applicable transactions active in the portfolio during that month. Similar portfolios are also created for the comparative benchmarks. For more statistics on the acquirers and targets, (Appendix Tables 2 and 3).

3.2. Comparative Benchmarks

With the merger data collection steps defined, techniques to compare the data in meaningful ways become key. A straight comparison of the two 8-year periods may not provide a valid comparison between the profitability of the 4-year horizons since economic factors such as the overall stock market and the crude oil price could have varying impacts on the results for each company in the two 8-year periods. In order to adjust these results to provide more meaningful comparisons, four comparative benchmarks are selected: The CRSP US market, the CRSP Global market, the CRSP oil industry (of 49 industries), and the Brent oil market price (Dartmouth, 2017; EIA, 2017). All four benchmarks exclude the risk free rate. The risk free rate is the US 1 month treasury-bill rate.

Crude oil prices are included because the profitability of oil companies is normally considered to be connected to the price level of crude oil prices (Ford, 2011). Crude oil sold in the US and much of Latin America is priced using the WTI quote (EIA, 2017). Crude oil sold in most of the rest of the world is linked to the Brent oil market quote (IEA, 2016). Both quotes typically track

within two dollars of each other, however, sometimes they diverge by more than five dollars depending on supply/demand issues which may affect one supply stream, but not the other (EIA, 2017).

The relationship between WTI and Brent changes in 2011 because of the increase in the production of shale oil in the US (Heier and Skoglund, 2014). This additional supply approaches the logistical constraints of moving the new oil supply to markets which could fully utilize the new supply (Akacem and Pence, 2015). The increased shale production tests the pipeline and storage limits at Cushing, Oklahoma, the main US trading point (Heier and Skoglund, 2014).

Because of this excess supply in the US, WTI trades at a significant discount to Brent beginning in 2011 with the discount exceeding \$29 in September of 2011 (EIA, 2017). This discount does not reflect the price differentials between Brent and other crude oil grades that are historically linked to WTI (Buyuksahin et al., 2013). Hence, for the purposes of this study, beginning in 2011, WTI no longer represents the world crude oil market, but represents a US market which is experiencing logistical constraints. For this reason, Brent is selected as the crude oil price marker for this study (EIA, 2017).

In the analysis using the total return formula, monthly price changes are measured and compared against the four comparative benchmarks for each 8-year period. With regard to the four comparative benchmarks, this volatility is important, but how the acquirers relate to this volatility is the key factor. Are they more volatile or less volatile than the market? This is called beta and can be measured. With regard to the price of crude oil specifically, the price level in addition to this volatility is important and also has an impact on the profitability of individual oil companies (Ford, 2011).

Based on the Brent oil market price, there is a natural break between the two 8-year periods with January of 2006 serving as the dividing line (EIA, 2017). The annual median for the 16-year time frame is \$58 per barrel. The mean for each year before this is less than \$58. For the entire 8-year period from 1998 to 2005 the mean is below \$29, which is 50% below the median price for the 16-year time frame. For the 8-year period from 2006 to 2013, the mean for the 8-year period from 2006 to 2013 is \$88 or 52% above the annual median for the 16-year time frame. The mean for each year from 2006 onwards is above the \$58 median. Please see Figure 1 for the Brent crude oil price graph using data from EIA on the Brent oil market prices during the 16-year time frame. For more statistics on Brent crude oil month-end prices, (Appendix Table 4).

3.3. Analytical Cases

The research question is: Are oil industry mergers becoming less profitable? The objective of this study is to evaluate the profitability of oil mergers within the 16-year time frame. This time frame is further segmented into two 8-year periods for comparative purposes. The stock price total return of the acquirers is the dependent variable in this analysis. The independent variable is whether or not the company acquired a target transaction during one of the specified time-periods. The research approach is

classified as causal and correlational. The intent is to establish a causal connection and quantify the relationship of the stock price total return performance of the acquirers to their merger activity. To further explore this topic and focus on quantifying the research question, three hypotheses are considered.

1. H_1 : The 1998-2005 period is superior to the 2006-2013 period in the three-factor tests.
2. H_2 : The acquirers perform worse than the oil industry.
3. H_3 : Proportionally smaller oil industry merger transactions outperform the larger ones.

The research approach matches the monthly portfolio to two other factors and is a version of the three-factor model of Fama and French (Fama and French, 1993). This method adheres with the strategy that long-run abnormal returns should be calculated as the long-run return of a sample less the long-run return of an appropriate benchmark (Barber and Lyon, 1997). The regression variables include the comparative benchmarks listed in the previous section. The US market or the Global market or the oil industry data are included in the first formula case. RF rate represents the risk free rate. The Brent oil market is included as well in the first formula case. The second formula case includes either the Brent oil market or the acquirers group.

$$\text{Return} - \text{RF Rate} = \alpha + \beta((\text{Oil Ind. or US Mkt. or Global Mkt.}) - \text{RF Rate}) + \beta(\text{Brent Mkt.} - \text{RF Rate}).$$

$$\text{Return} - \text{RF Rate} = \alpha + \beta((\text{Oil Mkt. or Acquirers}) - \text{RF Rate}).$$

This analytic approach utilizes seven cases which examine the stock price total return monthly percent changes for all acquirers which comprise the portfolios. The first three cases include comparisons of the two 8-year periods. There is one all acquirers case comparing against the oil industry and the Brent oil market. There is one case for acquirers domiciled in the US against the US market and the Brent oil market plus one case for non-US acquirers against the Global market and the Brent oil market. These three cases use the modified three-factor model as described above.

There are four additional cases included in the study and these cases utilize a two-factor model, similar to the three-factor model, but with one less factor. These four cases include comparisons over the entire 16-year time frame. There is a case with all acquirers against the Brent oil market and a case with the oil industry against the Brent oil market. This allows for the performance for both the acquirers and the oil industry to be measured independently. It also allows the acquirers performance to be compared indirectly against the oil industry performance. There are two cases based on the relationship between the targets and acquirers size separated by the median measurement and measured against all acquirers. These last two cases explore the level of profitability based on the size delineation of the targets/acquirers of the transactions. For more information (Table 1).

To measure the performance of the M&A activity in the oil industry during the 16-year time frame, calendar time portfolios are constructed for each of the cases. A set of regression statistics is included which provide a thorough analysis of the cases. For the first three cases, a two-sample test is used to quantify the

4. RESULTS

differences between the two time periods. A two-sample test is conducted to examine the differences between two different time periods and their relation to the independent variables (Penn State, 2007). The two-sample test is constructed using a Short Long portfolio. The first three cases use the Short Long portfolio methodology to distinguish performance between the 1998 and 2005 period and the 2006-2013 period.

The Short Long portfolio methodology combines two different time periods using a short strategy in one and a long strategy in the other where short equates to selling and long equates to buying. For purposes here, the Short Long portfolio is short for the 1998-2005 period and long for the 2006-2013 period. For the first three cases, the Short Long portfolios are regressed against the two benchmark factors used in each case. For the last four cases, the comparative groups are regressed against the one benchmark factor used in each case.

In the statistical analysis included, the first measurement posted is the Y-Intercept. For the analytical purposes here, the Y-Intercept equates to alpha. If alpha is positive then the portfolio is the superior performer in relation to the comparative benchmarks. In the first three cases, if alpha is positive then the Short Long portfolio is the superior performer. In this case, the 2006-2013 period would be the superior performer.

The summary results of the cases analyzed are included in Table 2. The detailed comparisons are discussed below the table.

In the first three cases using the Short Long portfolio methodology, the alphas are all negative which equate to the 1998-2005 period as being the superior performer. Case 4 compares the acquirers to the Brent oil market. Its alpha is positive. Case 5 compares the oil industry to the Brent oil market. Its alpha is also, positive, but larger. Hence, comparing the oil industry to the acquirers sees the oil industry as the better performer. Cases 6 and 7 use the acquirers group as the benchmark. Cases 6 and 7 results see the proportionally smaller targets/acquirers with a positive alpha perform better than the proportionally larger targets/acquirers with a negative alpha.

The P-value measurements are all below 0.05, and thus indicate the rejection of the null hypothesis in a statistically significant manner. The results for cases 1 through 3 are statistically significant at the 0.01 level. Hence, the performances of all of the 1998-2005 period groups in the first three cases are superior to the performances of all of the 2006-2013 period groups and the difference is statistically significant.

Figure 1: Brent crude oil annual mean and median price

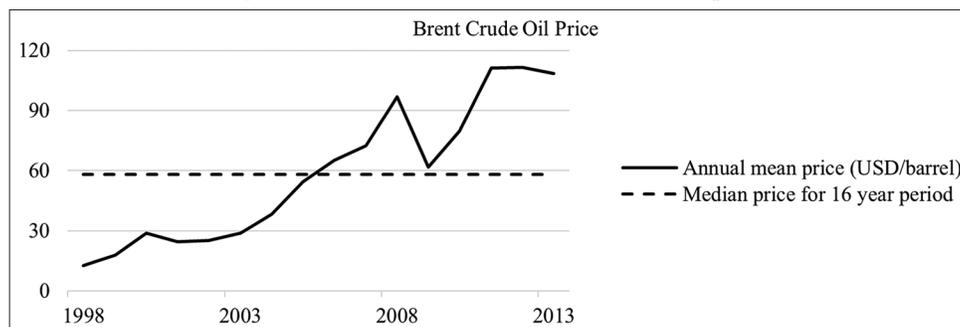


Table 1: Comparison of cases

Analytical cases: All cases minus the risk free rate	Oil industry	US market	Global market	Brent oil market	All acquirers
All acquirers	X			X	
US acquirers		X		X	
Non-US acquirers			X	X	
All acquirers				X	
Oil Industry				X	
Small targets/acquirers					X
Large targets/acquirers					X

Table 2: Comparison of results

Regression statistics table	Alpha (Y intercept)	t-stat	Beta one	Beta two	Adjusted R ²
	* = 10%, ** = 5%, *** = 1% denote significance levels				
Baseline Short Long portfolio using oil industry and Brent	(0.27)***	(9.64)	(0.17)***	(0.05)**	0.37
US firms Short Long portfolio using US market and Brent	(0.29)***	(8.61)	(0.02)	(0.16)***	0.24
Non-US firms Short Long portfolio using Global market and Brent	(0.40)***	(20.29)	(0.13)***	(0.12)***	0.42
Baseline using Brent (2-factor test)	0.16**	2.02	1.36***	NA	0.80
Oil industry using Brent (2-factor test)	0.28***	5.75	0.62***	NA	0.68
Small targets/acquirers using acquirers (2-factor test)	0.32***	7.31	1.37***	NA	0.97
Large targets/acquirers using acquirers (2-factor test)	(0.13)***	(7.16)	0.74***	NA	0.98

In case 4, the acquirers group is superior to the Brent oil market benchmark at a 0.05 level. In case 5, the oil industry is superior to the Brent oil market benchmark at a 0.01 level. The oil industry alpha reading is higher than that for the acquirers. These two cases show at a high degree of significance that the acquirers group as a whole underperforms in comparison to the oil industry during the study time frame and the difference is statistically significant.

The results for cases 6 and 7 are statistically significant at the 0.01 level and confirm that the small targets/acquirers transactions perform superior in comparison to the large targets/acquirers transactions during the study time frame and the difference is statistically significant.

With regard to the Adjusted R² readings, the first three cases using the baseline Short Long portfolio in relation to the benchmarks are not as correlated as would normally be expected. The Adjusted R² readings are at 0.37, 0.24, and 0.42, respectively. These low readings indicate that there is not much correlation between the benchmarks or independent variables and the dependent variable which is the baseline Short Long portfolio in the first three cases.

The last four cases include only one independent variable and display more correlation between the independent variable and the dependent variable. Case 4 is a summary comparison of the acquirers group to only the Brent oil market and its adjusted R² reading is at 0.80. This confirms that the acquirers group is more correlated with the Brent oil market than with the combination of the Brent oil market in conjunction with the oil industry in Case 1. The case 5 comparison of the oil industry to the Brent oil market has its adjusted R² reading at 0.68 and is in line with expectations to one of the key determinants of oil industry activity, that being the price of crude oil. The acquirers group's correlation to the Brent oil market is 18% higher than the oil industry's correlation to the Brent oil market. As expected, Cases 6 and 7 demonstrate high correlation to the independent variable, at 0.97 and 0.98, respectively, since the independent variable in these two cases is the acquirers group itself. The dependent variable in each of the two cases is a 50% subset of acquirers group.

With regard to the first of the hypotheses considered, H₁: The 1998-2005 period is superior to the 2006-2013 period in the three-factor tests, the regressions confirm that the 1998-2005 period performs superior to the 2006-2013 period in a statistically significant manner in each of the first three comparative cases that include the time period comparisons. These results confirm the H₁ null hypothesis. The 1998-2005 period is superior to the 2006-2013 period in the three-factor tests.

With regard to the second of the hypotheses considered, H₂: The acquirers perform worse than the oil industry, the acquirers' performance is inferior to that of the oil industry and in statistically significant manner. These results confirm the H₂ null hypothesis. The acquirers do perform worse than the oil industry. These results are in line with other studies which document losses for shareholders after oil industry mergers (Marfo et al., 2013).

On the third of the hypotheses considered, H₃: Proportionally smaller oil industry merger transactions outperform the larger ones. These are the size delineated cases for acquirers/targets, and the smaller relative sized transactions perform better than the larger ones, and do so in a statistically significant manner. These results confirm the H₃ null hypothesis. This is in line with the results of a study which states: "Profitability of their acquisitions decreases as the size of the target increases relative to that of the acquirer" (Gorton et al., 2009).

The research question is: Are mergers in the oil industry becoming less profitable? Based on the research methods in this study and the significance of the resultant differences in measurements, a confirmation of the hypothesis is warranted. In summary, yes, mergers in the oil industry are becoming less profitable.

5. CONCLUSIONS

When comparing the two study groups against each other, the 1998-2005 period performs superior as compared to the 2006-2013 period, in all three three-factor cases and in a statistically significant way. This confirms that during the time frame studied and the methodologies used, mergers in the oil industry are becoming less profitable. In a straight-up comparison between the acquirers and the oil industry during the study time frame, it would have been better not to partake in the M&A activity since the acquirers perform worse than the oil industry during the study time frame.

However, when analyzing the results of the performance of the size delineated cases based on the targets/acquirers proportions, the smaller relative sized transactions perform better than the larger ones and in a significant manner. This is in line with other research which documents improved performance for proportionally smaller acquisitions (Gorton et al., 2009).

A final comment regarding mergers in general is that the merger game is not certain and results are not guaranteed (Soni, 2014). Mergers increase risk and have dubious outcomes (Subeniotis, et al., 2011). "Merger activity is often value destroying" (Bouwman, et al., 2003). Merger success is not always ensured and therefore increases organizational risk (Subeniotis, et al., 2011). The key question is will company profitability increase to cover these risks (Ferrer, 2012). If not part of an overall strategy, perhaps management should spend more time on contemplation prior to proceeding with consummation.

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APPENDIX

Table 1: Selection of records for the data set

Selection criteria	Records
Initial Data Set from Thomson Reuters Eikon: MASRCH application for Advanced Search of Mergers and Acquisitions	>1,000,000
1. Select "completed" in the deal status field	>750,000
2. Select date effective between "01-Jan-1998 and 01-Jan-2014"	>500,000
3. Select "oil and gas" and "petrochemicals" in the target industry field	>18,000
4. Select "oil and gas" and "petrochemicals" in the acquirer industry field	>11,000
5. Select "public, subsidiary, joint venture" in the target public status FIELD	>6900
6. Select "acquisition of assets, acquisition of partial interest, merger, Acquisition of Majority Assets, Acquisition of Remaining Interest, Acquisition of Certain Assets" in Transaction field	>6700
7. Select "over 50%" in the % acquired field	>4400
8. Select "over 300 M (\$300 million)" in the deal size field	672
9. Select non-blank entries in the acquirer RIC field	459
10. Eliminate records with missing acquirer size information	409
11. Eliminate records which generate NULL or #N/A values when using the Total Return query	401
12. Eliminate records with same acquirer RIC within the same calendar year	364

Table 2: Acquirer companies

Acquirer companies (USD mm)	1998-2005	2006-2013
Observations	141	223
Maximum	214,732	302,270
Minimum	54	54
Range	214,678	302,216
Mean	15,257	19,673
Median	4167	4608
SD	34,824	42,083

SD: Standard deviation

Table 3: Target companies

Target companies (USD mm)	1998-2005	2006-2013
Observations	141	223
Maximum	95,444	40,659
Minimum	300	303
Range	95,144	40,356
Mean	4,645	2,360
Median	895	818
Standard Deviation	13,281	4,968

SD: Standard deviation

Table 4: Comparative benchmarks: Brent crude oil month-end prices

Brent (month-end)	1998-2005	2006-2013
Observations	96	96
Maximum	66.80	138.40
Minimum	9.91	35.82
Range	56.89	102.58
Mean	28.94	88.76
Median	26.89	89.29
Standard Deviation	12.90	23.70

SD: Standard deviation