

DISSERTATION

MERGER AND INNOVATION: THE CASE OF THE OIL AND GAS INDUSTRY

Submitted by

Rezki Anindhito

Department of Economics

In partial fulfillment of the requirements

For the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

Spring 2010

COLORADO STATE UNIVERSITY

January 14, 2010

WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY REZKI ANINDHITO ENTITLED "MERGER AND INNOVATION: THE CASE OF THE OIL AND GAS INDUSTRY" BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

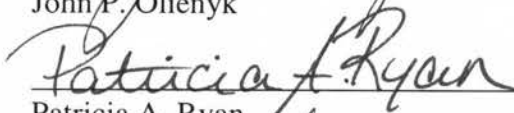
Committee on Graduate Work



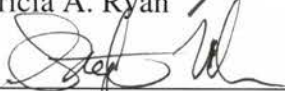
\_\_\_\_\_  
David Mushinski



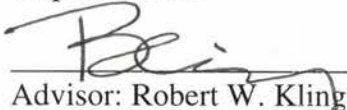
\_\_\_\_\_  
John P. Olienyk



\_\_\_\_\_  
Patricia A. Ryan



\_\_\_\_\_  
Stephan Weiler



\_\_\_\_\_  
Advisor: Robert W. Kling



\_\_\_\_\_  
Department Head: Steven J. Shulman

## ABSTRACT OF DISSERTATION

### MERGER AND INNOVATION: THE CASE OF THE OIL AND GAS INDUSTRY

Many studies in the late 1990's concerning the internet and information technology industries show that innovation is the main reasons for company mergers. This dissertation attempts to explain whether merger activities in the oil and gas industry were motivated for the same main reasons as merger activities in the internet and information technology industries.

The dissertation is divided into two parts. The first part of the study, using the event study and panel data methodology, examines whether positive impact hypotheses dominate the merger activities. The four benchmark models for normal returns, Market Model (MM), Capital Asset Pricing Model (CAPM), Fama-French Three Factors Model and Fama-French Four Factors Model are used to calculate Cumulative Abnormal Return (CAR). The CAR results from Market Model are the same as the other three normal return models. The only difference is the magnitude of CAR on different models which tend to be smaller as more variables were included in the equation. The CAR results are also in accordance with the fourth and fifth wave theory of mergers. In the second part, using the probit and panel data method, the study tries to explain the relationship between

innovation and merger activities. The result shows that innovation can have two opposite effect to merger.

We believe that our findings can only explain two from several motivations for merger waves and only focus on the positive impact hypothesis of merger. Therefore, further research is still necessary to examine for other motivations and also to test whether our conclusion also applies to other industries. Additional study on the negative impact hypothesis of merger is also desired to increase our knowledge on merger theory.

Rezki Anindhito  
Department of Economics  
Colorado State University  
Fort Collins, Colorado 80523  
Spring 2010

## **Dedication**

To my father, Rear Admiral Loemaksono (Indonesian Navy, Retired), 1942 – 2008.

## **Acknowledgements**

It is my pleasure to thank so many people who contributed some way or the other in making this dissertation possible. This dissertation would not have been possible without their support and assistance. First, I would like to thank my adviser, Dr. Robert Kling for his guidance, suggestions, help and encouragement throughout my dissertation process.

I would like to thank my committee members, Dr. Patricia Ryan, Dr. Stephan Weiler, Dr. David Mushinski and Dr. John Olienyk for their helpful comments and suggestions.

I am thankful to my mother who always prays for me day and night, and to my wife and son for accompanying me in this journey.

I would like to thank Mr. Erick Selgren and Mr. Robert Remsik at Colorado State University Business School IT Department, Mr. Chang Su at University of Chicago and Mrs. Joslyn Radden and Mrs. Sandra Milberg at Standard & Poor's Client Services for their guidance and help in using the software. I also would like to thank my editor, Mrs. Joan Hinkemeyer who helped me correcting grammatical errors in the dissertation.

I am grateful to all my friends, faculty members and staff at Economics Department for the help that they have given me during my study at Colorado State University, especially Lin Chun-Wei for long hours of study together and meaningful discussion and Kirk Dameron and his family for their hospitalities.

## TABLES OF CONTENTS

	Page
TABLES OF CONTENTS	vii
LIST OF TABLES AND FIGURES	x
CHAPTER ONE: INTRODUCTION	1
1.1 Background	1
1.2 The purpose of the Dissertation	2
1.3 Organization of the Dissertation	3
CHAPTER TWO: LITERATURE REVIEW	5
2.1 Literature Review on Merger and Acquisition Activities	5
2.1.1 Effects of Merger and Acquisition	5
2.1.2 Efficient Market Hypothesis Assumption	8
2.1.3 Merger Study Review	12
2.1.4 Case Studies of Merger	15
2.1.5 Mergers and Acquisitions Motives	16
2.1.6 The Positive Impact Hypothesis	20
2.1.6.1 Synergy Hypothesis	21
2.1.6.2 Growth Hypothesis	22
2.1.7 The Negative Impact Hypothesis	23
2.1.7.1 The Managerial Hypothesis	23

2.1.7.2 The Hubris Hypothesis	25
2.2 Literature on Innovation	26
2.2.1 Literature on Innovation driven Merger	27
2.2.2 Merger Hypothesis Association to Innovation	32
2.2.3 Equilibrium Theories of Merger	33
2.2.4 Disequilibrium Theories of Merger	35
CHAPTER THREE: RESEARCH METHODOLOGY	37
3.1 A Model based on Event Study Methodology	37
3.1.1 Mechanism of Event Studies	39
3.1.2 Event Dates and Estimation Periods	40
3.1.3 Estimation of Normal Returns	43
3.1.3.1 Return Calculation	43
3.1.3.2 Benchmark Models for Normal Returns	44
3.1.3.3 Fama-French Four Factors Model	46
3.1.3.4 Choice of the Market Index	50
3.1.3.5 Accumulation of Abnormal Returns	50
3.1.4 Wealth Effects in Merger	52
3.2. The Innovation Model	54
3.2.1 Probit Model on Innovation	55
3.2.1 Probit Model Based on Synergy Assumption	56
3.2.2 Probit Model Based on Disequilibrium Assumption	59
3.3. Panel Data Method	60



3.4. Data Sources	62
CHAPTER FOUR: ANALYSIS	64
4.1 Merger Analysis	65
4.1.1 Results based on Event Study Methodology	65
4.1.2 Event study with GLS Estimation	68
4.1.3 Event study Panel Data Model	69
4.1.4 Hypothesis Testing	79
4.2 Innovation analysis	80
4.2.1 Probit model Result	81
CHAPTER FIVE: CONCLUSIONS	85
REFERENCES	89
APPENDIX:	
Appendix 1	97
Appendix 2	104
Appendix 3	116
Appendix 4	128
Appendix 5	138
Appendix 6	147
Appendix 7	156
Appendix 8	168
Appendix 9	181
Appendix 10	191

## LIST OF TABLES AND FIGURES

	Page
Graph 1.1 Research Question Diagram	3
Graph 4.1 Merger Activities from Year 1980 to 2007	71
Graph 5.1 Merger and Oil Price	86
Table 2.1 Merger Hypothesis Summary	26
Table 3.1 Event Study Time Line	40
Table 4.1 Panel Data Estimation for First Wave (11 days Event Period)	71
Table 4.2 Panel Data Estimation for Second Wave (11 days Event Period)	73
Table 4.3 Panel Data Estimation for First Wave (21 days Event Period)	73
Table 4.4 Panel Data Estimation for Second Wave (21 days Event Period)	70
Table 4.5 Panel Data Estimation for First Wave (31 days Event Period)	75
Table 4.6 Panel Data Estimation for Second Wave (31 days Event Period)	76
Table 4.7 SUR Panel Data First Wave	78
Table 4.8 SUR Panel Data Second Wave	79
Table 4.9 Probit Panel Result	82

## **CHAPTER 1**

### **Introduction**

#### **1.1 Background**

Mergers, acquisitions, strategic alliances and joint ventures in the oil and gas industries have occurred as companies struggled to remain competitive against a background of multiple pressures. Weston, Johnson and Siu (1999) stated that the changing environment and new forms of competition have created both new opportunities but also threats for business firms, forcing firms to adopt many new forms of restructuring.

As a result of many merger activities in the internet and information technology industries in the late 90's, many studies observing this event indicated that innovation actually is one of the main reasons for companies to merge. De Man and Duyster (2005) stated that there is an indirect impact of mergers on innovation. Since merger activities could raise the overall Research and Development (R&D) budgets, the activities would allow companies to obtain greater economies of scale so that they could handle larger R&D projects than before the merger. The R&D activities would then receive more attention, thus leading to more advanced technologies being developed. More R&D budgets also provide opportunity for a company to diversify their R&D projects, thus resulting in more innovation. In addition, Gerpott (1995) also stated that firms having

complementary knowledge can combine their strengths and develop new technologies or products that individual companies would have not been able to create.

The most common purposes for merger activities in the oil and gas industry are to reduce cost and to develop new investment opportunities with positive returns. This involves a wide range of efforts by oil companies such as increasing efficiencies, investing in new technologies, looking for profitable investment opportunities through joint venture at home and abroad, and also focusing on activities in which they have developed specialized capabilities. All the activities mentioned above we believe are innovation activities. Unlike in the medical or information technology industry, in the oil and gas industry, an innovation does not have to be a new patented invention. An innovation can be new technique that could increase efficiencies or minimize the cost of production, new engineering design, new field exploration, and so forth.

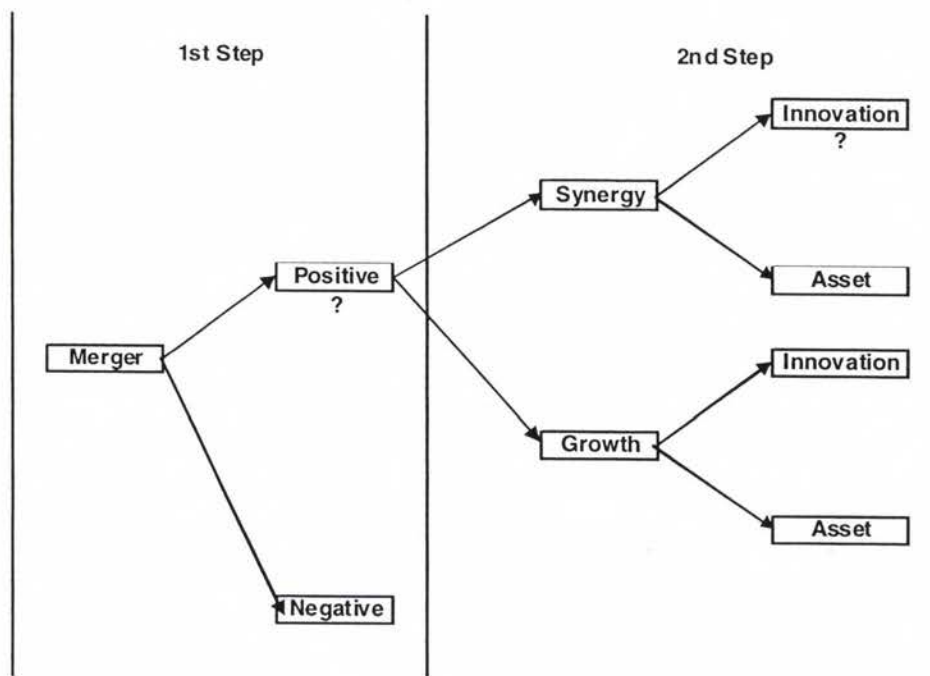
The purpose of this dissertation is to study how innovation influences merger activities in the oil and gas industry. The study is limited to the companies whose historical stock prices are publicly available from 1980 – 2007.

## **1.2 Purpose of the Dissertation**

We will divide the study into two parts as shown on graph 1.1; in the first part we will identify whether positive impact hypotheses dominate the merger activities. If the negative impact hypotheses dominate the merger activities, we will discontinue our investigation and conclude that there is a large possibility that the merger activities will have negative impact on innovation. Larsson et al (1998) stated that technological know how is often tacit and therefore not easily transmitted from one firm to another. When the

managers are still busy with such common merger problems as integration, there is little possibility they will pay attention to innovation creation activities. If positive impact hypotheses dominate, then we continue the second part of the analysis. In the second part, we will study whether innovation is the motive for merger activities.

**Graph 1.1 Research Question Diagram**



### 1.3 Organization of Dissertation

This dissertation is organized as follows. In chapter two, we review the literature on mergers, the associated hypotheses and also the innovation literature. This chapter provides a theoretical background to understand the merger process and its impact on innovation. In chapter three, we will discuss the event study methodology and the modeling techniques. Merger case study selection and data sources are explained.

Chapter four contains the empirical findings and the implication of the results. The final chapter, chapter five contains brief concluding remarks.

## **CHAPTER 2**

### **Literature Review**

This chapter is divided into two parts. The first part is a literature review of previous empirical studies on mergers and acquisitions. The second part is a literature review of innovation studies.

#### **2.1 Literature Review on Merger and Acquisition activities**

##### **2.1.1 Effects of Mergers and Acquisitions**

Most of the literature on merger studies focuses on the two approaches of evaluating a merger's effect on company profitability (Evans, 1994; Weston et al, 2001; Gaughan, 2002). The first one, the event study approach, is performance measurement by share price, and the second one is accounting measures of profitability. The event study approach typically looks at the *ex ante* market reaction to the announcement of a merger on the firm's stock prices. On the other hand, the operating performance approach is *ex post*, looking at the success or failure of merger programs after their completion, i.e., the performance of the new companies after they have formally merged. We do not use this approach because of several weak points in the operating performance approach found in the literature review.

The event study approach uses price responses of market securities to evaluate an investor's expectation for the future profitability of a merged entity. This methodology assumes that the capital market is efficient and all information is publicly available. The Efficient Markets Hypothesis (EMH) states that all publicly available information is incorporated into stock prices. One concern that complicates event studies arises from leakage of information. Leakage occurs when the information regarding a relevant event is released to a small group of investors before the official public release. In this case, the stock price might start to increase days or weeks before the official announcement date.

The operating performance approach uses operational data to evaluate the change in the operating performance of a merged company. It attempts to identify the source of gains from mergers and to determine whether the expected gains at announcement are ever actually realized. If mergers truly create value for shareholders, the gains should eventually show up in the firm's cash flows. The impact of a merger on operating performance is measured by comparing accounting measures of profitability before and after the merger and benchmarking these values to the industry average. We found several literature studies that criticized the operating performance approach.

Sirower and O'Byrne (1997) raise two serious problems with the typical method of accounting based studies of post acquisitions performance. First, different studies examine different accounting measures of performance (such as Return on Sales (ROS) or Return on Assets (ROA)), making it difficult to compare results. Second is the benchmarking problem. The weakness of using past accounting performance as a benchmark is that it ignores an important aspect of the economics of acquisition which is



the promise implicitly made by the buying company's management to its own shareholders in its willingness to pay a premium to target shareholders.

Pautler (2001) points out that accounting data may not reveal the true economic rate of return for the firm. Because accounting depreciation schedules do not accurately reflect the decline in the market value of a firm's investment over time, accounting data can provide a distorted picture of a firm's true economic rate of return. In addition, the firm level profitability data may be too aggregated in determining the effects of acquisition of particular lines of business.

Rhoades (1994) also raises two possible problems in the operating performance approach. First, the operating performance studies typically analyze accounting data for periods of one to six years after a merger occurs. During these years, many factors unique to the merged firm, other than the merger itself, may affect the firm's efficiency or performance. Second, a possible problem in the operating performance approach in studying a company's efficiency and performance is that it uses accounting measures instead of economic measures.

Fisher and McGowan (1983) stated that profits as reported by accountants may not be consistent from firm to firm or industry to industry and may not correspond to economists' definitions of profits. Accounting data for statements of assets and also stockholders' equity may fail to correspond to economically acceptable definitions because accounting practices do not provide for the capitalization of certain activities such as research and development and do not incorporate allowances for inflation.

Benston (1985) finds that there are five important sources of divergences of Accounting Data from Economic Market Values. Those sources are (a) the values of

long-lived tangible assets and their depreciation or depletion over time; (b) the value and amortization of intangible assets (for example, advertising and research and development); (c) inventory values and the cost of goods sold; (d) allocation of common and joint costs to lines of business; and (e) intra firm transfers among lines of business.

Weston et al (2001) suggests that accounting data do not provide information on the expected long run impacts of the mergers on the participants, and the comparison growth does not provide information on how the specific firms would have performed without the mergers.

### **2.1.2 Efficient Market Hypothesis Assumption**

The dominant view of markets in financial economics remains that markets are efficient at pricing all available information or news. This view is known as the Efficient Market Hypothesis (EMH) developed independently by Paul A. Samuelson and Eugene F. Fama in the 1960s. Samuelson (1965) based his study on the temporal pricing models of storable commodities that are harvested and subject to decay. He stated that in an informationally efficient market, price changes must be unforecastable if they are properly anticipated which means that they fully incorporate the information and expectations of all market participants. On the other hand, Fama (1965a, 1965b, 1970) based his study on measuring the statistical properties of the stock prices. Fama (1970) stated that the security price will always reflect full information available to investors. This statement is also true to securities average prices in the form of the S&P 500, NASDAQ over the counter market, or Dow Jones Industrial Average of 30 blue chip stocks. Generally there are three widely accepted versions of EMH: strong, semi-strong

and weak, distinguished by the amount of information to the market. The distinguishing feature is the quantity and nature of the available information, respectively,

- Strong – all information, even insider information.
- Semi-strong – public information only.
- Weak – only information on the past behavior of the price of the asset.

Burton Malkiel (2003) in support of the EMH stated that equity prices adjust to new information without delay; as a result, no arbitrage opportunities exist that would allow investors to achieve above-average returns without accepting above-average risk.

Markets can be efficient although they sometimes make errors in valuation. Markets can be efficient even if many market participants are quite irrational. Markets can be efficient even if stock prices exhibit greater volatility than can apparently be explained by fundamentals such as earnings and dividends. Malkiel believes in efficiency because he views markets as successful devices that adopt new information rapidly and accurately. However, he also does not argue that the market pricing is always perfect. Some market participants are probably less than rational, resulting in pricing irregularities.

Boettke (2009) stated that the market economy would truly be self-correcting because no errors would be made. The only change to the system would be the exogenous change to a shift in tastes or technology, but then the market would adapt to this change instantaneously and the prices in the economy would reflect fully the relevant information. He concluded by saying that an efficient market has a sort of dynamic adjustment to changing conditions. Markets work through a process of entrepreneurial discovery and competitive selection. EMH does not mean that no errors are ever made or

adjustments are made instantaneously so that a perfect pattern of resource allocation exists on the market at any point in time.

The financial crisis in 2008 provided an occasion to criticize the EMH theory. One of the criticisms of EMH is an assumption that people always behave rationally resulting in an efficient market. The *Economist* magazine in the July 2009 issue asked for a better theory that can explain the reason for liquid markets to suddenly become illiquid and how to manage the resulting moral hazard. Soros (2009) stated that financial markets don't deal with the current reality but with the future. It is simply a matter of anticipation, not knowledge. Shiller (2005) also criticizes EMH for its inability to explain mispricing in the stock market that could continue for many years or even decades. Shleifer (2000) stated that behavioral finance has emerged as an alternative view to EMH. Instead of believing that markets are efficient, this view believes that systematic and significant deviations from efficiency are expected to persist for long periods of time. He explains that there are two human fallibility factors that can be obstacles in an efficient market. The first factor is limited arbitrage in the real world securities markets. This factor is the reason why prices do not fully react to information by the right amount thus keeping markets inefficient. The second factor is investor sentiment which is the theory of how investors actually form their beliefs and valuations. Critics of EMH took the path initially of looking at past returns, and other factors related to fundamentals, to try to capture historic stock market movements not predicted by EMH models. The study by De Bondt and Thaler (1985) shows the tendency of overreaction to past positive and negative returns and a study by De Bondt and Thaler, (1987) and Lakonishok, et al. (1994) find extreme high and low measures of securities valuation. Kahneman and Tversky (1979)

propose the prospect theory in criticizing the assumption that investors make a rational choice in EMH. They stated that people underweigh outcomes that are merely probable in comparison with outcomes that are obtained with certainty. Grossman and Stiglitz (1980) argue that EMH is impossible; if markets are perfectly efficient, there will be no profit for gathering information. As a consequence, there would be little reason to trade and markets would collapse. The market inefficiencies that make investors willing to gather and trade on information should result in sufficient profits for them. The new study by Lo and Repin (2002) on research in cognitive neuroscience and economics suggests a link between rationality in decision making and emotion. They stated that both rationality and emotion are complimentary factors and physiological variables associated with automatic nervous systems that are highly correlated with market events.

Andrew Lo (2004, 2005) tries to reconcile both schools of thoughts, EMH and behavioral economics and finance, by proposing the theory of Adaptive Market Hypothesis (AMH). He explains that the AMH is an evolutionary approach to economic interactions, as well as some recent research in the cognitive neurosciences that has been transforming and revitalizing the intersection of psychology and economics. In the AMH, prices reflect as much information as dictated by the combination of environmental conditions and the number and nature of market participants in the economy. Lo based his theory on the work of Herbert Simon (1955) who stated that individuals are hardly capable of this kind of optimization because optimization is costly and human beings are naturally limited in their computation abilities. Due to their limited abilities, human think that their optimization result is optimal. In fact, the result is only merely satisfactory and not necessarily optimal. In other words, individuals are bounded in their degree of

rationality, which is in sharp contrast to the current orthodoxy of rational expectation, where individuals have unbounded rationality. Furthermore, Lo (2005) explains that the primary components of the AMH consist of the following ideas: (i) Individuals act in their own self interest, (ii) Individuals make mistakes, (iii) Individuals learn and adapt, (iv) Competition drives adaptation and innovation, (v) Natural selection shapes market ecology, and (vi) Evolution determines market dynamics.

Although many studies criticize EMH, in this dissertation we still use EMH as our base assumption because the event study approach that we are going to use to analyze the impact of mergers is based on the EMH assumption. Furthermore, Barberis and Thaler (2003) stated that behavioral finance is still a young field, which began in the 1980s and most of the work is still really narrow. Models typically capture something about investors' beliefs, or their preferences, or the limits to arbitrage, but not all three. And Lo (2005) also stated that his AMH is still in its infancy and still requires more research before becoming a feasible alternative view to EMH.

### **2.1.3 Merger study Review**

This section reviews merger studies that use different sample sizes within similar and different industries. Pautler (2001) stated that many of the merger studies examine samples of mergers that occurred across a range of industries, while others examine multiple mergers within one industry. On the multi industry studies, Healy, Palepu and Ruback (1992) examine the post merger outcome of 50 large mergers occurring between 1979 and 1984. They find that merged firms have significant improvement in asset productivity relative to their industries after the merger, leading to higher post-merger

operating cash flow returns. There is a strong positive relationship between post-merger increases in operating cash flows and abnormal stock returns at merger announcements, indicating that expectations of economic improvements underlie the equity revaluation of the merging firms. Berkovitch and Narayanan (1993) find that 76% of 330 successful tender offers from 1963 through 1988 achieved positive total gains. They conclude that synergy appears to be the dominant driving force in mergers but agency and hubris play some role as well. Andrade et al (2001) studies found that mergers seem to create value for shareholders overall. Seth, Song and Pettit (2000) study on cross border acquisitions of US industrial corporations during 1981-90 indicates that the synergy hypothesis dominates the majority of cross border acquisitions.

Not every study shows that merger activities will create positive values to their shareholders. Matalesta (1983) reports significant losses for acquiring shareholders from a total of 336 completed mergers that occurred between 1969 and 1974. In his opinion, merger is a negative net present value project for the acquiring firm. Agrawal et al (1992) reexamine the post merger performance of acquiring firms over the period of 1955 to 1987 and find that stockholders of acquiring firms suffered a statistically significant loss about 10% over the five year post merger period. Lougran and Vijh (1997) examine 947 whole firm acquisitions from the 1970s and 1980s and find that, compared to a matched sample of non merging firms, five year excess stock market returns to acquirers following the transaction were a positive 61% for cash tender offers but were a negative 25% for stock mergers.

On the subject of multiple mergers within one industry, Knapp's (1990) study of nine airline mergers proposed in 1986 showed that synergies were created and the merger

was motivated by efficiency or market power. This study was supported by Singal (1996) whose study on airline mergers during 1985-88 finds evidence of a linkage between the stock market and the product market and suggests that abnormal stock returns are correlated with profit changes signifying that the stock market anticipates profit changes and adjusts accordingly. In the iron ore industry, Warell (2007) found a positive welfare effect from merger activities.

In the banking industry, Rhoades (1994) surveys thirty nine studies of the effects of bank mergers on efficiency, profitability, or stockholder wealth that appeared from 1980 to 1993. Twenty one of them used the event study approach while the remaining nineteen used the operating performance approach. One study uses both methods. Rhoades finds that the twenty one event studies generally indicate that net gains accrue to stockholders of target firms after the merger announcement.

Rhoades (1998) also summarizes the results of nine horizontal banking studies done by several economists at the Federal Reserve. Using common methodologies, the economists examine nine relatively large 1990s horizontal bank mergers to determine whether common threads could be found among the post merger performance of the firms. For each merger, they examine costs, 16 financial ratios, econometric estimates of efficiency and scale economies, and the stock market price effect relative to control groups. No clear patterns emerge from the nine cases other than that costs were reduced in each case and at least one measure of total efficiency was improved in every case.

Most of the studies mentioned above appear to support the notion that positive value is created by merger activities as mentioned by Weston et al (2001). The gains to



acquiring firms around the announcement date are generally close to zero. The gains to target firms are mainly positive and synergy appears to be the dominant driving force.

#### **2.1.4 Case Studies of Mergers**

Andrade et al (2001) point out the large sample nature of most studies, which tends to combine transactions with different motivations and the inherent noisiness of the accounting data has made it nearly impossible for traditional research methods to address the issue of the underlying source of gains from mergers. Therefore, more detailed examination has to occur in smaller scale case studies that study individual transactions more deeply. Case studies provide insight into the motives behind particular transactions instead of the motives on average in the large scale studies. Case studies come in many varieties. In the oil and gas industry, Ruback (1982) uses the event study method to analyze the merger of Cities Service and Occidental Petroleum. He examined the stock price changes associated with the sequence of announcements that preceded the merger and found that the target firm realized a positive abnormal return while the acquiring firm's abnormal return was virtually zero. Weston (2002) and Weston et al (1999) study merger transactions within the oil industry using both event study and financial valuation techniques to find the performance of the mergers. Weston et al (1999) analyze the BP acquisition of Amoco and find that the transaction had positive economic effects. In addition, Weston (2002) finds that the Exxon-Mobil merger is an archetype of a successful merger and that seven other major oil mergers between 1998 and 2001 were also value increasing for acquirer as well as targets.

King et al (2002) studies two merger events in the agricultural biotechnology industry which is the acquisition of Pioneer Hi-Bred by DuPont in 1997, and the merger of Astra with Zaneca in 1998. They find that the merger announcement has a statistically positive effect on the combined value of the merged firm. Boonpramote (2003) studies mergers in the mining industries and finds that most of the merger transactions benefit the shareholders of the target firms.

Some case study research focuses on mergers in regulated industries such as the telecommunications, banking and electric utilities. Cox and Portes (1998) perform event studies on two cases in the telecommunication industry in 1996 namely the SBC Communication-Pacific Telesis (PacTel) merger and the MCI Communication-British Telecom (BT) merger. They find a negative effect on the combined value for the SBC-PacTel merger but a positive effect for the MCI-BT merger.

### **2.1.5 Mergers and Acquisitions Motives**

Mergers are often thought of as an alternative form of investment. Therefore, a number of motives might play a role in merger activity. The same factors that influence major investment decisions may also influence merger activity. Gaughan (2002) stated that the two most often cited motives for merger and acquisition activities are faster growth and synergy. Other motives are diversification where companies also often merge in an attempt to diversify into another line of business, horizontal integration to increase market share and market power and vertical integration so that a company could have a buyer-seller relationship plus improved management and tax benefits. There are even fewer noble motives such as hubris, or pride of the management of the bidder.

This view of mergers as a special case of business investment is not universally accepted. Mitchell and Mulherin (1996) who studied industry level patterns in takeover and restructuring activity during the period of 1982-1989 across 61 industries find two important empirical features of merger activity. First, merger activity tends to cluster within a narrow range during the sample period. And second, mergers occur in waves which means that specific shocks such as deregulation and financing innovations contribute to the magnitude of merger activities. In addition, Andrade et al (2001) also note that much merger activity occurs as a reaction to deregulation and thus is clustered in the post deregulatory period. The finding implies that merger activity is something other than a simple extension of business investment.

According to Gaughan (2002) and Weston et al (2001), the first empirical observation is that mergers and acquisitions occur in waves. Five periods of high merger activity, often called merger waves, have taken place in the history of the US economy. These periods were characterized by cyclical activity with high levels of mergers followed by periods of relatively fewer mergers. Gaughan (2002) and Weston et al (2001) show clearly the merger waves over the past century, which are summarized as follows (with rough dates):

- Horizontal Merger (1895-1904): The first merger wave occurred after the Depression of 1883 with the goal of achieving economies of scale. Mergers were mostly horizontal and industry consolidation resulted in a near monopolistic market structure. Examples include Standard Oil, US Steel, Du Pont, General Electric, Eastman Kodak, and American Tobacco. As a result of this wave, the

Sherman Act and Clayton Act were passed, significantly impeding horizontal merger activities that gave rise to excessive market power.

- Vertical Mergers (1916-1929): During the second merger wave, several industries were consolidated. Rather than monopolies, the result was often an oligopolistic industry structure. This second wave of mergers featured a large percentage of vertical transactions as horizontal mergers came under control of antitrust authorities. Consolidation occurred in many industries such as electric and gas utilities as well as in the manufacturing and mining industries. This was sometimes called merging for oligopoly wave. The post World War I economic boom initiated this wave, ended with the stock market crash in 1929 and was followed by the Great Depression.
- Conglomerate Mergers (1965-1969): During the third wave, the focus of merger activity was no longer consolidation but diversification. During these years, often known as the conglomerate period, it was not uncommon for relatively smaller firms to target larger companies in contrast to the two previous merger waves. The boom was fueled both by a strong stock market and by financial innovation. This third merger wave ended when the hostile public policy environment depressed the stock prices of conglomerate firms. Together with hostile antitrust policies, punitive tax laws, and declining stock prices this brought the conglomerate merger movement to an end.
- The Deal Decade (1984-1989): The significant role of hostile mergers is a unique characteristic of the fourth wave. With stock prices low relative to the cost of building new capacity, companies saw takeovers as the cheapest way to expand.

The fourth wave included large components of hostile takeovers, break-ups and a refocusing of conglomerate firms, as well as the use of debt capital to finance a buyout of a firm's stock known as leveraged buyouts (LBO). The fourth merger wave ended in 1989 and the economy went into a brief and relatively mild recession in 1990.

- Strategic Mergers (1992-2000). By 1992, another merger movement commenced. It arose from a combination of multiple factors. The information technology revolution, deregulation, lowered trade barriers, and globalized economic environment, method of payment, share repurchases and stock options all contributed. As the economy expanded, firms sought to meet the growing demand in the economy by acquiring or merging with other companies. The deals in the fifth merger wave were a worldwide phenomenon, since a large volume of mergers was also taking place in Europe and Asia. Most were strategic mergers that involved companies seeking to expand into new markets or take advantage of perceived synergies.

These five merger waves provoked major changes in the structure of the industries over the last century. They were instrumental in transforming the industries from a collection of small and medium sized businesses to the current form, which includes thousands of multinational corporations. There is no sector or major industry that has not been affected by mergers and almost none of the largest has been spared from being to some extent a product of past mergers.

### **2.1.6 The Positive Impact Hypotheses**

One of the concerns in this dissertation is to estimate the effect of corporate mergers on stockholder returns to see whether the merger creates value. There are two categories based on the value creation from a merger: the positive impact hypotheses, predicting that corporate mergers will have a positive impact on the value of the target and/or acquiring firm's equity, synergy and market power and the non-positive impact hypotheses stating that corporate mergers have no significant positive impact or even negative effect on the combined values of the firms involved, and the managerial and hubris hypotheses.

There are two hypotheses predicting that corporate mergers will have a positive impact on the value of a target and/or acquiring firm's equity: synergy and market power. These hypotheses are strongly related to the neoclassical theory of the firm whereby behavior is derived from the assumption that a firm maximizes its profits or value. Since the shareholder wealth maximization hypothesis requires that mergers lead to increased profitability for the merged firm in order for the activity to be justified, each of these hypotheses implies that the announcement of a corporate merger releases positive information about the firms involved and that the stock prices of these firms will rise to reflect this new information.

Gaughan (2002) stated that the two most often cited motives for merger and acquisition activities are faster growth and synergy. Other motives are diversification where companies also often merge in an attempt to diversify into another line of business, horizontal integration to increase market share and market power and vertical integration so that a company could have a buyer-seller relationship plus improved management and

tax benefits. There are even less noble motives such as hubris, or pride of the management of the bidder.

#### **2.1.6.1 The Synergy Hypothesis**

The synergy hypothesis implies that the managers of targets and acquirers engage in merger activity due to increased efficiency and shareholder wealth when the real assets of the two firms are combined. Therefore, it follows that the measured gains to both target and acquirer shareholders would be positive. This hypothesis holds that combining the assets and management teams of two firms will result in benefits that could not be achieved by either firm alone. The resulting combination produces synergies and thus improvement in post merger performance which results in an increased aggregate market value of the two firms.

According to this motive, mergers are undertaken in order to achieve cost savings, which include both fixed costs and variable costs. In addition, transaction costs can also be reduced from the transaction specific assets which may lead to synergy. On the other hand, real economies represent true productive resource savings in the economy because of increased specialization or economies of scale. Economies of scale are perhaps the easiest of the potential efficiency gains from mergers to understand and could be expected to follow a horizontal merger. Combining firms may reduce duplication or produce other benefits from increased size. For example, the firm may be able to save management costs by using a single set of managers to run both firms.

Clearly, real economies are socially beneficial and should be encouraged, while pecuniary economies merely reflect redistribution of income between buyers, sellers and

governments. Berkovitch and Narayanan (1993) stated that the synergy motives assume that managers of targets and acquirers maximize shareholder wealth and would engage in take over activity only if the activity resulted in gains to both shareholders. Therefore, if mergers are motivated by synergy, gains to the target and the acquirer, the total gain will be positive and positively correlated.

#### **2.1.6.2. The Growth Hypothesis**

Gaughan (2002) stated that one of the most fundamental motives for mergers is growth. A company's expansion can be conducted either through internal growth or growth through mergers. The process of internal growth is usually slow and uncertain. On the other hand, the merger growth process, although it also has its own uncertainty, is more rapid. Companies may grow within their own industries or diversify to outside their business category which leads to an increase in the company's market power. The term market power implies the ability to control product price. Any merger that increases a firm's market power must, therefore, increase its ability to control or raise the price of its product and increase profitability. If large economies of scale exist, a big company may set its price above marginal cost but below the level that would lead to entry. Therefore, in some cases, large mergers may cause an entry barrier for potential competitors, and the merger then provides a positive impact on the value of the merging firm.

In the quest for growth, companies may look at the cross border merger. Cross border has an advantage of tapping a new market which enables companies to utilize a country's specific knowledge of the target, including its indigenous staff and distribution



network. With an increase in international competition, mergers help meet competition and also reduce rivalry.

### **2.1.7 The Negative Impact Hypotheses**

There are two hypotheses stating that corporate mergers have no significant positive impact or somewhat negative impact on the combined values of the firms involved: the managerial and hubris hypotheses. These hypotheses can be considered as the alternative non-value maximizing hypotheses, since these hypotheses do not necessarily require increased profitability. These hypotheses imply that there are no net gains from altering the operations of the target or bidding firms. The concepts of bounded rationality and opportunism are consistent with these hypotheses.

#### **2.1.7.1 The Managerial Hypothesis**

The managerial hypothesis suggests that the manager knows that they overpay for the merger. The intention for the managers is to maximize their own utility at the expense of the shareholders. The background of managerial hypothesis can be found from the principal- agent theory (Jensen and Meckling, 1976). They develop the concept of agency problems in the management of public corporations where they argue that agency problems arise when managers of public firms pursue their own economic self interest instead of maximizing shareholder wealth. Managers are likely to pursue personal agendas that may have little to do with shareholder value. This means that some mergers

reduce both profitability and efficiency and result in negative wealth effects for the merged firms.

Managerial motives assume that instead of shareholder wealth, managers maximize their own wealth (Mueller, 1969). Management self interests are likely to include such factors as reducing the risk of losing their jobs, increasing their salary levels, and increasing their power and job satisfaction. These managerial incentives may drive a company to grow beyond its optimal size. Hence, managers build their own empire in order to obtain personal benefits such as the manager's compensation, power and prestige.

These self interests can be aided by growth in size. A firm may increase its size by expanding through investment or by means of a merger. Mergers and acquisitions provide a faster means to grow than internal expansion does. They are the quickest way to increase size, particularly when financed by share exchanges rather than by cash. Furthermore, managers have incentives to expand their firms beyond the size that maximizes shareholder wealth. Growth increases managers' power by increasing the resources under their controls and changes in management compensation are positively related to growth. Consistent with the agency theory, certain specific types of mergers earn lower announcement returns to bidder firms and, thus, performance of the acquiring firms seems disappointing over longer periods (Agrawal et al, 1996).

In addition to growth and firm size, a variety of other managerial motivations have been advanced in the literature, including diversification, increased specialization, and retention and misuse of corporate wealth in the form of free cash flow as suggested by the free cash flow hypothesis (Jensen, 1988). Free cash flow is cash flow in excess of

that required to fund a firm's entire projects that have positive net present values when discounted at the relevant cost of capital. Such free cash flow must be paid out to shareholders if the firm is to be efficient and to maximize value for shareholders. However, payment of cash to shareholders rescues the resources controlled by managers, thereby reducing the power of managers and potentially subjecting them to monitoring by capital markets that occur when a firm must obtain new capital.

#### **2.1.7.2 The Hubris Hypothesis**

The hubris hypothesis (Roll, 1986) suggests that acquisitions occur because managers make mistakes in evaluating target firms. This hypothesis, however, does not imply that managers act consciously against an owner's interests. It implies that target firms gain wealth and acquirers suffer wealth losses. Whether the total wealth change is zero or positive depends on the synergy value created. Hence, if there is no synergy value from the merger, the hubris hypothesis suggests the total wealth of zero instead of negative as in the managerial hypothesis.

In contrast to the synergy hypothesis which assumes rational profit maximizing behavior on the part of individual managers, the hubris hypothesis assumes irrational individual behavior, since rational managers would realize that any bid above the market price is an error and could cancel the bid. The hypothesis relies upon asymmetric beliefs by the bidder and the target about the wealth gains associated with the merger. Therefore, in this case, overvaluation by the bidder on the target is a mistake and not conducted on purpose (Seth et al, 2000).

The next table summarizes the prediction of the wealth effect of mergers from the two testable hypotheses mentioned above.

**Table 2.1 Merger Hypothesis Summary**

<b>Merger Hypothesis Summary</b>	
Positive Impact	Synergy Hypothesis
	Growth Hypothesis
Negative Impact	Managerial Hypothesis
	Hubris Hypothesis

## **2.2 Literature review on Innovation**

In this chapter we lay the foundations for the theoretical and empirical investigations for the next chapter. In addition, we will discuss the possible approaches that can be followed in modeling the interaction between innovation and mergers. Jorde and Teece (1990) explained that innovation is not only an invention for the new discovery, new process or products, but it can be new development, improvement, and adoption of technology in one industry to another industry. The innovation will involve risk taking activities due to an uncertainty environment in the innovation process. Johnston (1966) stated that there are five factors affecting innovation which is Research and Development (R&D) activity, purchase and flow of knowledge, talent, economic and market structure, and investment and availability of financing. We decided to focus on one factor that affects innovation, namely, R&D activity based on Johnston's

explanations that the contributions of science and technology to economic growth are concentrated on R&D expenditure and manpower. Tirole (1988) distinguishes four stages of R&D: first is basic research with the goal to derive the fundamental knowledge, second is applied research such as research in engineering, third is development research which bring new products and processes into commercial use and the last one is the post research stage where innovation diffuses through the industry via licensing, innovation of patented innovation or adoption of unpatented innovations. He also explains the difference between product innovation which creates new goods and services and process innovation which results in cost reduction.

### **2.2.1 Literature on Innovation-driven Mergers**

Empirical studies on technology deals suggest that innovation is one of the reasons for merger activities. Hitt et al (1991) conclude that mergers will give significant value to the stakeholder and improve efficiency. However, the acquirer should be prepared to accept the trade-offs of the benefit from the merger to the increase of managerial risk aversion which leads to commitment reduction for R&D activities. A Chakrabarti and Souder (1987) survey of perceptions regarding 31 merger activities across engineering, electronics and other technology-based industries found that managers felt that their motives, such as growth and financial performance were rarely achieved. Hitt et al (1996) analyzed 250 firms and found that R&D intensity and patent intensity declined after mergers. They found that the inventions for new products on the acquirer were disturbed due to tighter financial control.

Based on studies of the recent high technology sectors, there is broad consensus among scholars that merger intention is not just technologies, but also people. Birkinshaw (1999) stated that the acquirer needs to devote some attention to integrate both tasks and people. Zollo and Singh (1998) stated that the replacement of top managers in the target firm could result in negative performance. Coff (1999) analyzed 218 mergers across multiple industries and found that it is really difficult to assess the quality of target knowledge and then how to blend it with existing acquirer capabilities, since human capital can not be observed and evaluated in the same objective manner as physical assets even if it can be observed hypothetically. A Graebner and Eisenhardt (2002) study of 12 entrepreneurial ventures in three industry sectors points out that in choosing the acquired, target companies consider more than price. They also choose buyers' offering combination potential, consisting of both similarities and complementarities between the two companies. Ranft and Lord (2000) who investigated 89 mergers in the communications, computer hardware, computer software/service, and other high technology sectors, stated that retention is the central attention during mergers in knowledge intensive firms. The acquired must ensure that employees stay by providing them autonomy, status and managerial commitment over economic incentives.

Knowledge retention is a prerequisite to transfer and application, which is a major source of integration complexity in innovation driven mergers. Ranft and Lord (2002) examined seven software, electronics, and biotech mergers and discuss the complexities posed by the dual need for knowledge preservation and transfer. They argue that while higher levels of organizational integration and faster assimilation lead to greater transfer of tacit knowledge due to increased interaction and communication between individuals

on both sides, these actions make it difficult to preserve the knowledge since they can disturb the interactions and relationships among target members.

In a number of studies several strategies ensure positive performance of mergers. Chakrabarti and Souder (1987) found that a high degree of organizational integration with much knowledge sharing but without excessive formalization of processes will encourage interaction and knowledge transfer while also allowing the newly acquired employees to adjust to the new environment.

Chakrabarti, Hauschildt et al (1994), in their interview based investigation of 30 German-American mergers, determined that greater autonomy in research and development coupled with high levels of interpersonal communication improved performance, leading to preservation of the desired independence but with simultaneous knowledge transfer.

Birkinshaw (1999) analyzed three case studies of mergers in the engineering industries and stated that a certain amount of decision work regarding work arrangements and processes is necessary to enable both sides to begin working together, but that concentrating on activities fostering interaction and open communication at first reduces initial anxieties. These activities could create further efficiency if followed by a reinforced interaction of individuals through joint work, thus leading to business productivity, and they demonstrate the value of merging both sides, while also building common values and objectives.

Chaudhuri and Tabrizi (1999) studied 53 mergers in the information technology, communications, and engineering industries and suggest that embarking on joint projects

but also giving key technical employees alternatives to pursue other interests provides assimilation benefits while not making innovators feel cramped.

Puranam (2001), suggests a contingent solution for the problem, based on an empirical study of 365 information technology mergers through public information and surveys. He finds that merger performance, in terms of abnormal stock returns at announcement is enhanced when there is a high degree of integration of the purchased entity into the acquiring organization if target capabilities are interdependent with those of the acquirer. He explains that in the former case, the benefit of knowledge transfer and application outweighs the costs of routines disruptions.

However, merger activities also produce some barriers to innovation. The most common problem is that mergers require so much time and so many individual to be involved in the merger; consequently, management attention will be diverted from the innovation focus. The Chakrabarti et al (1994) study shows that post merger integration management is not an easy task. The result could be disintegration instead of the integration of the newly merged company.

There are also complexities that emerge from inherent characteristics of the two merging organizations that are generally associated with the purchase of more established companies: large target size and cultural differences. These conditions although challenging could create value creation opportunities but can also create more problems. On the empirical evidence surrounding the problems of the acquiring larger firm, Ahuja and Katila (2001) examined 534 mergers in the chemical industry and found that the absolute target size positively influences subsequent innovation for inventive recombination. However, they also determine that the relative size of the target to the



acquirer negatively impacts performance, presumably because time is spent on integration of processes and people at the expense of operations. On the other hand, Ernst and Vitt's (2000) investigation of 43 deals in the mechanical, electrical engineering, and chemical industries concluded that key investors who come from larger targets underperform their counterparts from smaller firms in their post merger patenting productivity, since the latter are recognized more easily and are engaged more appropriately.

Chakrabarti, Hauschildt et al (1994) found the same effect with absolute size as Ahuja and Katila (2001), while the Puranam (2001) study found no effect for absolute size but a negative impact of relative size on performance. Therefore, it is still unclear whether the purchase of larger companies is beneficial or not.

On the cultural differences problem, an Ernst and Vitt (2000) study indicated that different value systems and patterns of behavior lead key R&D personnel to face interface problems in collaboration. Their result is still not conclusive about whether this cultural differences problem could lower performance of the merger as a whole.

Besides these organizational level integration difficulties, the literature also shows technical complexity related to the integration of the acquirer and target products, arising from pre-existing technological incompatibilities. The impact of this factor in performance, however, is not clear. On the one hand, Chakrabarti and Souder (1987), Chakrabarti, Hauschildt et al (1994) and Ernst and Vitt (2000) show that technical mismatches and conflicts in technological philosophies lower merger performance, complicating product interoperability and hampering productive collaboration. Yet there also are other studies that stated technical differences can produce positive performance, provided the acquired technology is complementary. For example, Ahuja and Katila (2001) stated that some

non-relatedness of the technical bases of the two sides are necessary to enhance the number of knowledge combinations for product innovation.

The work on merger activities' impact on innovation mergers has focused on the technical and organizational complexities in the integration. There are also challenges posed by technical and market uncertainty surrounding these transactions. Chakrabarti, Hauschildt et al (1994) point out that while new technologies offer much potential at the outset, whether or not they develop to fulfill product performance goals is unpredictable, since scientific progress can take unexpected paths. Similarly, Chakrabarti and Souder (1987) and Kohers and Kohers (2001) indicate that the nature of technology-based mergers is to enter unproven environments. This creates vast opportunities but comes with the danger that the markets change in different directions.

### **2.2.2 Merger Hypotheses association to Innovation**

To analyze the relationship between merger activity and the innovative efforts of firms, we will analyze motivations for mergers in general. In this chapter, we categorize the positive and negative impacts of mergers into two categories-the equilibrium and disequilibrium theories. The reason is that mergers are essentially caused by the existence of synergies and are basically equilibrium theories while, negative hypotheses such as managerial and hubris hypotheses are considered to be disequilibrium theories.

The models based on disequilibrium theories provide fertile soil for exploring the relationship between innovative efforts and the process by which a firm becomes a merger target. In particular, there is the fact that the outcomes of R&D are inherently stochastic and the difficulties to quantify meaningfully the output of R&D suggest that

there may be significant imperfections in both management and evaluation of R&D programs (Addanki, 1986). First we will discuss theories based on synergies and their relationship to innovation; subsequently, we also will discuss the disequilibrium theories.

### **2.2.3 Equilibrium Theories of Merger**

The equilibrium theory of merger is also known as the positive impact hypothesis of merger. Although there are two positive impacts of merger hypotheses, this dissertation will focus more on the synergy hypothesis since synergy reflects the competitiveness of the market compared to the growth hypothesis which reflects the monopoly market. Arrow (1959) stated that the returns generated by a process innovation are greater when the innovation is used in a competitive as opposed to monopolized market. Therefore, competitive markets imply greater incentives to innovate. Greenstein and Ramey (1998) disagreed with Arrow's statement and maintain that the incentives are strictly greater under monopoly when the monopolist can be threatened by entry.

Donnenfeld (1982) also mentioned that markets dominated by firms with monopoly power may create incentives to over invest in R&D relative to socially desirable levels.

The question of interest to us is how synergies may be affected by characteristics related to R&D and innovations. In the case of horizontal mergers, it may be thought that firms that are engaged in the development and production of broadly similar products could find it in their interests to merge. Firms that did a lot of R&D relative to their size should appear to be attractive prospects for an acquisition since the innovative output of

the targets could presumably be more profitably exploited by the merged firm. On the other hand, we might find that firms which have little experience in innovation may have other assets that make them attractive targets for a perhaps more R&D intensive firm. Dasgupta and Stiglitz (1980) stated that industrial concentration and large size spur inventive activity. This argument is supported by Aghion and Tirole (1994) who said that the scale effect states somewhat vaguely that a larger firm has more incentives for R&D. It is not easy to make a case for innovative efforts to have either a positive or negative impact on the probability that a firm will disappear through a horizontal merger.

The case of vertical mergers may be clearer. Particularly in high technology industries, R&D outlays could constitute an important specific investment that an upstream or downstream firm is obliged to make in a vertical relationship. We might then expect firms that have invested heavily in specific R&D to be inclined to protect themselves from opportunistic behavior through joint ownership. The mergers that cannot be classified as either vertical or horizontal are more properly viewed as conglomerate mergers.

Addanki (1986) stated that synergies for conglomerate mergers may take the form of economies in marketing and distribution, control, or access to capital markets. Small high technology firms that have a proven record of success at innovation may find it difficult to extract all potential rents from their innovations due to the economy of scale. These firms could be attractive targets for larger firms with complementary strengths and probably fewer R&D labs. On the other hand, small firms that have little investment in R&D but have established market power in some segment of the market may be attractive targets for an acquirer that perhaps does more R&D but has limited access to those

market segments. Baumol (1992) mentioned several benefits of the merger to innovation: first, cost sharing and avoidance of duplication since innovation is expensive, second, an *ex ante* sharing arrangement offers insurance to each participant against the great risk that its own innovation program will produce no valuable result, and third, a competitive advantage over other firms.

### **2.9.2 Disequilibrium Theories of Mergers**

Addanki (1986) stated that the departure from neoclassical equilibrium that has received the most attention in the theories of mergers is the potential for divergence between the objectives of management and shareholders as in managerial and hubris hypotheses. While mismanagement of a firm may take many forms, our interest is primarily in the firm's innovative activity. Therefore, we will restrict our attention to the possible ways that R&D may not be optimally managed. The most obvious form of potential mismanagement is that the firm does too much or too little R&D overall. A firm that operates in a relatively high R&D industry may find its stock penalized by the market if it does not devote enough resources to research. An outsider may then find it profitable to acquire the firm.

Another possibility is that firms devote sufficient resources to innovative efforts, but in the wrong direction. This condition would not maximize the expected returns to R&D expenditures, a factor which would be reflected in the stock price of the firm, causing it to be undervalued in relation to its overall R&D outlays. There is then an opportunity for bidders to acquire the firm. If we view the innovative process as accepting inputs (R&D expenditures, facilities, etc) and converting them through a series

of projects into output (innovations), a firm that has a large R&D budget clearly has the capacity to perform research activity. Pakes (1985) stated that on average, unexpected changes in patents and in R&D were associated with significant changes in the market value of a firm. If the projects are wrongly chosen, producing very little output, the firm's R&D capabilities are clearly not being optimally exploited.

## **CHAPTER 3**

### **Research Methodology**

#### **3.1 A Model based on Event Study Methodology**

Peterson (1989) stated that event study methodology is one of the most frequently used analytical tools in financial research. However, the use of event study methodology is not only limited to finance literature, it is also an important methodology in fields such as management research and law. In the law, Lowengrub (2002) uses event studies to measure the effect of securities fraud on a company's value. In management research fields, McWilliams and Siegel (1997) examined the use of event studies in management research and suggested that the event study can help researchers assess the financial impact of changes in corporate policy. According to their survey, one of the reasons that the event study method has become popular is that it eliminates the need to analyze the accounting-based measure of profit. The accounting data have been criticized because they often are poor indicators of the true performance of the firms (Evans, 1994). For example, managers can manipulate accounting profits because they can select accounting procedures.

On the other hand, stock prices usually are not subject to manipulation by insiders. Since stock prices are supposed to reflect the true value of firms, they are assumed to reflect the discounted value of all future cash flows and incorporate all

relevant information (Armitage, 1995). Reilly and Brown (2003) stated that according to the semi-strong version of the Efficient Market Hypothesis (EMH), security prices adjust rapidly to the release of all this information; as a result, current security prices fully reflect all public information. Therefore, only an unanticipated event can then change the price of the stock. Hence, event studies, which are based on stock price changes, should measure the financial impact of a change in corporate policy, leadership, or ownership more effectively than a methodology based on accounting returns.

The strength of the methodology lies in the fact that it can capture the overall assessment by a large number of investors of the discounted value of current and future firm benefits attributed to particular events (MacKinlay, 1997). Event studies rely on the assumptions that investors are well informed of the underlying characteristics of the industry and on stock market efficiency (Sirower and O'Byrne, 1998). It must be stressed that the event study methodology reflects capital market expectations to news about a firm's actions, not the actual performance of the firms after the event. This may lead to a number of limitations.

The first published study using the event study method is by James Dolley (1933) who wrote about the characteristics of common stock splits. He examined the price effect of stock splits by studying nominal price changes at the time of the split. Using 174 examples from 1921 to 1931, he found a price increase in 57 of the cases and a price decrease in 26 of cases. His study is followed by Myers and Bakay (1948) who found that the decision of a company's management to propose a split of common shares was favorably regarded by the market. In 63 of 70 selected cases from the years 1945 to 1946,



the price of split shares rose more than the market price of stocks in the same industry in the weeks preceding the split when news of the event first appeared.

Over the decades from the early 1930s to the late 1960s, the level of sophistication of event studies increased. In the late 1960s, Ball and Brown (1968) considered the value of a company's annual earnings announcement while Fama et al. (1969) examined the effect of the announcements of stock splits on stock prices after removing the effects of simultaneous dividend increases. Since then event studies have become the standard method measuring market reaction to some announcement or event.

By 1997, MacKinlay stated that the most successful applications of event studies have been in the area of corporate finance. Event studies now dominate the empirical research in this area. Important examples include the wealth effects of mergers and acquisitions as well as the price effects of mergers and acquisitions and the price effects of financing decisions by firms. Any study of these events usually focuses on an abnormal return around the date of the first announcement. When a merger announcement occurs, event study analysis measures the response of stock price performance against an estimate of expected (normal) returns based on previous behavior.

### **3.1.1 Mechanism of Event Studies**

The basic steps for the event study process mentioned by Henderson (1990) are the following:

1. Define the date upon which the market would have received the news. This is called the event date.

2. Estimate the returns of the individual companies in the absence of this news. This is called normal returns.
3. Calculate the difference between observed return and normal returns for each firm. The result is called the abnormal returns (AR).
4. Aggregate the abnormal returns across time to find the cumulative abnormal return (CAR) over the event windows. In the case of multi firm studies, it should be aggregated across all firms in the samples to find the average abnormal returns.
5. Statistically test the aggregated returns to determine whether the abnormal returns are significant.

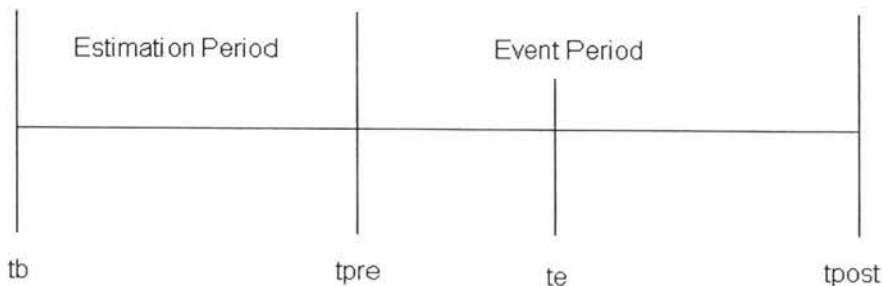
Each basic step in the event study methodology is discussed in the following sections including justification for the choices used in this dissertation.

### 3.1.2 Event Dates and Estimation Periods

Henderson (1990) stated that the most important first step is choosing an event to study. After defining the event, we should determine the time of the event. The issue is not when an event occurred but when the markets started to react to the news.

Peterson (1989) described the time line for the event study as follows:

**Figure 3.1. Event Study Time Line**



where:

- tb = The first period used in the estimation of normal security return;
- tpre = The first period used in the calculation of abnormal return;
- te = The event period;
- tpost = The last period used in the calculation of abnormal returns.

She said that tpre and tpost are selected to capture any wealth effect expected to happen on the security within that period. In event studies, it is important to distinguish between two periods--estimation period and event period. An event window is centered on the event date, which is designated day 0 in event time. Thus, the event window is the event day plus and minus some number of days, weeks or months depending on time observation intervals. On the estimation period, Henderson (1990) explains further that estimates are derived from the benchmark model. These estimates are used to define expected or normal returns for each firm during the event window. Peterson (1989) suggested that the typical lengths of the estimation period range from 100 to 300 days for daily studies and from 24 to 60 months for monthly studies. Whereas, MacKinlay (1997) suggested that the estimation period should be more than 120 days and the event period is not included in the estimation period in order to prevent the event from influencing the normal return model parameter estimates. Overall, the selection of the length of the event and the estimation period are left to the researcher's judgment. The researcher must consider the trade off between an improved prediction model and model parameter instability in the longer period.

Morse (1984) studies some economic issues on the choice between monthly and daily return data. He examines factors affecting the power of statistical tests to investigate

the effect of information on security returns based on the return data over different units of time. His results generally support the choice of a shorter measurement interval to detect information effects. The only condition to consider for the use of monthly data is when there is uncertainty about the announcement date of the information. The choice of a shorter measurement interval is also supported by the simulation studies of Brown and Warner (1985).

Brown and Warner (1980, 1985) conducted two simulation examinations of event study methodology in which they emphasize the importance of carefully defining event dates because of the results of their power tests on uncertain event dates. In their 1980 study, they used monthly data and discovered that in event studies, simple methodologies could result in the same conclusion as more complicated methodologies. In their 1985 study, they suggested that the use of daily data and corrected event dates served to increase the statistical power of the event study technique. For that reason, this dissertation selects daily stock prices to conduct the merger event studies.

After defining the event and the measurement interval, the next step is to search for the first public announcement of the event. Mullin et al (1995) stated that not all of an event can be included in the analysis. Some already anticipated events cannot be included in the analysis. This omission weakens the estimation but will not bias the result. They explained that an overlooked event is treated as an omitted dummy variable and does not cause bias since the omitted dummy is not correlated with any other regressor.

### 3.1.3 Estimation of Normal Returns

#### 3.1.3.1 Return Calculation

Brooks (2002) stated that for a number of statistical reasons, it is preferable not to work directly with the price series; as a result, raw price series are usually converted into a series of stock returns. Additionally, returns also have the added benefit that they are unit free.

Strong (1992) also stated that there are two different ways to calculate returns, the discrete and logarithmic returns.

$$\text{Discrete Returns: } R_{jt} = \frac{P_{jt} + D_{jt} - P_{jt-1}}{P_{jt-1}} = \frac{P_{jt} + D_{jt}}{P_{jt-1}} - 1$$

$$\text{Logarithmic Returns: } R_{jt} = \log\left[\frac{P_{jt} + D_{jt}}{P_{jt-1}}\right]$$

where  $R_{jt}$  = return on security j in period t.

$P_{jt}$  is the price of security j at the end of period t;

$D_{jt}$  is the dividends paid during period t;

$P_{jt-1}$  is the price of security j at the end of period t-1, adjusted for any capitalizations in order to make it comparable to  $P_{jt}$

Most event studies barely mention how they calculate returns. Brooks (2002) points out that the academic finance literature generally employs the log return formulation. Empirically, logarithmic returns are more likely to be normally distributed and so conform to the assumptions of standard statistical techniques (Strong, 1992). Hence, the returns calculation in this dissertation uses the logarithmic return.

### 3.1.3.2 Benchmark Models for Normal Returns

Strong (1992) stated that correct specification of the benchmark models used for normal return measurement is critical for the successful application of the method. The finance literature has considered several models for normal returns. MacKinlay (1997) stated that there are a number of approaches to deal with calculating normal returns. The approaches can be loosely grouped into two categories: statistical and economic. The statistical category such as constant mean return model and market model follows statistical assumptions concerning the behavior of asset return and does not depend on any economic argument. In contrast, models in the economic category such as the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) rely on assumptions concerning an investor's behavior and not solely on statistical assumptions.

Cable and Holland (1999) categorize these normal returns models based on the statistical technique, distinguishing regression models i.e. Capital Asset Pricing Model (CAPM), the Market Model (MM), and non-regression models i.e. the Mean Adjusted Return Model (MAR) and the Market Adjusted Returns or Index Model (IM). They tested the most appropriate model from these four models based on the restrictions imposed on the general model and also developed the relationship among the four models by linking these models to the general model which can be written as:

$$\hat{R}_{jt} = \alpha_j + (\gamma_j - \beta_j)R_{ft} + \beta_j R_{mt}$$

The normal or expected return ( $\hat{R}_{jt}$ ) on the j'th firm is an unrestricted, linear function of the risk free rates ( $R_{ft}$ ) and the market index return ( $R_{mt}$ ).

Cable and Holland (1999) impose the first restriction as:

$$(\gamma_j - \beta_j) + \beta_j = \gamma_j = 1$$

With this restriction, they derive the CAPM with added intercept to permit estimation around the mean as:

$$\hat{R}_{jt} = \alpha_j + R_{ft} + \beta_j (R_{mt} - R_{ft})$$

Then they put constraint for  $\alpha_j$  to zero in the above equation. This additional constraint forces the regression through the origin and yields the CAPM in the alternative form as:

$$\hat{R}_{jt} = R_{ft} + \beta_j (R_{mt} - R_{ft})$$

When general model is restricted with  $(\gamma_j - \beta_j) = 0$ , the general model will become the market model (MM):

$$\hat{R}_{jt} = \alpha_j + \beta_j R_{mt}$$

Cable and Holland (1999) note that MM differs from the general and CAPM models in that the risk free rates ( $R_{ft}$ ) are suppressed. However, market wide factors remain accounted for, and the expected return can vary across firms.

Imposing  $\beta_j = 0$  and  $\bar{R}_j = \hat{\alpha}_j$  gives the mean adjusted model (MAR):

$$\hat{R}_{jt} = \alpha_j$$

where  $\bar{R}_j$  is the mean average return on security j over the estimation period: then neither market wide factors nor risk are accounted for. This result in the basic prediction of no change in normal returns in the absence of the event, but expected return can differ across firms.

Finally, Cable and Holland (1999) impose on MM the joint restriction  $\alpha_j = 0$  and  $\beta_j = 1$ . These restrictions yield the market adjusted returns or index model (IM):

$$\hat{R}_{jt} = R_{mt}$$

Cable and Holland (1999) showed a clear preference for the regression based models, MM and CAPM. The market model (MM) was valid and dominated the CAPM in all except in a few cases. On the other hand, the MAR model performed badly in all cases and IM was rejected in more than one in three cases. Fama and French (1996) discovered deviations from CAPM which imply that the validity of the restrictions imposed by the CAPM on the normal return model is questionable. In addition, MacKinlay (1997) stated that the study by Fama and French has introduced the possibility that the results of the studies may be sensitive to specific CAPM restriction. Because this potential for sensitivity can be avoided at little cost by using the MM, the use of the CAPM has almost ceased. Armitage (1995) stated that the market model is the most commonly used model of expected returns in event studies and is best supported by evidence. However, the CAPM is also used in tests of investment rules and fund performance, which are not strictly event studies. Binder (1998) also shows strong support for the use of market models in the event studies. He said that the market model works well as a measure of the benchmark rate of return. In the next chapter we are going to use both MM and CAPM for our benchmark along with the Fama-French Three Factors Model and the Fama-French Four Factors Model. The two later models will be discussed in the next section.

### **3.1.3.3 Fama-French Four Factors Model**

Fama and French (1992, 1993, and 1995) proposed a three factor model as an attempt to explain the size and value of CAPM anomalies. It is known that profitability is



related to size and book-to-market value. By controlling for book-to-market equity, small firms tend to have lower earnings on assets than large firms. Firms with high book-to-market value tend to have low earnings on assets. The Fama-French three factors are defined as: (i) the market factor which is the market return in excess of a risk free rate, or  $(RM-RF)$ ; (ii) the size factor which reflects the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks, or SMB (Small Minus Big); and (iii) the value factor which is the difference between the return on a portfolio of high book to market stocks and the return on a portfolio of low book to market stocks, HML (High Minus Low). SMB is designed to measure the additional return investors have historically received by investing in stocks of companies with relatively small market capitalization. This additional return is often referred to as the size premium. HML is constructed to measure the value premium provided to investors for investing in companies with high book to market values. Exposures to risk factors are generally unknown and can be hard to estimate, especially at the individual stock level. It is common practice first to rank the stocks on raw returns and estimate the risk exposures after portfolio formation. Using  $(R_{i,t} - RF_t)$  to denote the excess return of a portfolio of interest over the risk free rate (i.e., one month Treasury bill rate), the usual time series regression equation used to investigate the pricing model is

$$R_{i,t} - RF_t = a_i + b_i(RM_t - RF_t) + s_iSMB_t + h_iHML_t + \varepsilon_{i,t}$$

where  $b_i$ ,  $s_i$  and  $h_i$  are factor loadings or the risk exposures of the excess return on portfolio  $i$  to the corresponding risk factor, and the asset pricing model predicts that the intercept  $a_i$  is zero in this regression. Alternatively, one can view the model as an

arbitrage pricing theory in which the returns of the three factor mimicking portfolios aim at perfectly replicating the return of the portfolio of interest.

In his website Kenneth French explains that The Fama/French factors are constructed using the 6 value-weight portfolios formed on size and book-to-market from July 1, 1963-May 29, 2009. SMB (Small Minus Big) is the average return on the three small portfolios minus the average return on the three big portfolios.

$$SMB_t = \left[ \frac{SmallValue + SmallNeutral + SmallGrowth}{3} \right] - \left[ \frac{BigValue + BigNeutral + BigGrowth}{3} \right]$$

HML (High Minus Low) is the average return on the two value portfolios minus the average return on the two growth portfolios,

$$HML_t = \left[ \frac{SmallValue + SmallGrowth}{2} \right] - \left[ \frac{BigValue + BigGrowth}{2} \right]$$

$R_m - R_f$ , the excess return on the market, is the value-weight return on all NYSE, AMEX, and NASDAQ stocks (from CRSP) minus the one-month Treasury Bill rate.  $R_m - R_f$  includes all NYSE, AMEX, and NASDAQ firms. SMB and HML for July of year  $t$  to June of  $t+1$  include all NYSE, AMEX, and NASDAQ stocks for which we have market equity data for December of  $t-1$  and June of  $t$ , and (positive) book equity data for  $t-1$ .

Using the three factor model, Fama and French (1993) demonstrate that there is indeed covariation in returns related to both book size and book to market value (captured by SMB and HML). The Fama and French (1995) study shows that weak firms with persistently low earnings tend to have high BE/ME and positive HML. On the other hand, strong firms with persistently high earnings have low BE/ME and negative loading on HML. They suggest HML captures the variation of the risk factor that is related to relative earnings performance.

Carhart (1997) extends the Fama-French Three Factor Model by considering a fourth factor based on price momentum. He argues that the price momentum can increase the explanatory power of the Fama-French model over the previous year. The momentum factor is based on monthly return differences between winner and loser portfolios.

The Fama-French Four Factor model is based on the following regression:

$$R_{i,t} - RF_t = a_i + b_i(RM_t - RF_t) + s_iSMB_t + h_iHML_t + u_iMom_t + \varepsilon_{i,t}$$

where Mom is the momentum factor designed to address the risk associated with prior returns by subtracting a portfolio of low prior return firms from a portfolio of high prior return firms where prior returns are measured over the months t-12 to t-2.

Kenneth French also explains in his website that he used six value-weight portfolios formed on size and prior (2-12) returns to construct Momentum (Mom). The portfolios, which are formed monthly, are the intersections of two portfolios formed on size (market equity, ME) and three portfolios formed on prior (2-12) return. The monthly size breakpoint is the median NYSE market equity. The monthly prior (2-12) return breakpoints are the 30th and 70th NYSE percentiles.

$$Mom_t = \left[ \frac{SmallHigh + BigHigh}{2} \right] - \left[ \frac{SmallLow + BigLow}{2} \right]$$

Mom is the average return on the two high prior return portfolios minus the average return on the two low prior return portfolios. The six portfolios used to construct Mom each month include NYSE, AMEX, and NASDAQ stocks with prior return data. To be included in a portfolio for month t (formed at the end of the month t-1), a stock must have a price for the end of month t-13 and a good return for t-2. In addition, any missing

returns from t-12 to t-3 must be -99.0, which is CRSP's code for a missing price. Each included stock also must have ME for the end of t-1.

#### **3.1.3.4 Choice of the Market Index**

Brown and Warner (1985) suggest the use of a value weighted index such as NYSE composite index as a market index. However, Peterson (1989) stated that an equally weighted index such as the CRSP index, which represents an aggregate of stocks traded in the major exchanges such as New York Stock Exchange (NYSE) and American Stock Exchange (AMEX) is more likely to detect abnormal security returns. This result is due to the greater degree of correlation between the equally weighted index and security returns; the greater the precision of the estimated parameters, the more easily detectable are the abnormal returns.

For Market Model (MM), we used the market index that we calculated from the data that we obtained from Professor Kenneth French's Website. Professor French provides us with the market premium and risk free rate data. Therefore, we have to subtract the market premium with the risk free rate in order to get the market index data. On his website, he indicated that he obtained the data from Ibbotson and associates.

#### **3.1.3.5 Accumulation of Abnormal Returns**

MacKinlay (1997) stated the procedures in an event study after estimating the normal return over the estimation window is to calculate the return over the event window. An important consideration when setting up an event study is the ability to detect the presence of a non-zero abnormal return and analyze the relationship between the magnitude of the event's abnormal return and firm characteristics. Ruback (1983)

explained the meaning of abnormal return as the difference between the realized returns and the normal return. The abnormal returns reflect unanticipated percentage changes in expected value.

Consider the underlying normal return model in the event study as the market model:

$$R_t = \alpha + \beta R_{mt} + \varepsilon_t$$

where  $R_t$  is the continuously compounded return to an individual security at time  $t$ ,  $R_{mt}$  is a continuously compounded return of a market index, and  $\varepsilon_t$  is a random error term.

Let  $\hat{\alpha}$  and  $\hat{\beta}$  be the estimates of  $\alpha$  and  $\beta$  over the estimation period. For each period in the event window, the sample abnormal return ( $\hat{AR}_t$ ) is estimated as

$$\hat{AR}_t = R_t - \hat{\alpha} - \hat{\beta}R_{mt}$$

Almost all event studies call for abnormal returns to be cumulative over a number of periods. This may be to capture the effect of an event on share prices or to accommodate uncertainty over the exact date of the event. Denote an event window as time  $-T$  to  $T$  (see figure 3.1). The estimated cumulative abnormal return ( $CAR(-T,T)$ ) accumulates over the event window of the estimate  $\hat{AR}_t$ .

Although there are probably other methods, Strong (1992) suggests the two most popular methods of accumulating abnormal returns depend upon whether returns have been measured in discrete or continuous time. These are calculated using an arithmetic average and geometric product respectively, as follows:

$$CAR(-T,T) = \sum_{t=-T}^T \hat{AR}_t$$

or

$$CAR(-T, T) = \prod_{t=-T}^T (1 + AR)^t - 1$$

This dissertation uses the second equation to calculate the CAR which is also the technique used by Ruback (1983).

### 3.1.4 Wealth Effects in Mergers

Mergers and acquisitions are investment decisions used by the acquiring firms. The expected benefits of the mergers and acquisitions are the incremental cash flows generated by the combination of the previously independent firms or by the achievement of control over the operations of the target firms. The net present value (NPV) of the decision represents the expected dollar gain to the shareholders of the acquiring firm. The sum of the gains to both the acquiring and the target firm in the acquisition reflect the expected value of the economic impact. The split of this total gain and the impact on stock prices will depend on the value received by the shareholders of the target firm or the premium paid by the acquiring firm.

In a merger transaction, both the acquirer and the target company know that the purchase price will be higher than the intrinsic value and the buyer will most likely pay a premium known as a control premium. That premium allocates some of the future benefits of the combination to the target shareholders. Absent a premium, most target shareholders would refuse to sell. The acquirer's manager needs to calculate how large a premium their company can bridge through synergies. The target, meanwhile, will be trying to calculate how high the price can be pushed. If there's more than one potential acquirer and the bidding becomes competitive, that places even more upward pressure on

the purchase price. All of these values mentioned here will be reflected in the stock prices of the firms participating in the merger.

The main question in the event study methodology is whether the merger is expected to create value. The following explanation for this answer draws on the ideas of Cox and Portes (1998).

Consider a merger that is expected to result in synergy. Call the acquiring company, Company A and the target company, Company B. The market values of Company A and Company B before the merger announcement are  $V_A$  and  $V_B$ . Call the additional value that arises from the merger  $V_{AB}$ . In this case the newly merged company is worth:

$$V_m = V_A + V_B + V_{AB}$$

Since the stocks of the companies, taken together, will eventually represent the stock of the merged company, the combined values of the two companies after the announcement should add up to  $V_m$ . That is the best market estimate of the value of the merged firm. This analysis suggests that gains resulting from the merger can be evaluated by looking at the combined effect on the merging companies.

Company A should be willing to pay up to  $V_B + V_{BA}$  for Company B, less any costs of selling the company for any amount greater than  $V_B$ . Hence, the outcome is not predetermined. The price paid for the target firm will reflect any gains to its shareholders that result from successful bargaining by its management.

In principle, it is possible for one side to appropriate all the benefits of the merger. The relative effects of the announcement on each company's stock prices may provide information on the bargaining strength of the two companies. However, it is not possible

to evaluate the overall values from the merger simply by looking at the stock price performance of either the target firm or the acquiring firm in isolation.

Practically, the return on stock prices of both firms will be transformed into the return on the market capitalization which is the value of the stock prices multiplied by the number of shares outstanding. The market capitalization captures changes in the firm values as a result of either stock price changes or the number of shares changed. In addition, it allows us to measure the total value of merged firms regardless of the firm size. Hence, the combined value of the merging firm at the announcement period can be calculated.

The positive impact hypotheses (synergy and growth hypotheses) predict that there is value created from the merger. Hence, the combined gains of the merging firms are positive. The gains to the acquirer can be negative or positive, while the gains to the target firm are usually always positive as a result of premiums paid by the acquirer.

### **3.2. The Innovation Model**

The equilibrium theory of mergers is also known as the positive impacts hypothesis of mergers. After the event study result shows that the majority of merger activities have a positive impact, we will continue the study on synergy hypothesis. The synergy hypothesis suggests that the market is competitive. We believe that the oil and gas industry is a competitive market.

The question of interest to us is the relation of the synergy hypothesis to R&D and innovations. The approach we would follow in developing a model of mergers based on synergies is to view the productive assets of a firm in the two different categories. First,



the firm's research and development, which we refer to as stock of knowledge, and second is its physical capital. This dichotomy has been used in the past in assessing the contribution of R&D to productivity growth (Griliches and Mairesse (1984)). If these two types of assets, knowledge and capital, are complementary factors in production, and firms face adjustment costs that make it expensive to alter their stock rapidly, it is possible to show that firms that have different mixes of stock have an incentive to merge. The value of the merged firm can be greater than the sum of the individual firm's values, depending on the actual mixes of stock in each case. This gain in value is the synergistic gain. This potential gain could lead to potential takeover bids from the universe of a potential acquirer. The characteristics of this distribution depend on the joint distribution of the two types of stocks in the universe of firms as well as on the stocks of the target firm itself. We will develop this model in the next chapter and we will also discuss the estimation result in chapter four.

### 3.2.1 The Probit Model on Innovation

In this dissertation the problems arising in estimating the impact of merger activities to innovation come from the dependent variable which is qualitative and must be represented by dummy variables. The dependent variable is binary with

$$y_i = \begin{cases} 1 & \text{Merger with probability } p \\ 0 & \text{No Merger with probability } 1-p \end{cases}$$

Cameron and Trivedi (2005) explains that a regression model is formed by parameterizing the probability  $p$  to depend on a regressor vector  $x$  and a  $K \times 1$  parameter vector  $\beta$ . The commonly used models are of single index form with conditional probability given by

$$p_i = \Pr[y_i = 1|x] = F(x_i'\beta)$$

where  $F(\cdot)$  in the probit model is the standard normal cdf.

The probit model specifies the conditional probability

$$p = \Phi(x'\beta) = \int_{-\infty}^{x'\beta} \phi(z)dz$$

where  $\Phi(\cdot)$  is the standard normal cumulative distribution function (cdf), with derivative

$\phi(z) = (1/\sqrt{2\pi}) \exp(-z^2/2)$ , which is the standard normal density function. The

observed values of  $y$  are just a realization of a binomial process and vary from trial to

trial, depending on  $x$ . The log likelihood function is  $L = \prod_{y_i=0} F(x'\beta) \prod_{y_i=1} [1 - F(-x'\beta)]$

(Maddala, 1983).

Cameron and Trivedi (2005) explain about the marginal effects in the probit model. Unlike the linear regression model, in nonlinear regression the coefficient of the regressor cannot be interpreted directly as the marginal effect. The marginal effect is the change in the condition mean of  $y$  when the regressor  $x$  changes by one unit. Cameron and Trivedi stated that for the probit model the marginal effects are

$$\frac{\partial p_i}{\partial x_{ij}} = \phi(x_i'\beta)\beta_j = \phi(\Phi^{-1}(p_i))\beta_j, \text{ where } p_i = \Phi(x_i'\beta). \text{ With the formula, we could}$$

calculate the marginal effects by using the sample means of the data or take the average of the individual marginal effects.

### 3.2.2 Probit Model Based on Synergy Assumption

Addanki (1986) stated that it is reasonable to assume both that knowledge and physical capital are complementary factors in the production process and to also assume

that firms are in fact managed by value maximizers and that stock prices adequately reflect the value of a firm's optimal program. Two firms with different mixes of stocks would find it in their interest to merge because the mix of the combined firm could be more productive than that of the individual firms. The synergy involved here is incorporated directly into the production function. From the literature study in chapter two, we also find that synergy is a dominant force in driving merger activities. In this section we would like to analyze whether the merger activities have an impact on innovation.

To see whether innovations have a positive or negative impact on merger activities, we modified the previous probit model by Addanki (1986) as follows:

$$MERGE = \alpha_0 + \alpha_1 ASSETS + \alpha_2 RND + \alpha_3 PATENT + \varepsilon_t$$

The dependent variable is MERGE if one of the firms was acquired during the period and zero otherwise. The ASSETS is a variable that measures if the merger is driven more by the target's asset physical capital such as plants, facilities and oil or gas reserves. The PATENT and R&D are variables to capture whether the merger is driven by the target's physical capital or innovation. Addanki (1986) explained that positive signs of variables in merger probit model can be interpreted as a driving force for that merger.

Stermole and Stermole (2006) defined the total assets as the value of everything a person, corporation or organizations owns or has owed. Usually, the total asset are divided into two categories, current assets and fixed assets. Furthermore, Stermole and Stermole (2006) describe current assets as the asset that is convertible into cash within a year while a fixed asset is an asset that will not be converted into cash within a year such as land, mineral rights, buildings, equipment and business interest. Johnston (1992) stated

that a company's oil and gas reserves can be recognized as assets in accordance to Financial Accounting Standards Board (FASB) Statement No. 19, termed Reserves Recognition Accounting (RRA). Brock et al (1996) explains that oil and gas reserves can be divided into three categories reflecting some degree of uncertainty on the reserves. Proved reserves are defined as reserves that can be estimated with reasonable certainty to be recoverable under existing economic conditions including the oil price at the present time. Reasonable certainty is not 100 percent certainty, Brock et al (1996) stated that it is between 70 to 95 percent probability. Their definition is based on the majority view of petroleum engineers on Cooper's Lybrand poll. Because aggregate economic conditions and oil prices are already factors included in determining the value of oil reserves, our Asset variable becomes a very important variable that capture many other intention of the merger other than innovation. We believe by including other variables that already counted in determining oil reserves will expose us to multicollinearity problems. Probable reserves are reserves that are more likely to recover than not, but still need additional drilling or testing. Probable reserves can also mean that the reserves are not recoverable under present economic conditions but will be recoverable with favorable economic conditions in the future. The last category is possible reserves, which suggests that the reserves are less likely to be recovered due to structural and stratigraphic features. Both probable reserves and possible reserves are also labeled as unproved reserves.

Griliches (1990) stated that both R&D expenditure and Patent are a good measure of inventive activity. Therefore, in our model the positive coefficient on the RND or PATENT explains that merger activities were driven by innovation. We face some

difficulties in finding R&D data since most of the companies put their R&D expenses into Selling, General and Administrative (SG&A) expenses. We consider exploration as part of the R&D activities. For the company that reports R&D and exploration costs as a separate entity, we add them together as one variable. Therefore, the R&D variable consists of R&D expenses, or exploration expenses or the combination of both of them.

### 3.2.2 Model Based on Disequilibrium Assumption

The market value of a firm's stocks need not always reflect the expected cash flows accruing to the optimal allocation of the firm's tangible and intangible assets. These are disequilibrium models in the sense that their assumptions may be inconsistent with the joint hypotheses of efficient stock markets, fully informed investors, and fully optimal firm behavior.

Addanki (1986) stated that the price at which a firm is acquired provides a natural alternative valuation to the one reflected in stock prices, perhaps embodying different information than the market uses for its valuation. In this section we would like to analyze whether the R&D expenditures of firms that have a record of patenting are more highly valued by the stock market than are those of firms that hold no patents. In theory, firms that do R&D and have no patented output have their R&D expenditures undervalued (relative to the value of that R&D to a potential acquirer).

For the reason mentioned above, using the probit model as follows, we would like to see whether companies who own patent rights and those who do not have the same impact on merger activities:

$$MERGE = \alpha_0 + \alpha_1 ASSETS + \alpha_2 RND + \alpha_3 RNDNOPAT + \varepsilon_i$$

The additional dependent variable RNDNOPAT is the R&D expenditure for the company that does not own patent rights. The results from this model should be compared with the results from the synergy assumption model to determine which company is an attractive target for a merger. Unfortunately, we do not have the data for the RNDNOPAT variable; therefore, we could not make a simulation based on the model above.

### 3.3. Panel Data Method

Panel data are repeated observations of the same cross section observed for several time periods. Cameron and Trivedi (2005) stated that the major advantage of panel data is increased precision in estimation. Another attraction of panel data is the possibility of consistent estimation of the fixed effects model which allows for unobserved individual heterogeneity that may be correlated with regressors. There is a stronger assumption that permits consistent estimation of all parameters, including coefficients of time invariants regressors that are called random effects. The third advantage of panel data is the possibility of learning more about the dynamics of individual behavior compared to just a single cross section method.

Green (2003) explains that the basic framework for discussion of panel data is a regression model of the form  $y_{it} = x'_{it} \beta + z'_i \alpha + \varepsilon_{it}$ . There are K regressors in  $x'_{it}$ , not including the constant term.  $z'_i \alpha$  is an individual effect where  $z_i$  contains a constant term and a set of individual or group specific variables which are taken to be constant over time t. There are many variations of the panel data method, but we are going to discuss the three most common ones. The first is pooled regression which is the condition where  $z_i$  contains only a constant term, in which case ordinary least squares (OLS) provides

consistent and efficient estimates for  $\alpha$  and  $\beta$ . Second is the condition called fixed effects where  $z_i$  is unobserved, but correlated with  $x_{it}$ , and then the least square estimator  $\beta$  is biased and inconsistent as a result of an omitted variable problem. To accommodate this problem, the regression model will become  $y_{it} = x'_{it} \beta + \alpha_i + \varepsilon_{it}$  where  $\alpha_i = z'_i \alpha$ . The fixed effects take  $\alpha_i$  as a group specific constant term in the regression model. The third one is the random effects model, which unlike fixed effects, assumes there is no correlation between  $\alpha_i$  and  $x$ , and  $\alpha$  is independent and identically distributed (iid)  $[0, \sigma^2]$ . The time fixed effect estimation is the one that we are going to use for the event study analysis in chapter four, while the random effects is the model that we will use for the panel probit model. Since the random effect model assumes that there is no correlation between the unobserved individual heterogeneity and included variables, it can be formulated as  $y_{it} = x'_{it} \beta + \alpha + u_i + \varepsilon_{it}$  where  $u_i$  is a group specific random element, similar to  $\varepsilon_{it}$  except that for each group there is but a single draw that enters the regression identically in each period. Cameron and Trivedi (2005) stated that the fixed effects estimation is possible for the panel logit model by using the conditional MLE, but not for the panel probit. Therefore, in our panel probit model for chapter four we use the random effects estimation which also is in accordance with our statistics software, STATA.

The formulation on the probit model assumes that the error term has an iid standard normal distribution; thus, it ignores any heterogeneity between individuals. Hsiao (1986) stated that the probit model allows us to account for the heterogeneity in the form of specific effects represented by  $\alpha_i$ . Therefore, the model for the panel probit

model will become  $y_{it} = x'_{it} \beta + \alpha_i + v_{it}$ , where  $\alpha_i$  is the individual specific effects and  $v_{it}$  is the random error term of the panel probit model with the assumption that  $\alpha_i$  and  $v_{it}$  are independently and normally distributed with zero means and  $\sigma_\alpha^2$  and  $\sigma_v^2$  variances. Cameron and Trivedi also added that the random effects estimation is more commonly used because of inconsistency of the fixed effects estimator. If one applies the fixed effects estimation technique when individual specific effects are random, this will result in efficiency loss in the estimates of  $\beta$ .

### **3.4. Data Sources**

The stock price data of the oil and gas companies was obtained from the Center for Research in Security Prices Security Information Filtering Tool (CRSPSift) at the University of Chicago via the College of Business, Colorado State University (CSU). The patent data was obtained from the United States Patent and Trademark Office (USPTO) website (<http://www.uspto.gov>), and Asset and R&D variable data of the oil and gas companies are from Standard and Poor's Research Insight database also via College of Business, CSU and Edgar Database through the Security Exchange Commission website (<http://www.sec.gov>). The sample focus is on 290 firms in the US oil and gas industry during the period 1980-2007. Announcement dates for merger events are taken from the energy information administration (official energy statistics from US government) website (<http://www.eia.doe.gov>) and Mergerstat Review from University of Colorado at the Boulder Business School Library for years 1996 to 2009 and the Preservation and Access Service Center for Colorado Academic Libraries (PASCAL) libraries storage at University of Colorado at Denver Anschutz Medical Campus for years 1980 to 1995. We



assumed that the patent data for the oil and gas industry consisted of the patent in fuel and especially in gas such as: heating and illuminating, gas separation processes, gas separation apparatus, as well as mineral oil process and products, and gas and liquid contact apparatus categories. We excluded other categories such as combustion, because we believe the patent in that category results from an industry outside oil and gas, although we see the equipment in that category often being used in the oil and gas industry. This technique is also used by Schmookler (1966) in his work on innovation and economic growth. For the Fama-French Four Factor Model, the daily risk factors, SMB, HML and UMD are generously provided by Professor Kenneth French on his Dartmouth University data library website ([http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)).

## CHAPTER 4

### Analysis

This chapter begins with the event study method application with an estimate for each company's merger activity and for the entire oil and gas industry. The merger analysis will be followed by the innovation analysis, where we would see whether innovation is the motives of many merger activities in the oil and gas industry.

The list of US oil and gas companies and their merger activities is shown in the Appendix 1. The list is gathered from the Energy Information Administration (EIA) website and Mergerstat Review. From both sources, we record that there are 388 merger transactions from 1980 to 2008. Unfortunately, we can only use 145 merger transactions. We only use the merger transactions where stock price data are available for the company, acquirer and target. The source of data is Center for Research in Security Prices Security Information Filtering Tool (CRSPSift) database from University of Chicago. We do not use the merger transaction of the company data that is not on CRSPSift, either for acquirer, target or both. In addition, we also can not use the data if it covers less than our estimation period, which is 250 days.

## 4.1 Merger Analysis

In this section we implement the event study method on merger transactions in the oil and gas industry. We use four models, Market Model, CAPM, Fama-French 3 Factors, and Fama-French 4 Factors, to try to capture the effects of the mergers.

### 4.1.1 Results based on Event Study Methodology

Market Model. The results from the event study methodology using the market model are shown in Appendix 2. The t-test value shows that  $\hat{\beta}$  for market is statistically significant for most of the firms, implying that there is a relationship between the return of the market index and the firm's stock return.

CAPM. The results from the event study methodology using the capital asset pricing model (CAPM) are shown in Appendix 3. The t-test value shows that  $\hat{\beta}$  for market factor (Rm-Rf) is statistically significant for most of the firms, implying that there is a relationship between the return of the market factor and the firm's stock return. On the other hand the risk free rate variable (Rf) in Appendix 3 shows that the coefficient is not statistically significant, implying very little relationship between the risk free rate and the firm's stock return. The insignificance of risk free rate variable on the result is probably one of the reasons that many studies tend to use the Market Model instead of CAPM since the Market Model is less complex compared to CAPM. There are no differences in results from the Market Model and CAPM as shown in Appendix 2 and Appendix 3.

Fama-French Three Factors Model. The results from the event study methodology using Fama-French Three Factors model are shown in Appendix 4. The t-test value

shows that the  $\hat{\beta}$  for market factor (Rm-Rf) is statistically significant for most of the firms, again implying that there is a relationship between market return factor and the firm's stock return. The size (s) and value (h) factors are behaving differently on different merger transactions. Sometimes the size and value coefficient are statistically significant for one merger transaction; on other merger transactions, only size is statistically significant while value is not statistically significant and vice versa for other merger. Sometimes both size and value coefficient are not statistically significant for a merger transaction.

Fama-French Four Factors Model. The results from the event study methodology using the Fama-French Four Factors model are shown in Appendix 5. The t-test value shows that  $\hat{\beta}$  for market factor and momentum (u) are statistically significant for most of the firms, implying that there is also relationship between the momentum and the firm's stock return. The size and Value factors are behaving the same way as in the Fama-French Three Factors Model.

CAR. That cumulative abnormal return (CAR) for the target firms is positive would suggest that the stock market expected the merger deal would have a positive impact for the shareholders of the acquiring firms. The negative (CAR) on the acquiring firms indicates that the stock market believed that the acquirer firms paid a higher price for the target firms (Warell, 2007). When the target and acquirer have positive CARs, it means that the stock market believed that the mergers would benefit shareholders of both firms. A positive return for both target and acquirer indicate that the synergy and market power hypothesis dominate the merger. We would expect the CAR will be positive at least for the target firm. A positive CAR on the target firm shows that the merger

decision still creates some benefit for the target share holder and that the firm is worth acquiring. On the other hand, negative CARs from both target and acquirer suggest that the stock market expects a negative impact on the combined values of the firms. This condition shows that the managerial or hubris hypothesis dominates the merger.

We also believe that oil price fluctuations and trends influence the sign of the CAR. The negative CAR usually happened when oil prices already showed a rising trend meaning increasing profits for both target and acquirer firms. A merger during a profitable year was seen by the market as a merger that would have a negative impact for the shareholder of either acquiring or target firms. On the other hand, positive CAR usually occurs during the declining trend of the oil prices. The market probably sees this situation as an opportunity for the company to synergize their production and exploration activities.

The result for all four models, MM, CAPM, Fama-French Three Factors Model and Fama-French Four Factor Models shows consistency on the CAR results. The CAR results never reveal contradictions among all four models. When a company has negative CAR in one model, it will also occur in the other three models. The only difference is the magnitude of CAR which tends to get smaller from MM, CAPM, Fama-French Three Factors Model to Fama-French Four Factors Model.

The Durbin-Watson  $d$  statistics also show no direct indication of serial correlation in the estimations for most of the companies as shown on Appendix 6.

#### 4.1.2 Event Study with GLS Estimation

Cameron and Trivedi (2005) stated that the SUR model was first proposed by Zellner in his 1962 paper. The term SUR explains the condition when the equations are related if the error terms in different equations are correlated. The GLS estimator for SUR according to Green (2003) is  $\hat{\beta} = [X' \Omega^{-1} X]^{-1} X \Omega^{-1} y$ , with  $\Omega^{-1}$  equal to  $\Sigma^{-1} \otimes I$  where  $\Sigma$  is the variance-covariance matrix of the disturbance and  $I$  is the identity matrix. The use of  $\Omega^{-1}$  will result in a more efficient estimation in comparison to OLS. The GLS estimation will collapse to OLS if the errors are uncorrelated. From Appendix 1, we could see that each year there always was more than one merger transactions. We suspect that the errors of the merger activities in the same years are correlated to each other. From our estimation using SUR, we find no difference in results when we simulate with single or a small number of merger transaction such as in the year 1992, but we have a more efficient estimation when we have many merger transactions such as in the year 2000. Fortunately, the SUR estimation does not have any impact to the sign of CAR. The negative and positive sign of CAR does not change with SUR estimation in comparison to the OLS estimation; only the magnitude of the CAR are smaller on SUR estimation. Appendix 7, 8, 9 and 10 provides the result of SUR estimation for all four models.

This condition can be explained by looking at the term  $\Omega^{-1}$  on the GLS estimator equation. When we have only small numbers of merger activities, the value  $\Omega^{-1}$  will also be small and the GLS will be the same as OLS since its estimators are multiplied by small numbers from  $\Omega^{-1}$ ; thus the GLS estimation will have the virtually same results as the OLS estimation. On the other hand, when we have a large number of mergers, there is an increased chance that the errors are correlated and the value of  $\Omega^{-1}$  will also be larger.

As a result, the GLS estimator will be more efficient compared to the OLS estimator since the GLS estimator is multiplied by the larger value of  $\Omega^{-1}$ . In the case of the two equation linear regression model, Goldberger (1991) explains that the GLS estimators for beta are  $b_1^* = b_1 - \alpha_1 A_1 (y_2 - X_2 b_2^*) = b_1 - \alpha_1 A_1 e_2$  and  $b_2^* = b_2 - \alpha_2 A_2 (y_1 - X_1 b_1^*) = b_2 - \alpha_2 A_2 e_1$ . The GLS estimators are efficient because in the  $b_1^*$  there is information with reference to other variables, in this case  $X_2$  and vice versa. In the case where  $X_1 = X_2$  and  $A_2 = A_1$  or  $\sigma_{12} = 0$ , then  $\alpha_1 = 0$  and  $\alpha_2 = 0$ , will make  $b_1^* = b_1$  and  $b_2^* = b_2$ . With this condition, the GLS and OLS estimator will coincide in every sample. Our result is also consistent with the explanation above. We see no difference between OLS and SUR estimates for 2003 merger activities when there are only two mergers, but we see SUR estimates are more efficient for 2005 with four mergers and 2001 with eight merger activities.

#### 4.1.2 Event study Panel Data model

We have data that consist of 250 observation days for 290 firms. From the Graph 4.1, we can see that two merger waves occurred during the period 1980 to 2008. Therefore, we divide our panel estimation into two groups. One group consists of the merger transactions between the years 1980 to 1989 as our first wave, and another group with merger transactions between the years 1995 to 2006 as the second wave. We have 50 merger activities on the first wave and 91 merger activities on the second wave. Our explanation for the first wave is there are already high merger activities in 1980 and the activities start to decline in year 1989. Unfortunately, we do not have the data prior to 1980 so we could see in what year that first wave of the mergers started. For the second

wave, we could see that the merger wave starts in 1995, reached its peak on 2001, and starts to diminish in 2006.

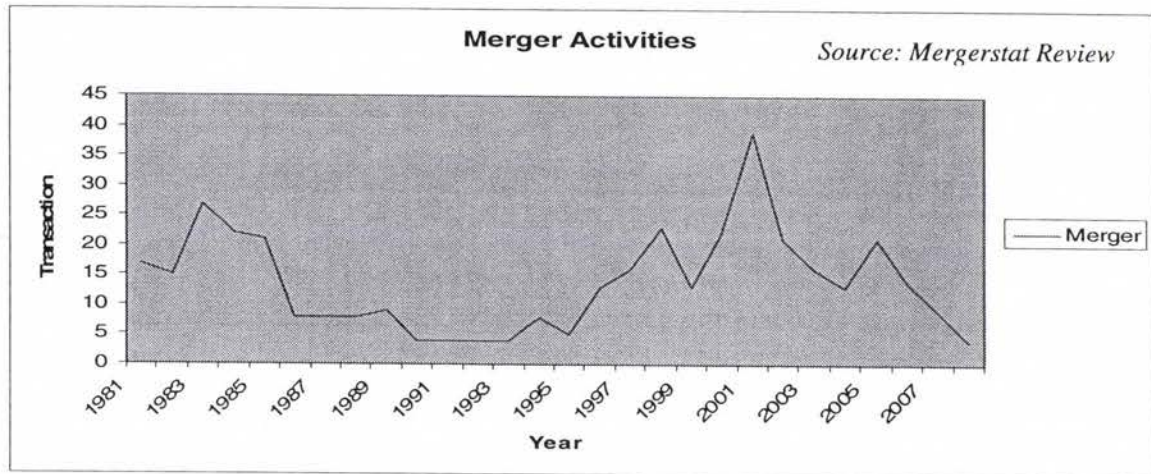
We would like to know the wealth effects of the mergers in the oil and gas industry on those different waves mentioned above. From the results of the individual companies in Appendix 1, 2, 3 and 4, it is hard to see whether the mergers have positive or negative effects on the industry. Therefore, we use the panel data method to see whether both waves behave the same way. We investigate the two waves of mergers by using the panel data method with fixed effects; therefore, for example, the market model for the panel data will become:

$$R_{it} = \alpha_i + \beta_j Rm_{it} + \varepsilon_{it}$$

The model is called the fixed effects model because it assumes that the unobservable individual effects  $\alpha_i$  group specific constant term in the regression model that possibly correlates with the regressor. The error terms  $\varepsilon_{it}$  are assumed to be independent and identically distributed (iid),  $\varepsilon_{it} \sim [\alpha, \sigma_\varepsilon^2]$ . We estimate all four models with fixed effects and the result is presented in table 4.1 to table 4.6. From the results of the panel data estimation, we calculate CAR to see whether it results in a positive or negative number.



**Graph 4.1 Merger Activities from year 1980 to 2007**



The results in table 4.1 show negative CAR for all four models and are slightly insignificant with 0.05 critical value. These results suggest that the negative impact hypothesis dominates the merger activities.

**Table 4.1 Panel Data Estimation for first wave (11 days Event Period)**

Periods	Market Model					
	$\alpha$	$\beta$	CAR			
1980-1989	-0.00029	0.00853	-0.066388			
	-1.53	42.38	-1.719912			
	CAPM					
	$\alpha 1$	$\alpha 2$	$\beta$	CAR		
	0.00386	-0.11712	0.00846	-0.066287		
	6.14	-6.44	42.08	-1.80768		
	Fama-French Model					
	$\alpha$	$\beta$	s	h	CAR	
	-0.00015	0.01003	0.00391	0.00064	-0.068101	
	-0.79	29.49	8.56	1.05	-1.703685	
	Fama-French 4 Factors Model					
	$\alpha$	$\beta$	s	h	u	CAR
	-3.5E-05	0.01068	0.00461	0.00129	-0.00576	-0.071112
	-0.18	31.33	10.1	2.12	-15.84	-1.852302

Note: t-statistics below the coefficient

The merger activities during this period reflect the characteristics of the fourth wave theory of mergers, which are hostile mergers. With stock prices low relative to the cost of building new capacity, many companies saw takeovers as the cheapest way to expand.

The t-test value shows that  $\hat{\beta}$  for market factors are significant in four models. The size, value factors and momentum are statistically significant for the Fama-French four factors model while value factor is not significant in the Fama-French three factors model.

This result for the second wave as shown in table 4.2 shows positive CAR and is insignificant. The result in table 4.2 contradicts to the results for the first wave in table 4.1. The result in table 4.2 supports the positive impact hypothesis. The different result for the first wave and second wave shows that there are different motives for mergers in different time periods. The innovation motives as part of the positive impact hypothesis that we think of as the main motives for mergers in the oil and gas industry only happen during the second wave of merger activities. The t-test value shows that  $\hat{\beta}$  for market factors are significant in four models. The size, value factors and momentum are statistically significant for the Fama-French three factors and four factors model. The coefficients for estimations in table 4.1, 4.2 until 4.8 are really small. Levich and Rizzo (1998) argued that in a white noise or any process with relatively low autocorrelations the coefficients will tend to be smaller and relatively similar.

**Table 4.2 Panel Data Estimation for Second Wave (11 days Event Period)**

Periods	Market Model						
	$\alpha$	$\beta$	CAR				
1995-2007	0.00024	0.00439	0.000301				
	1.56	32.66	0.013983				
	CAPM						
	$\alpha 1$	$\alpha 2$	$\beta$	CAR			
	0.00033	-0.00215	0.00443	0.000323			
	1.97	-0.53	33.02	0.015013			
	Fama-French Model						
	$\alpha$	$\beta$	s	h	CAR		
	-0.00032	0.00934	0.00411	0.01075	4.61E-05		
	-2.07	47.74	15.67	34.12	0.002135		
	Fama-French 4 Factors Model						
	$\alpha$	$\beta$	s	h	u	CAR	
	-0.00034	0.00932	0.00391	0.01062	0.00059	0.000642	
	-2.2	47.62	14.63	33.49	3.62	0.02995	

Note: t-statistics below the coefficient

We also try to make a sensitivity analysis by adding the event period and reducing the estimation period. For the first sensitivity analysis, we extend the event period to +/- 10 days from the event date and reduce the estimation period to 245 days. The results for first and second wave are shown on table 4.3 and 4.4.

**Table 4.3 Fixed Effect Panel Data Estimation for First Wave (21 days Event Period)**

Periods	Market Model						
	$\alpha$	$\beta$	CAR				
1980-1989	-0.000289	0.008538	-0.223563				
	-1.54	42.02	-2.145045				
	CAPM						
	$\alpha 1$	$\alpha 2$	$\beta$	CAR			
	0.003785	-0.114997	0.008476	-0.805951			
	6	-6.29	41.72	-1.450363			
	Fama-French Model						
	$\alpha$	$\beta$	s	h	CAR		
	-1.46E-04	0.009994	3.83E-03	5.92E-04	-0.225177		
	-0.77	29.08	8.29	0.96	-2.170845		
	Fama-French 4 Factors Model						
	$\alpha$	$\beta$	s	h	u	CAR	
	-2.98E-05	0.01064	0.004527	0.001238	-0.005762	-0.238226	
	-0.16	30.9	9.81	2.01	-15.69	-2.309447	

The results in table 4.3 show negative CAR for all four models and are significant for all three models, Market Model, Fama-French Model and the Fama-French 4 Factors Model. Only the CAPM model shows insignificant CAR result but it has a correct sign. These results share the same conclusion as table 4.1 which is that the negative impact hypothesis dominates the merger activities. The t-test result shows the same conclusion as the results for table 4.1 where  $\hat{\beta}$  for market factors are significant in four models, namely that the size, value factors and momentum are also statistically significant for the Fama-French four factors model and value factor is not significant in the Fama-French three factors model.

This result for the second wave as shown in table 4.4 shows positive CAR for three models and is slightly insignificant with 95% confidence level. The CAPM model shows the wrong sign and also is slightly insignificant. Apart from the CAPM model, the result in table 4.4 is in accordance with the result in table 4.2 which supports the positive impact hypothesis. The t-test value shows that  $\hat{\beta}$ s, the size, value factors and momentum are statistically significant for all models.

We also try to make a sensitivity analysis by adding the event period and reducing the estimation period. For the first sensitivity analysis, we extend the event period to +/- 15 days from the event date and reduce the estimation period to 240 days. The results for the first and second wave are shown on table 4.5 and 4.6.

**Table 4.4 Panel Data Estimation for Second Wave (21 days Event Period)**

Periods	Market Model					
	$\alpha$	$\beta$	CAR			
1995-2007	0.000216	0.004323	0.061703			
	1.39	31.86	1.718667			
	CAPM					
	$\alpha 1$	$\alpha 2$	$\beta$	CAR		
	0.000304	-0.001268	0.004428	-0.122595		
	1.8	-0.31	32.65	-1.771346		
	Fama-French Model					
	$\alpha$	$\beta$	s	h	CAR	
	-3.28E-04	0.009353	4.08E-03	1.08E-02	0.062521	
	-2.12	47.21	15.36	33.74	1.739605	
	Fama-French 4 Factors Model					
	$\alpha$	$\beta$	s	h	u	CAR
	-3.47E-04	0.009333	0.003892	0.010642	0.000566	0.065926
	-2.24	47.1	14.36	33.15	3.45	1.789362

Note: t-statistics below the coefficient

The results in table 4.5 show negative CAR for all four models and are significant for all three models, Market Model, CAPM Model and Fama-French Model. Only the Fama-French 4 Factors Model has a slightly insignificant CAR result but it has a correct sign. These results share the same conclusion as table 4.1 and table 4.5 which is that the negative impact hypothesis dominates the merger activities. The t-test result shows the same conclusion as the result for table 4.1 and 4.5 where  $\hat{\beta}$  for market factors are significant in four models, namely that the size, value factors and momentum are statistically significant for the Fama-French four factors model and value factor is not significant in the Fama-French three factors model.

**Table 4.5 Fixed Effect Panel Data Estimation for First Wave (31 days Event Period)**

Periods	Market Model					
	$\alpha$	$\beta$	CAR			
1980-1989	-0.00036	0.008599	-0.299611			
	-1.88	41.83	-2.122998			
	CAPM					
	$\alpha 1$	$\alpha 2$	$\beta$	CAR		
	0.003858	-0.11911	0.008536	-0.306142		
	6.01	-6.42	41.53	-2.300016		
	Fama-French Model					
	$\alpha$	$\beta$	s	h	CAR	
	-1.99E-04	0.009944	3.69E-03	3.92E-04	-0.278723	
	-1.03	28.64	7.9	0.62	-1.966705	
	Fama-French 4 Factors Model					
	$\alpha$	$\beta$	s	h	u	CAR
	-7.92E-05	0.010587	0.004383	0.001074	-0.005691	-0.2511
	-0.41	30.42	9.39	1.72	-15.24	-1.861253

Note: t-statistics below the coefficient

This result for the second wave as shown in Table 4.6 shows positive CAR for three models and is slightly insignificant for Fama-French 4 Factors Model with a 95% confidence level but significant for both the Market Model and Fama-French Model. The CAPM model shows the wrong sign and also insignificant results. Apart from the CAPM model, the result in table 4.6 is in accordance with the result in table 4.2 and 4.6 which supports the positive impact hypothesis. The t-test value shows that  $\hat{\beta}$ s, the size, value factors and momentum are statistically significant for all models.

**Table 4.6 Panel Data Estimation for Second Wave (31 days Event Period)**

Periods	Market Model						
	$\alpha$	$\beta$	CAR				
1995-2007	0.000228	0.004325	0.101152				
	1.45	31.58	2.9628				
	<b>CAPM</b>						
	$\alpha 1$	$\alpha 2$	$\beta$	CAR			
	0.000316	-0.00132	0.004432	-0.022065			
	1.86	-0.32	32.38	-0.113827			
	<b>Fama-French Model</b>						
	$\alpha$	$\beta$	s	h	CAR		
	-3.14E-04	0.009353	4.07E-03	1.08E-02	0.102062		
	-2.02	46.8	15.2	33.42	3.030897		
	<b>Fama-French 4 Factors Model</b>						
	$\alpha$	$\beta$	s	h	u	CAR	
	-3.34E-04	0.009333	0.00388	0.010642	0.000591	0.102985	
	-2.14	46.68	14.19	32.87	3.57	3.053113	

Note: t-statistics below the coefficient

We could see that the longer the event period, the more significant the CAR. The CAR signs also do not change except for CAPM model for 11 days event period estimation on second wave. Henderson (1990), Peterson (1989) and MacKinlay (1997) studies suggested different days for both estimation period and event period. Therefore, the selection of the length of the event and the estimation period are is very subjective. We should consider the trade off between an improved prediction model and model parameter instability in the longer period.

In anticipation for the SUR problem, since the errors of the merger activities in the same years are correlated to each other, we also conducted the estimation of panel data with the SUR technique as shown on Table 4.3 and Table 4.4.

Cameron and Trivedi (2005) explain the application of SUR in panel data estimation as

follows:  $y_{git} = x'_{git}\beta + \alpha_{gi} + \varepsilon_{git}$  where  $g = 1, \dots, G$

In this model, the error components of SUR are given by the  $g$ th of  $G$  equation, where  $\alpha_{gi}$  is independent over  $i$ , and  $\varepsilon_{git}$  is independent over  $i$  and  $t$ , and  $\alpha_{gi}$  and  $\varepsilon_{git}$  are independent of each other. The error components are allowed to be correlated across components, so that  $\text{Cov}[\alpha_{gi}, \alpha_{hi}] \neq 0$  and  $\text{Cov}[\varepsilon_{git}, \varepsilon_{hit}] \neq 0$  for  $g \neq h$ . The SUR panel data equation is estimated by GLS which controls for the correlation in each equation. The results from the SUR panel data estimation on Table 4.3 and 4.4 also reach the same conclusion as the fixed effect panel data result; only the magnitude of the CAR is smaller since the coefficients of all variables are more efficient.

**Table 4.7 SUR Panel Data Estimation for First Wave**

Periods	Market Model					
	$\alpha$	$\beta$	CAR			
1980-1989	-0.00029	0.00853	-0.066388			
	-1.53	42.38	-1.719912			
	CAPM					
	$\alpha 1$	$\alpha 2$	$\beta$	CAR		
1980-1989	0.00386	-0.11712	0.00846	-0.066287		
	6.14	-6.44	42.08	-1.80768		
	Fama-French Model					
	$\alpha$	$\beta$	$s$	$h$	CAR	
1980-1989	-0.00015	0.01003	0.00391	0.00064	-0.068101	
	-0.79	29.49	8.56	1.05	-1.703685	
	Fama-French 4 Factors Model					
	$\alpha$	$\beta$	$s$	$h$	$u$	CAR
1980-1989	-3.5E-05	0.01068	0.00461	0.00129	-0.00576	-0.071112
	-0.18	31.33	10.1	2.12	-15.84	-1.852302

Note: t-statistics below the coefficient

The results in table 4.7 show the same conclusion as the results in table 4.1; both show negative CAR for all four models. The t-test value in table 4.7 also shows the same conclusion as table 4.1 where  $\hat{\beta}$  for market factors are significant in four models. The



size, value factors and momentum are statistically significant for the Fama-French four factors model but value factors are not significant in the Fama-French three factors model.

The results in table 4.8 show positive CAR for all four models, similar to the results in table 4.2. The t-test value in table 4.8 also shows the same conclusion as table 4.2 where  $\hat{\beta}$  for market factors are significant in four models. The size, value factors and momentum are statistically significant for both the Fama-French three and four factors model.

**Table 4.8 SUR Panel Data Estimation for Second Wave**

Periods	Market Model					
	$\alpha$	$\beta$	CAR			
1995-2007	0.00024	0.00439	0.000301			
	1.56	32.66	0.013983			
	CAPM					
	$\alpha 1$	$\alpha 2$	$\beta$	CAR		
1995-2007	0.00033	-0.00215	0.00443	0.000323		
	1.97	-0.53	33.02	0.015013		
	Fama-French Model					
	$\alpha$	$\beta$	s	h	CAR	
1995-2007	-0.00032	0.00934	0.00411	0.01075	4.61E-05	
	-2.07	47.74	15.67	34.12	0.002135	
	Fama-French 4 Factors Model					
	$\alpha$	$\beta$	s	h	u	CAR
1995-2007	-0.00034	0.00932	0.00391	0.01062	0.00059	0.000642
	-2.2	47.62	14.63	33.49	3.62	0.02995

Note: t-statistics below the coefficient

#### 4.1.4 Hypothesis Testing

From the results above and in the appendices, we see that the Market Model is consistent compared to the other three models. The study from Fama and French (1996),

MacKinlay (1997), Armitage (1995) and Binder (1998) as mentioned in chapter three also shows strong support for the use of Market Model for event study method. For that reason, we test whether variables other than the market factor are needed in the regression equation, with the hypothesis as follows:

$$H_0 : s = h = \mu = 0$$

$$H_A : \neq 0$$

The results for the first wave  $F(3, 23269) = 100.01$  and the second wave,  $F(3, 43672) = 377.37$  indicate rejecting  $H_0$  hypothesis. The conclusion that we have from the hypothesis testing is that market factors partially but not entirely explain a firm's stock return. There are also other factors such as size, value and momentum that will influence the stock return.

#### **4.2 Innovation analysis**

We developed a simple model in trying to explain whether innovation is the driving force for merger activities. The theory proposed is based on positive impact hypothesis, namely synergy hypothesis. Synergy could rise complementarily between different factors of production. Two firms that have different mixes of factors of production would find it in their interest to merge because the mix of the combined firm could be more productive than that of the individual firms. We assume the research efforts serve as a stock of knowledge and innovation. Therefore, it is reasonable to assume that knowledge and physical capital are complementary factors in the production process. We also assume that firms are managed by management whose objective is to maximize their company's value. Their effort in maximizing the value of the company

will be reflected in the stock prices. The stock prices will respond according to the optimality of the program offered by the management.

#### 4.2.1 Probit model Result

We obtained data from both the Edgar database through the Security Exchange Commission (SEC) website, and Standard and Poor's Research Insight. Both the SEC and Standard and Poor's have available data only from 1995. Due to the limited data availability, it is not possible for us to investigate the merger motives during the first wave period of a merger. We can only examine the motives behind those merger activities for the second period of waves which is dominated by the positive impact hypothesis.

We conducted the estimation based on the panel data probit model. Baltagi (2001) stated that for the random effects probit model, the maximum likelihood estimation model (MLE) yields a consistent and efficient estimator of  $\beta$  and further suggested LIMDEP and STATA as statistical programs providing the basic routines for the random effects probit model. The estimation will be generated by  $y^*_{it} = x'_{it} \beta + \alpha_i + \varepsilon_{it}$  where random effect  $\alpha_i$  and the error term  $\varepsilon_{it}$  are assumed to be uncorrelated.

Since we used STATA for all estimation in this dissertation, we also use the random effects probit model. Hsiao (1986) stated that with random effects the log likelihood for the probit model then becomes

$$\log L = \sum_{i=1}^N \log \int \prod_{y_{it}=0}^T F(x'_{it} \beta + \alpha)^{y_{it}} \prod_{y_{it}=1}^T [1 - F(x'_{it} \beta + \alpha)]^{1-y_{it}} dH(\alpha | \delta)$$

The equation above assumed that random effects  $\alpha_i$  independent from the variable  $x$ , are a random sampling from a univariate distribution  $H$ , indexed by a finite number of parameters  $\delta$ . Hsiao also said that maximizing the log likelihood equation above will give consistent estimators for  $\beta$  and  $\delta$  as  $N$  tends to infinity. The results from the random effects probit model are shown on Table 4.9.

**Table 4.9 Probit Panel Result**

Int	Asset	RND	Patent	LogLikelihood
-5.486638	1.51E-05	0.000188		
-17.14	1.41	0.28		-103.11009
-3.89934	1.27E-05		-0.010118	
-2.62	1.32		-2.72	-94.819214
-3.863793	1.08E-05	0.000202	-0.010023	
-2.65	0.89	0.27	-2.78	-94.782531

Note: t-statistics below the coefficient

In reference to the Addanki (1986) study, we suspect that R&D and Patent variables may also suffer a multicollinearity problem. He argued that both R&D and Patent variables measure the same thing, innovation. Therefore to avoid the multicollinearity problem, we estimate probit panel models with R&D and Patent variables independently, then jointly. The coefficient of Asset and R&D are positive for all estimations but not significant. The positive signs for R&D and Asset are in accordance with the fifth wave merger theory which is that a merger can occur from a combination of multiple factors. On the other hand, the Patent variable is always negative and statistically significant. The coefficients of Patent indicate a negative relationship between the probabilities of merger with patentable innovation. Since there is no significant difference of coefficient values either between the independent and joint estimations for R&D and Patent variables, we would like to check whether both variables

suffer a multicollinearity problem. The STATA website (<http://www.stata.com>) states that the STATA program will automatically drop variables that have multicollinearity problem. We check the variance inflation factor (VIF). The VIF result, 2.43, indicates no multicollinearity problem. Scherer (1984) asserted the different behavior of innovation variables can be explained if we separate innovation into two types: invention and technological innovation. He explains invention should come first, through basic research, and once inventions are available, the technological innovation process comes to solve more detailed technical problems. This technological innovation will affect productivity directly and indirectly. The uncertainty factor is high on the invention process whereas, technological innovation has high possibility for scientists or engineers to tackle the problems. Following the Scherer (1984) study, we believe that in our case, invention is represented by the Patent variable and on the other hand, technological innovation is represented by the R&D variable. Our explanation in regard to this behavior is that although oil and gas companies do some unconventional oil research such as research on oil shale, tight gas and deep water exploration that has more potential for a patent, during the high oil price period, they put more of their research into activities that would increase production such as production efficiency and enhanced oil recovery from their producing fields. Any other research with a purpose other than to increase production in high oil price economic condition will be considered non-value-maximizing, and as a drawback to possible merger.

Our conclusion does not contradict the results found in the studies by Chakrabarti and Souder 1987; Chakrabarti, Hauschildt and Suverkrup 1994; Hitt et al. 1996; Birkinshaw 1999; Ahuja and Katila 2001; Chaudhuri and Tabrizi 1999; Ranft and Lord

merger activity is an alternative strategy for established players to obtain new technologies, products, and innovative organizations.

There is still a debate between the use of R&D and patents to capture innovation. The previous study by Griliches, Hall and Pakes (1987) stated that patents are an extremely noisy measure of the underlying economic value of the innovations with which they are associated. On the other hand, Geroski (1990) stated that the R&D expenditure systematically understates the research activity of the company and Hall (1999) stated that patents lack explanatory power as the R&D measure process.

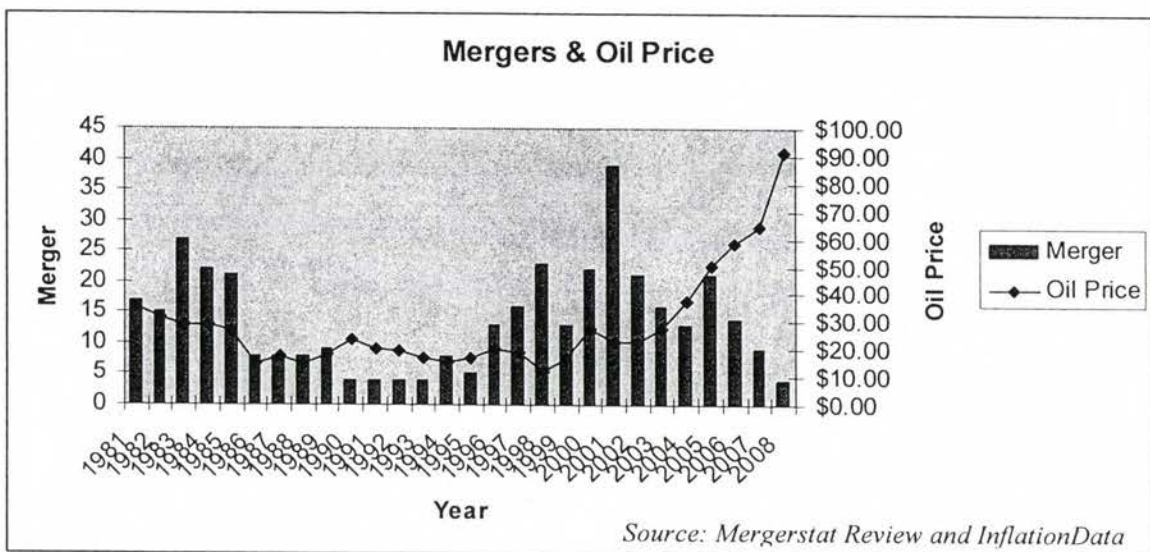
## **CHAPTER 5**

### **Conclusion**

The study has three general implications. First, from the event study results we can see that merger activities in the oil and gas industry are in agreement with the merger waves theory, especially the fourth and fifth merger wave theory. The fourth wave is characterized by the role of hostile mergers, while the fifth wave is so complex that the merger waves can occur from a combination of multiple factors such as information technology revolution, deregulation, lowered trade barriers, and a globalized economic environment. The negative CAR resulting from the merger activities during the fourth wave period can be interpreted as the reaction to the hostile takeover as theory suggested (Gaughan, 2002 and Weston et al, 2001). On the other hand, the positive CAR resulting from the merger activities during the fifth reflects the condition that supports the positive impact hypothesis. For the synergy hypothesis, the condition such as the information technology revolution, deregulation, and lowered trade barriers will be the factors that trigger the merger waves. On the other hand, a globalized economic environment creates the economic expansion to meet the growing demand that is the factor for growth hypothesis. From Graph 5.1, we could also see that the merger waves in the oil and gas industry are related to the movement of oil prices. The merger activities increase during the period when oil prices are low and start to decrease when the oil prices are high.

Second, all regressions applied to firms independently, using the four benchmark models for normal returns—Market Model (MM), Capital Asset Pricing Model (CAPM), Fama-French Three Factors Model and the Fama-French Four Factors Model—resulted in the same conclusion. The only difference is the magnitude of CAR on different models which tend to be smaller as more variables are included in the equation. The variables involving market data mostly are statistically significant in all four models. This condition implies a relationship between the market return variable and the firm’s stock return. We also do the regression with panel data methods which are divided into two waves. The regression results for Market Model (MM), Fama-French Three Factors Model and the Fama-French Four Factors Model show the same conclusion for both waves, which is negative CAR for the first wave and positive CAR for the second wave. The Capital Asset Pricing Model (CAPM) model result behaves differently compared to the other three models for the second wave but not for the first wave. Our sensitivity analysis results show the longer the event period, the more significant the CAR results.

**Graph 5.1 Mergers and Oil Price Relation**





Third, although unfortunately the results are not significant, the study shows that R&D and Asset have positive relationships with merger activities. The result shows the merger activities in the oil and gas industry behave according to the fifth wave theory which is that the merger wave can occur from a combination of multiple factors. In addition, Patent variable shows that innovation in the oil and gas industry will focus more on increasing production and efficiency instead of research on technology for future needs that can be patented. The Scherer study (2006) regarding the standard oil merger with the main purpose to acquire assets is in accordance with the first merger wave theory. The first merger wave theory explains that after the depression of 1883, the primary goal of mergers is to achieve economies of scale (Gaughan, 2002 and Weston et al, 2001). Our result does not contradict Scherer's study conclusion. The result also shows that R&D and Patent do not behave in the same way a proxy for innovation. Although there is still a debate between the use of R&D and patents to capture innovation, our explanation in regard to this behavior is that not every innovative activity can be patented. Ranft and Lord (2000) also face difficulty in valuing innovation. They stated that unlike tangible financial assets, the acquired firms' valuable human assets cannot be purchased or owned outright and they can leave the firm at any time.

Therefore, further research is still necessary to investigate whether the same conclusion that we reached in the oil and gas industry also applies to other industries. From this study, it has been learned that R&D and Asset are complementary motivations for merger waves in the 2000's period, but we still do not know the motivation for the merger waves in the 1980's period. Our study can only offer one or two motivations for merger waves. We believe that our findings are not the only motivations for the merger

waves. Rhodes-Kropf and Visvanathan (2004) stated that there can be many motivations and reasons that a merger wave would occur, but unfortunately those reasons can only explain the part of the story and not the entire story of the merger waves.

In summary, despite its limitations, this study has tried to connect the study of innovation and merger with event study methodology that previously was conducted independently. With the connection mentioned above which covers the period from merger announcements and activities after mergers, we hope to have offered a better understanding of the theory of merger, especially the synergy hypothesis.

## REFERENCES

- Addanki, S (1986) "*Research and Development, Innovation and Mergers*," PhD Thesis, Harvard University, 108 pages.
- Aghion, P, and J. Tirole (1994), "The Management of Innovation," *The Quarterly Journal of Economics*, 109(4), pp. 1185-1209.
- Agrawal, A., J.F. Jaffe, and G.H. Mandelker (1996), "The post-merger performance of acquiring firms: A re-examination of an anomaly," *Journal of Finance*, 47(4), pp. 1605-1621.
- Ahuja, G., and R. Katila (2001), "Technological Acquisitions and the Innovation Performance of Acquiring Firms: A Longitudinal Study," *Strategic Management Journal*, 22(3), pp. 197-220.
- Andrade, G., M.Mitchell, and E. Stafford (2001), "New evidence and perspectives on mergers," *Journal of Economic Perspectives* 15(2), pp. 103-120.
- Armitage, S (1995) "Event study methods and evidence on their performance," *Journal of Economic Surveys*, 8(4), pp. 25-22.
- Arrow, K.J (1959) "*Economic Welfare and The Allocation of Resources for Invention*," Economics Division, The RAND Corporation.
- Ball, C.A. and P. Brown (1968) "An empirical evaluation of accounting income numbers," *Journal of Accounting Research*, 6(2), pp. 159-178.
- Baltagi, B (2001) "*Econometric Analysis of Panel Data*," 2<sup>nd</sup> Ed. John Wiley and Sons, Ltd.
- Barberis, N., and R. Thaler (2003) "A Survey of Behavioral Finance" in G. Constantinides, M. Harris, and R. Stulz (editors) *Handbook of the Economics of Finance*, North Holland, Amsterdam
- Baumol, W.J (1992) "Horizontal Collusion and Innovation," *The Economic Journal*, 102(410), pp. 129-137.
- Benston, G.J. (1985) "The Validity of Profits-Structure Studies with Particular Reference to the FTC's Line of Business Data," *American Economic Review* 75(1), pp.37-67.
- Berkovitch, E. and M.P. Narayanan (1993) "Motives for takeovers: An empirical investigation," *Journal of Financial and Quantitative Analysis* 28(3), pp.347-362.
- Binder, J.J. (1998) "The event study methodology since 1969," *Review of Quantitative Finance and Accounting* 11(2), pp.111-137.

- Birkinshaw, J. (1999) "Acquiring Intellect: Managing the Integration of Knowledge Intensive Acquisitions," *Business Horizons* 42(3), pp.33-42.
- Boettke, P.J. (2009) "What Happened to Efficient Markets," *Mercatus Center, George Mason University*, Working Paper No. 09-22, June 2009.
- Boonpramote, T (2004) "*Mergers and acquisition in the metal mining industries: cases of aluminium, copper and diversified mining companies*," PhD Thesis, Colorado School of Mines, 202 pages
- Bradley, M., A. Desai, and E.H. Kim. (1988) "Synergistic gains from corporate acquisitions and their division between the stockholders of target and acquiring firms," *Journal of Financial Economics*, 21, pp. 3-40.
- Brock, H.R., D.R.Jennings and J.B.Feiten (1996), "*Petroleum Accounting: Principles, Procedures and Issues*," 4<sup>th</sup> ed. Professional Development Institute, Denton, Texas.
- Brooks, C. (2002), "*Introductory Econometrics for Finance*," Cambridge: Cambridge University Press.
- Brown, S.J. and J.B Warner (1980) "Measuring security price performance," *Journal of Financial Economics*, 8, pp. 205-258.
- Brown, S.J. and J.B Warner (1985) "Using daily stock returns: The case of event studies," *Journal of Financial Economics*, 14, pp.3-32.
- Cable, J and K. Holland, (1999) "Regression vs. non-regression models of normal returns: Implications for event studies," *Economic Letters*, 64 (1) pp. 81-85
- Cameron, A.C. and P.K. Trivedi (2005), "*Econometric Models and Economic Forecast*," Cambridge:Cambridge University Press.
- Center for Research in Security Prices (CRSP). 2001. Chicago: Graduate School of Business, University of Chicago.
- Chakrabarti, A., J. Hauschildt and C. Suverkrup (1994) "Does it Pay to Acquire Technological Firms" *R&D Management*, 24(1), pp. 47-56.
- Chakrabarti, A.K. and W.E Souder (1987) "Technology, Innovation and Performance in Corporate Mergers: A Managerial Evaluation" *Technovation*, 6(2), pp. 103-114.
- Chaudhuri, S. and B. Tabrizi (1999) "Capturing the Real Value in High Tech Acquisitions" *Harvard Business Review*, 77(5), pp. 123-130.
- Chaudhuri, S (2004) "*Can Innovation be Bought?Managing Acquisition in Dynamic Environment*," DBA Thesis, Harvard University, 201 pages
- Coff, R.W (1999) "How Buyers Cope with Uncertainty When Acquiring Firms in Knowledge Intensive Industries: Caveat Emptor" *Organization Science*, 10(2), pp. 144-161.
- Cox, A.J. and J. Portes (1998) "Mergers in regulated industries: The uses and abuses of event studies" *Journal of Regulatory Economics*, 14(2), pp. 281-304.
- Dasgupta, P. and J. Stiglitz (1980) "Industrial Structure and the Nature of Innovative Activity" *Journal Economic Journal*, 90(358), pp. 266-293.

- De Bondt, W.F.M., and R. Thaler (1985) "Does the stock market overreact" *The Journal of Finance*, 40(3), pp. 793-805.
- De Bondt, W.F.M., and R. Thaler (1985) "Further evidence on investor overreaction and stock market seasonality" *The Journal of Finance*, 42(3), pp. 557-581.
- De Man, A. and G. Duysters (2005) "Collaboration and innovation: a review of the effects of mergers, acquisitions and alliances on innovation" *Technovation*, 25, pp. 1377-1387.
- Dolley, J.C. (1933) "Characteristics and Procedure of Stock Split Ups" *Harvard Business Review*, April (11), pp. 316-326.
- Donnenfeld, S. (1982) "Monopoly and Incentive to Innovate" *Southern Economic Journal*, 48(3), pp. 778-774.
- Edgar Database (<http://www.sec.gov/edgar.shtml>).
- Ernst, H. and J. Vitt (2000) "The influence of Corporate Acquisitions on the Behavior of Key Investors" *R&D Management*, 30(2), pp. 105-119.
- Energy Information Administration (Official Energy Statistics from US government) (<http://www.eia.gov/edgar.shtml>).
- Evans, R. D. (1994) "Statistical survival analysis of corporate mergers," *Journal of Economics*, 20(1), pp. 296-308.
- Fama, E. (1965a) "The behavior of stock market prices," *Journal of Business*, 38, pp. 34-105.
- Fama, E. (1965b) "Random walks in stock market prices," *Financial Analyst Journal*, 21, pp. 55-59.
- Fama, E. and K.R. French (1992) "The Cross-Section of Expected Stock Returns," *Journal of Finance*, 47(2), pp. 427-465.
- Fama, E. and K.R. French (1993) "Common risk factors in the returns on stocks and bonds," *Journal of Financial Economics*, 33(1), pp. 3-56.
- Fama, E. and K.R. French (1996) "Size and Book to Market Factors in Earnings and Returns," *Journal of Finance*, 50(1), pp. 131-151.
- Fama, E. and K.R. French (1996) "Multifactor explanations of asset pricing anomalies," *Journal of Finance*, 51(1), pp. 55-84.
- Fama, E., L. Fisher, M. Jensen and R. Roll (1969) "Multifactor explanations of asset pricing anomalies," *International Economic Review*, 10(1), pp. 1-21.
- Fisher, F.M and J.J. McGowan (1983) "On the misuse of accounting rates of returns to infer monopoly profits," *American Economic Review* 73(1), pp.82-97.
- Gaughan, L.W. (2002), "*Mergers, Acquisitions, and Corporate Restructurings*," 3<sup>rd</sup> ed. New York: John Wiley & Sons, Inc.
- Geroski, P.A (1990) "Innovation, Technological Opportunity and Market Structure", *Oxford Economic Papers*, New Series 42(3), pp. 586-602.

- Gerpott, T.J (1995) "Successful integration of R&D functions after acquisition: an exploratory empirical study ", *R&D Management*, 25, pp. 161-178.
- Goldberger, A.S. (1991), "A *Course in Econometrics*," Harvard University Press, Cambridge, Massachusetts.
- Graebner, M.E and K.M. Eisenhardt (2002) "Other Side of the Story: Seller Decision Making in Entrepreneurial Acquisitions." *Working Paper, The Wharton School*
- Greenstein, S. and G. Ramey (1998) "Market Structure, innovation and vertical product differentiation", *International Journal of Industrial Organization*, 16, pp. 285-311.
- Griliches, Z (1990) "Patent Statistics as Economic Indicators: A Survey", *Journal of Economic Literature*, 28 (4), pp. 1661-1707.
- Griliches, Z. and J. Mairesse, (1984) "Productivity and R&D at the Firm Level", in Griliches, ed. *R&D, Patents and Productivity*
- Griliches, Z., A. Pakes and J. Mairesse, (1987) "The Value of Patents as Indicators of Inventive Activity", in Dasgupta, P. and P. Stoneman, eds. *Economic Policy and Technological Performance*.
- Hall, B.H. (1999) "Innovation and Market Value," *National Bureau of Economic Research*, Working Paper No. 6984, February 1999.
- Healy, P.M., K.G. Palepu, and R.S. Ruback (1992) "Does corporate performance improve after mergers?," *Journal of Financial Economics*, 31, pp. 135-175.
- Henderson, G.V., Jr. (1990) "Problems and solutions in conducting event studies," *Journal of Risk and Insurance*, 57, pp. 282-306.
- Hitt, M.A., R.E. Hoskisson, I.E. Duane and J.S. Harrison (1991) "Effects of Acquisitions on R&D Inputs and Outputs," *Academy of Management Journal* 34(3), pp. 693-706.
- Hitt, M.A., R.E. Hoskisson, I.E. Duane and D.D. Moesel (1996) "The Market for Corporate Control and Firm Innovation," *Academy of Management Journal* 39(5), pp. 1084-1119.
- Hsiao, C (1996) "*Analysis of Panel Data*," Cambridge University Press.
- Jensen, M.C. (1988) "Takeovers: Their causes and consequences," *Journal of Economic Perspectives*, 2(1). pp.21-48.
- Jensen, M.C and W.H. Meckling (1976) "Theory of the firm: Managerial behavior, agency costs and ownership structure," *Journal of Financial Economics* 3, pp. 305-306.
- Jorde, T.M and D.J. Teece (1990) "Innovation and Cooperation: Implication for Competition and Antitrust," *Journal of Economic Perspectives* 4(3), pp. 75-96.
- Johnston, D (1992), "*Oil Company Financial Analysis in Nontechnical Language*," PennWell Books.
- Johnston, R.E (1966) "Technical Progress and Innovation," *Oxford Economics Papers* 18(2), pp. 158-176.
- Kenneth R French Homepage (<http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/>)

- King, J.L., N.L.W. Wilson and A. Naseem (2002) "A tale of two mergers: What we can learn from agricultural biotechnology event studies," *AgBioForum* 5(1) pp. 14-19.
- Knapp, W. (1990) "Event analysis of air carrier mergers and acquisitions," *Review of Economics and Statistics* 72(4). pp.703-707.
- Kohers, N. and T. Kohers (2001) "Takeovers of Technology Firms: Expectation vs. Reality," *Financial Management* 30(3). pp. 35-54.
- Levich, R.M. and R.C Rizzo (1998) "Alternative test for time series dependence based on autocorrelation coefficients," *Stern School of Business New York University Working Paper*, 1998.
- Lo, A. (2004) "The Adaptive markets hypothesis: market efficiency from an evolutionary perspectives," *Journal of Portfolio Management*, 30, pp. 15-29.
- Lo, A. (2004) "Reconciling efficient markets with behavioral finance: the adaptive markets hypothesis," *Journal of Investment Consulting*, 7, pp. 21-44.
- Lakonishok, J., A. Shleifer and R.W. Vishny (1994) "Contrarian Investment, Extrapolation and Risk" *The Journal of Finance*, 49(5), pp. 1541-1547.
- Larsson, R., L. Bengtsson, K. Henriksson, and J. Sparks (1998) "The interorganizational learning dilemma: collective knowledge development in strategic alliance," *Organization Science* 9. pp. 285-305.
- Loughran, T and A.M. Vijh, (1997) "Do long-term shareholders benefit from corporate acquisitions?," *The Journal of Finance*, 52(5), pp. 1765-1790.
- Lowengrub, P. (2002) "Using event studies to measure the effect of securities fraud on a company's value," *Expert Evidence Report*, 2(14), pp.446-447.
- MacKinlay, A.C. (1997) "Event studies in economics and finance," *Journal of Economic Literature*, 35(1), pp.13-39.
- Maddala, G.S (1983) "*Limited Dependent and Qualitative Variables in Econometrics*," Cambridge University Press.
- Malatesta, P.H. (1983) "The wealth effect of merger activity and the objective functions of merging firms," *Journal of Financial Economics*, 11, pp.155-181.
- Malkiel, B. (2003) "Efficient Market Hypothesis and its critics," *CEPS Working Paper No 91, April 2003, Princeton University*.
- McWilliams, A. and D. Siegel (1997) "Event studies in management research: Theoretical and empirical issues," *Academy of Management Journal*, 40(3), pp.626-657.
- Mergerstat Review, Factset Mergerstat Global Merges and Acquisitions Information, Santa Monica California, USA.
- Mitchell, M.L. and J.H. Mulherin (1996) "The impact of industry shocks on takeover and restructuring activity," *Journal of Financial Economics*, 41, pp.193-229.
- Morse, D. (1984) "An econometric analysis of the choice of daily versus monthly returns in tests of information content," *Journal of Accounting Research*, 22(4), pp.605-623.

- Mueller, D.C. (1969) "A theory of conglomerate mergers," *Quarterly Journal of Economics*, 83, pp.643-659.
- Mullin, G. L., C. Mullin, and W.P. Mullin (1995) "The competitive effects of mergers: Stock market evidence from the US Steel dissolution suit," *RAND Journal of Economics*, 26(2), pp. 314-330.
- Myers, J.H. and A.J. Bakay (1948) "Influence of Stock Split Ups on Market Price" *Harvard Business Review*, March (26), pp. 251-255.
- Pakes, A. (1985) "On Patent, R&D and the Stock Market Rate of Return," *Journal of Political Economy*, 93(2), pp.390-409.
- Pautler, P.A. (2001) "*Evidence on Mergers and Acquisitions*," Working Paper No. 243. Washington, D.C: Bureau of Economics, Federal Trade Commission.
- Peterson, P.P (1989) "Event Studies: A review of issues and methodology," *Quarterly Journal of Business and Economics*, 28(3), pp. 36-66.
- Pindyck, R.S. and R.S. Rubinfeld (1997), "*Econometric Models and Economic Forecast*," 4<sup>th</sup> ed. McGraw-Hill/Irwin.
- Puranam, P (2001) "*Grafting Innovation: The Acquisition of Entrepreneurial Firms by Established Firms*," PhD Thesis, University of Pennsylvania, 182 pages
- Ranft, A.L. and M.D. Lord (2000) "Acquiring New Knowledge: The Role of Retaining Human Capital in Acquisitions of High-Tech Firms," *Journal of High Technology Management Research*, 11(2), pp. 295-321.
- Ranft, A.L. and M.D. Lord (2002) "Acquiring New Technologies and Capabilities: A Grounded Model of Acquisition Implementation," *Organization Science*, 13(4), pp. 420-441.
- Reilly, F.K. and K.C. Brown (2003), "*Investment Analysis and Portfolio Management*," 7<sup>th</sup> ed. Thomson South-Western, Ohio, USA.
- Rhoades, S.A. (1994) "*A Summary of Merger Performance Studies in Banking, 1980-93, and an Assessment of the Operating Performance and Event Study Methodologies*," Staff Study No. 167. Washington, D.C.: Board of Governors of the Federal Reserve System.
- Rhoades, S.A. (1998) "The efficiency effects of bank mergers: An overview of case studies of nine mergers," *Journal of Banking and Finance*, 22(2), pp. 273-291.
- Rhodes-Kropf, M. and S. Viswanathan (2004) "Market Valuation and Merger Waves," *Journal of Finance*, 59(6), pp. 2685-2718.
- Roll, R. (1986) "The hubris hypothesis of corporate takeovers," *Journal of Business*, 59(2), pp. 197-216.
- Ruback, R.S. (1982) "The Cities Service takeover: A case study," *Journal of Finance*, 38(2), pp. 319-347.
- Samuelson, P. (1965) "Proof that properly anticipated prices fluctuate randomly," *Industrial Management Review*, 6, pp. 41-9.



- Scherer, F.M. (1984) "*Innovation and Growth: Schumpeterian Perspectives*," The MIT Press.
- Scherer, F.M. (2006) "Technological Innovation and Monopolization," *Harvard Economics Department Working Paper*, March, 2006.
- Schmookler, J. (1966) "*Invention and Economic Growth*," Harvard University Press.
- Seth, A., K.P. Song and R. Petit, (2000) "Synergy, Managerialism or Hubris? An Empirical Examination of Motives for Foreign Acquisitions of US Firms," *Journal of International Business Studies*, 31(3), pp. 387-405.
- Shiller, R.J. (2005) "*Irrational Exuberance*," 2<sup>nd</sup> Princeton University Press.
- Shleifer, A. (2000) "*Inefficient Markets: An Introduction to Behavioral Finance*," Oxford University Press.
- Simon, H. (1955) "A behavioral model of rational choice," *Quarterly Journal of Economics*, 69, pp. 99-118.
- Singal, V. (1996) "Airline mergers and competition: An integration of stock and product price effects," *Journal of Business*, 69(2), pp. 233-268.
- Sirower, M.L. and S.F. O'Byrne (1998) "The measurement of post acquisition performance: Toward a value based benchmarking methodology," *Journal of Applied Finance*, 11(2), pp.107-121.
- Soros, G. (2009) "One way to stop bear raids: credit default swap need much stricter regulation," *Wall Street Journal*, Opinion, March 24, 2009.
- Stata website (<http://www.stata.com>)
- Stermole, F.J. and J.M. Stermole (2006), "*Economic Evaluation and Investment Decision Methods*," 11<sup>th</sup> ed. Investment Evaluations Corporation.
- Strong, N. (1992) "Modelling abnormal returns: a review article," *Journal of Business, Finance & Accounting*, 19(4), pp. 533-553.
- Tirole, J. (1988) "*The Theory of Industrial Organization*," Cambridge, Massachusetts: MIT Press.
- The Economist (2009) "Financial economics: efficiency and beyond", July 18<sup>th</sup> -24<sup>th</sup>, pp. 68-69.
- United States Patent Office (<http://www.uspto.gov>)
- Warell, L (2007) "A horizontal merger in the iron ore industry: an event study approach," *Resources Policy*, 32, pp.191-204.
- Weston, J.F. (2002) "The Exxon-Mobil merger: An archetype," *Journal of Applied Finance*, 12(1), pp.7-26.
- Weston, J.F., B.A. Johnson and J. A. Siu (1999) "Mergers and restructuring int world oil industry," *Journal of Energy Finance and Development*, 4(1), pp.149-183.
- Weston, J.F., B.A. Johnson and J. A. Siu (1999) "Mergers and acquisition in the global chemical industry," *Business Economics*, 34(4), pp.23-31.

Weston, J.F., J. A. Siu and B.A. Johnson (2001) "*Takeovers, Restructuring and Corporate Governance*," 3<sup>rd</sup> Ed. Upper Saddle River: Prentice Hall.

Zollo, M. and H. Singh (2000) "The Impact of Knowledge Codification, Experience Trajectories and Integration Strategies on the Performance of Corporate Acquisitions," *Working Paper, The Wharton School*.

**Appendix 1**  
**List of Merger Transactions**

Year	No.	Annoucement Date	Acquirer	Data Available? (Y/N)	Target	Data Available? (Y/N)
1981	1	2/26/1981	Adobe Oil & Gas Corp	Y	Olix Industries Inc	N
	2	3/20/1981	NCC Energy Ltd Britain	N	Alpine Geophysical Associates Inc	N
	3	3/23/1981	Discovery Oil Ltd	Y	Texo Oil Corp	N
	4	5/6/1981	Dome Petroleum Ltd Canada	Y	Conoco Inc	Y
	5	6/19/1981	Cimarron Corp	Y	Oklahoma Oil Co	N
	6	6/26/1981	Seagram Ltd	Y	Conoco Inc	Y
	7	7/6/1981	Francana Oil & Gas Ltd	N	Adobe Oil & Gas Corp	Y
	8	7/7/1981	Du Pont	Y	Conoco Inc	Y
	9	7/16/1981	American Energy Corp	N	Argonaut Energy Corp	N
	10	8/4/1981	Apex Oil Co	N	Clark Oil & Refining Corp	N
	11	8/25/1981	Monogram Development Ltd	N	Appalachian Exploration Inc	N
	12	9/24/1981	CSR Ltd	N	Delhi International Oil Corp	N
	13	9/25/1981	Hanna Mining Co	N	Midland Southwest Corp	N
	14	9/30/1981	Drillers Inc	N	Shiloh Oil Corp	N
	15	10/15/1981	MGF Oil Corp	Y	Griffin Petroleum Corp	N
	16	10/23/1981	Delta Drilling Co	N	Pecos Irrigation Co	N
	17	11/20/1981	US Steel Corp	N	Marathon Oil Co	N
1982	18	2/2/1982	Transamerica corp	Y	Hershey Oil Corp	N
	19	2/11/1982	Allied Corp & Continental Group	Y	Supron Energy Corp	Y
	20	2/19/1982	MFG Oil Corp	Y	Griffin Petroleum Corp	N
	21	6/10/1982	AB Volvo Sweden	N	Hamilton Brothers Petroleum Corp	N
	22	6/23/1982	Global National Resources Pls	N	McFarlane Oil Co	N
	23	8/16/1982	Occidental Petroleum Corp	Y	Cities Service Co	Y
	24	8/19/1982	Atlantic Oil Corp	Y	Vanderbilt Energy Corp	N
	25	9/13/1982	Tosco Corp	Y	AZL Resources Inc	N
	26	9/15/1982	Kirby Exploration Co	Y	General Energy Corp	N
	27	10/22/1982	Private Group	N	Empire Inc	N
	28	11/1/1982	Damson Oil Corp	Y	Juniper Petroleum Corp	Y
	29	12/9/1982	Proco Holding Corp	N	Suburban Propoane Gas Corp	N
	30	12/20/1982	Mesa Petroleum Co	Y	General American Oil Co of Texas	Y
	31	12/21/1982	Burlington Northern Inc	Y	El Paso Co	Y
	32	12/21/1982	First City Financial Corp Canada	N	Suburban Propoane Gas Corp	N
1983	33	1/3/1983	National Distillers & Chemical Corp	Y	Suburban Propoane Gas Corp	Y
	34	1/10/1983	Phillips Petroleum Co	Y	General American Oil Co of Texas	Y
	35	1/14/1983	Stephens Inc	N	Atlantic Oil Corp	N
	36	2/9/1983	Goodyear Tire and Rubber Cor	Y	Celeron Corp	Y
	37	2/28/1983	Yankee Oil & Gas Inc	N	Resources	N
	38	4/4/1983	Internorth Inc	Y	Belco Petroleum Corp	Y
	39	4/12/1983	Anret Inc	Y	Sunlite Oil Co	N
	40	4/18/1983	Apex Oil Co	N	Commonwealth Oil Refininf co	N
	41	4/22/1983	Northwest Industries Inc	Y	Pogo Producing Co	Y
	42	5/23/1983	Penn Central Corp	Y	Gulf Energy & Development Corp	N
	43	5/23/1983	Diamond Shamrock Corp	Y	Natomas Co	Y
	44	5/24/1983	Harbert Corp	N	Plumb Oil Co Inc	N
	45	6/1/1983	Weeks Petroleum Ltd Bermuda	N	Energy Minerals Corp	N
	46	6/8/1983	CSX Corp	Y	Texas Gas Resources Corp	Y
	47	8/10/1983	Midcon Corp	Y	Union Pacific Corp	N
	48	8/25/1983	Private Group	N	Meenan Oil Co	N
	49	8/26/1983	Burlington Northern Inc	Y	El Paso Co	Y
	50	8/30/1983	Zapata Corp	Y	General Production Co	N
	51	9/12/1983	Williams Cos	Y	Northwest Energy Co	Y
	52	10/3/1983	Kaneb Services Inc	Y	Moran Energy Inc	Y
	53	11/2/1983	Madison Fund Inc	Y	Vanderbilt Energy Corp	N
	54	11/18/1983	Sun Co Inc	N	Exeter Oil Co	N
	55	12/5/1983	Private Group	N	Dorchester Gas Corp	N
	56	12/5/1983	Sabine Corp	N	Tribune Oil Corp	N
	57	12/15/1983	Lear Petroleum Corp	Y	Mcrae Consolidated Oil & Gas	Y
	58	12/28/1983	Pennzoil Co	Y	Getty Oil Co	Y
	59	12/30/1983	Willbros Energy Services Co	N	Alatenn Resources Inc	N
1984	60	1/9/1984	Texaco Inc	Y	Getty Oil Co	Y
	61	1/25/1984	Howell Corp	Y	Howell Petroleum Corp	Y
	62	1/25/1984	Royal Dutch Shell Group Netherlands	Y	Shell Oil Co	Y
	63	1/26/1984	Damson Oil Corp	Y	Dorchester Gas Corp	Y
	64	2/14/1984	Worldwide Energy Corp	Y	American Pacific Internatrition Inc	N
	65	3/6/1984	Chevron Corp	Y	Gulf Corp	Y
	66	3/12/1984	Mobil Corp	Y	Superior Oil Co	Y
	67	4/10/1984	Yazoo Investment Corp	N	Mississippi Valley Gas Co	N
	68	4/11/1984	Homestate Mining Co	N	Felmont Oil Corp	N
	69	5/23/1984	Unimar Co	Y	Enstar Corp	N
	70	7/13/1984	Louisiana Land & Exploration Co	Y	Louisiana Land Offshore Exploration Co	N
	71	9/4/1984	Sunshine Mining Co	Y	First Matagorda Corp	N
	72	9/14/1984	Freeport McMoran Inc	Y	Midlans Energy Co	N
	73	9/17/1984	Soquip Canada	N	Sundance Oil Co	N
	74	9/17/1984	AB Volvo Sweden	N	Hamilton Oil Corp	N
	75	10/2/1984	Sunshine Mining Co	Y	Texas Sunshine Inc	N
	76	10/31/1984	Seagull Energy Corp	Y	Enstar Corp	N

Year	No.	Annoucement Date	Acquirer	Data Available? (Y/N)	Target	Data Available? (Y/N)
	77	11/6/1984	Broken Hill Proprietary Co Australia	Y	Energy Reserves Group	N
	78	11/6/1984	Houston Natural Gas Co	Y	Texas Eastern Corp	Y
	79	11/14/1984	MDC Corp	Y	Mizel Petro Resources Inc	N
	80	11/18/1984	Placer Development Ltd Canada	Y	Prairie Production Co	Y
	81	12/10/1984	Piedmont Natural Gas Co	Y	Tennessee Natural Resources Inc	N
1985						
	82	2/4/1985	Falcon Oil & Gas Co	Y	Cox Resources Corp	N
	83	2/8/1985	Nicor Inc	N	Toklan Oil Corp	N
	84	2/26/1985	SunShine Mining Co	Y	Woods Petroleum Co	Y
	85	2/27/1985	Mutual Oil of America Inc	Y	Alanco Ltd	N
	86	3/4/1985	Coastal Corp	Y	American Natural Resources Co	Y
	87	3/6/1985	Premier Technology Inc	Y	Fossil Oil & Gas Inc	N
	88	4/9/1985	Private Group	N	Kravies, Roberts & Co	N
	89	6/19/1985	Tenneco Inc	Y	Goodyear Tire & Rubber Co	Y
	90	7/19/1985	Diversified Energies Inc	Y	Dyco Petroleum Corp	Y
	91	7/31/1985	Barrett Resources Corp	N	Excel Energy Corp	
	92	8/12/1985	Midcon Corp	Y	United Energy Resources Inc	Y
	93	8/13/1985	Avalon Corp	Y	MSR Exploration Ltd	N
	94	9/5/1985	Hall Financial Group	Y	May Petroleum Inc	N
	95	9/10/1985	Pacific Gas & Electric Co	Y	Pacific Gas Transmission Co	Y
	96	9/17/1985	Worldwide Energy Corp	Y	Western Energy Development Co Inc	N
	97	10/22/1985	Burlington Northern Inc	Y	Southland Royalty Co	Y
	98	10/28/1985	US Steel Corp	Y	Texas Oil & Gas Corp	N
	99	12/16/1985	Freeport McMoran Inc	Y	Wagner & Brown Midcon Corp	N
	100	12/16/1985	Harken Oil & Gas Inc	Y	Masters Energy Corp	N
	101	12/23/1985	Mineral Development Inc	Y	Newport Petroleum Inc	
	102	12/31/1985	Occidental Petroleum Corp	Y	Midcon Corp	Y
1986						
	103	2/19/1986	Mesa Limited Partnership	Y	Pioneer Corp	N
	104	4/24/1986	KRM Petroleum Corp	N	Deca Energy Corp	N
	105	5/2/1986	Global Natual Resources Pls	Y	Cambridge Royalty Co	N
	106	5/13/1986	Louisiana Land & Exploration Co	Y	Inexco Oil Co	Y
	107	6/12/1986	Triton Energy Corp	Y	Worldwide Energy Corp	Y
	108	9/29/1986	Dyson Kissner Moran Corp	N	Conquest Exploration Co	N
	109	11/5/1986	PSA Inc	Y	Statex Petroleum Inc	N
	110	12/18/1986	Questar Corp	Y	Universal Resources	Y
1987						
	111	10/5/1987	Arkla Inc	Y	Entex Inc	Y
	112	3/27/1987	British Petroleum Co	Y	Standard Oil Co	Y
	113	10/29/1987	Broken Hill Proprietary Co Australia	Y	Hamilton Oil Corp	N
	114	6/23/1987	Conquest Exploration Co	Y	Cenergy Corp	Y
	115	1/16/1987	Energy Development Partner Ltd	Y	May Energy Partnemrs Ltd	Y
	116	12/15/1987	Mesa Limited Partnership	Y	KN Energy Inc	Y
	117	11/20/1987	Pentane Partnes LP	N	Tesoro Petroleum Corp	N
	118	1/20/1987	Snyder Oil Partners	Y	Energy Oil Inc	N
1988						
	119	3/2/1988	Pacific Lighting Corp	N	Sabine Corp	N
	120	2/1/1988	NUI Corp	Y	City Gas Co FI	N
	121	7/15/1988	Witco Corp	Y	Calumet Inds Inc	Y
	122	11/14/1988	Private Group	N	Callon Petroleum Co	N
	123	2/24/1988	British Petroleum Co	Y	Lear Petroleum Corp	Y
	124	5/9/1988	Pentane Partnes LP	N	Tesoro Petroleum Corp	N
	125	4/13/1988	United Meridien Corp	N	MCO Resources Inc	N
	126	9/27/1988	Utilicorp Utd Inc	Y	Michigan Energy Resources Co	Y
1989						
	127	5/2/1989	Corona Corp	Y	Avalon Corp	N
	128	10/4/1989	Metallgesellschaft AG	N	Castle Energy Corp	N
	129	1/31/1989	United Meridien Corp	N	Ensource Inc	N
	130	10/13/1989	Phoenix Canada Oil Co	N	OKC Limited Partnership	N
	131	1/9/1989	Broken Hill Proprietary Co Australia	Y	Pacific Resources Inc	N
	132	12/21/1989	National Intergroup Inc	N	Permian Partners	N
	133	4/21/1989	Raytheon Company	Y	Standard Havens	Y
	134	2/22/1989	Panhandle Eastern Corp	Y	Texas Eastern Corp	Y
	135	9/8/1989	Crystal Oil Company	N	Vermillion Bay Land Company	N
1990						
	136	9/24/1990	National Intergroup Inc	Y	Permian Partners	N
	137	4/23/1990	Louis Dreyfus Energy Corp	N	Bogert Oil Co	Y
	138	10/18/1990	Hudson Energy Resources Corp	N	Baruch Foster Corp	Y
	139	12/5/1990	Goldfen Oil Co	N	Cobb Resources Corp	Y
1991						
	140	4/9/1991	Park Oil & Gas	N	Oxford Consolidated Inc	Y
	141	7/25/1991	Chippewa Resources Corp	Y	Amber Resources	N
	142	1/8/1991	Oxford Consolodated Inc	Y	Premier Resources Ltd	N
	143	4/12/1991	Foreland Corp	Y	Krutex Energy Corp	N
1992						
	144	3/3/1992	Grace (W.R) & Co	Y	Grace Energy Corp	Y
	145	5/7/1992	PC Ventures Ltd	N	Canadian Turbo Corp	N
	146	8/20/1992	Vantage Point Energy	Y	Windsor Energy Corp	N
	147	5/19/1992	Windsor Energy Corp	N	Vantage Point Energy	N

Year	No.	Annoucement Date	Acquirer	Data Available? (Y/N)	Target	Data Available? (Y/N)
1993						
	148	6/18/1993	Apache Corporation	Y	Hadson Energy Resources Corp	Y
	149	5/12/1993	Sagasco Holding Ltd	N	Magellan Petroleum Corp	N
	150	1/26/1993	Patrick Petroleum Co	Y	Hambrecht & Quist Group Inc	N
	151	8/27/1993	Apache Corporation	Y	Hadson Energy Resources Corp	N
1994						
	152	3/14/1994	Alexander Energy Corp	Y	American Natural Energy	N
	153	7/26/1994	Burlington Resources Inc	Y	Diamond Shamrock Offshore Partners LP	N
	154	11/15/1994	Edisto Resources Corp	N	Windsor Energy Corp	N
	155	7/25/1994	Lomak Petroleum Inc	Y	ENEX Resources Corp	N
	156	9/21/1994	Parker & Parsley Petroleum Co	Y	Tide West Oil Co Inc	N
	157	11/25/1994	Private Group	N	Box Energy Corp	Y
	158	8/11/1994	United Meridien Corp	N	General Atlantic Resources Inc	Y
	159	12/13/1994	Williams Cos	Y	Transco Energy Co	Y
1995						
	160	5/4/1995	Barret Resources Corp	Y	Plains Petroleum Co	Y
	161	8/25/1995	Enron Crop	Y	Coda Energy Inc	Y
	162	10/3/1995	GAF Corp	Y	US Intec Inc	N
	163	10/5/1995	Hallwood Consolidated Resources Corp	N	Hallwood Energy Partners LP	N
	164	3/1/1995	Yacimientos Petroliferos Fiscales	N	Maxus Energy Corp	N
1996						
	165	8/13/1996	Alliance Resources PLC	N	LaTex Resources Inc	N
	166	3/28/1996	Apache Corp	Y	Phoenix Resources Co	N
	167	5/29/1996	Casmyn Corp	Y	Westamerica Corp	N
	168	5/24/1996	Enron Corp	Y	Clinton Gas System Inc	N
	169	9/10/1996	Hallwood Group Inc	N	Hallwood Energy Corp	N
	170	2/26/1996	HS Resources Inc	N	Tide West Oil Co	N
	171	7/18/1996	Midland Resources	N	Summit Petroleum	N
	172	1/3/1996	National Energy Groups	Y	Alexander Energy Corp	N
	173	6/21/1996	Seaboard Acquisitions Partners Inc	N	Seaboard Oil Co	N
	174	7/22/1996	Seagull Energy Corp	Y	Global Natural Resources Inc	Y
	175	8/5/1996	Tom Brown inc	Y	Presidio Oil Co	N
	176	4/5/1996	Tribo Petroleum Corp	N	Union Resources Co	N
	177	9/23/1996	Ultramar Corp	Y	Diamond Shamrock Inc	Y
1997						
	178	6/20/1997	Belco Oil & Gas Corp	N	First Reserve Corp	N
	179	7/17/1997	Burlington Resources Inc	Y	Louisiana Land & Exploration Co	Y
	180	5/27/1997	Columbia Gas System Inc	Y	Alamco Inc	Y
	181	6/20/1997	Forcenergy	Y	Edisto Resources Corp	Y
	182	10/20/1997	Kinder Morgan Energy Partners LP	Y	Santa Fe Pacific Pipeline Partner LP	Y
	183	10/22/1997	Koch Industries Inc	N	USX Corp	N
	184	6/24/1997	Louis Dreyfus Natural Gas Corp	Y	American Exploration Co	Y
	185	7/7/1997	Meridian Resources Corp	Y	Cairn Energy USA Inc	Y
	186	4/7/1997	Mesa Inc	Y	Parker & Parsley Petroleum Co	Y
	187	7/25/1997	Northport Operating CO LC	N	Great Eastern Energy and Development Co	N
	188	9/3/1997	Pioneer Natural Resources	Y	Chauvco Resources Ltd	N
	189	6/17/1997	Santa Fe Energy Resources Inc	Y	McFarland Energy	Y
	190	11/17/1997	Southern Mineral Corp	Y	Amerac Energy Corp	N
	191	8/18/1997	Texaco Inc	Y	Monterey Resources Inc	N
	192	3/31/1997	Texas Pacific Group	N	Belden & Blake Corp	N
	193	11/24/1997	Williams Cos Inc	Y	Mapco Inc	Y
1998						
	194	5/4/1998	Atlantic Richfield Co	Y	Union Texas Petroleum Holding Inc	Y
	195	8/11/1998	British Petroleum Co PLC	Y	Amoco Corp	Y
	196	12/23/1998	Chevron Corp	Y	Rutherford-Moran Oil Corp	Y
	197	8/3/1998	CMS Energy Corp	N	Continental Natural Gas Inc	N
	198	7/7/1998	Crown Asphalt Distribution LLC	N	Petro Source Asphalt	N
	199	6/29/1998	Devon Energy Corp	Y	Northstar Corp	N
	200	2/11/1998	Devon Energy Corp	Y	Burlington Resources Coal	N
	201	5/1/1998	EXCO Resources Inc	N	Gladstone Resources Inc	N
	202	12/1/1998	Exxon Corp	Y	Mobil Corp	Y
	203	10/15/1998	Kerr-McGee	Y	Oryx Energy co	Y
	204	6/18/1998	Lyondell Petrochemical Co	Y	Atlantic Richfield Co	Y
	205	11/12/1998	Madison Dearborn Partners	N	Forcenergy	N
	206	1/23/1998	National Fuel Gas Co	N	HarCor Energy Inc	N
	207	3/23/1998	Plains Resources Inc	Y	Goodyear Tire & Rubber Co	Y
	208	5/29/1998	Pogo Producing Co	Y	Arch Petroleum Inc	Y
	209	7/14/1998	Resources America Inc	Y	Atlas Group Inc	N
	210	11/25/1998	Seagull Energy Corp	Y	Ocean Energy Inc	Y
	211	1/29/1998	SOCO International PIC	N	Territorial Resources Inc	N
	212	5/15/1998	Southern Mineral Corp	Y	Neutrino Resources Inc	N
	213	6/9/1998	Tengasco Inc	Y	Twister Gas Service LLC	N
	214	1/26/1998	Union Pacific Resources Group Inc	Y	Norcen Energy Resources Ltd	N
	215	5/29/1998	USX Corp	N	Tarragon Oil & Gas Ltd	N
	216	11/16/1998	Vulcan Materials Co	Y	CalMat Co	Y
1999						
	217	4/1/1999	BP Amoco PLC	Y	Atlantic Richfield Co	Y
	218	8/16/1999	Burlington Resources Inc	Y	Pogo Petroleum Ltd	N
	219	8/25/1999	Capine Corp	N	Sheridan Energy Inc	N

Year	No.	Announcement Date	Acquirer	Data Available? (Y/N)	Target	Data Available? (Y/N)
	220	6/1/1999	Crompton & Knowles Corp	Y	Witco Corp	Y
	221	5/20/1999	Devon Energy Corp	Y	PennzEnergy Co	Y
	222	2/24/1999	Dominion Resources Inc	Y	Remington Energy Ltd	Y
	223	5/12/1999	Esenjay Exploration Inc	Y	3DX Technology Inc	N
	224	3/16/1999	Illinois Tool Works Inc	Y	Morgan Crucible Plc	N
	225	7/8/1999	KN Energy Inc	N	Kinder Morgan Inc	Y
	226	1/13/1999	Santa Fe Energy Resources Inc	Y	Snyder Oil Corp	Y
	227	7/27/1999	St Mary Land & Exploration Co	Y	King Ranch Inc	N
	228	12/10/1999	Unit Corp	Y	Questa Oil & Gas Co	N
	229	5/21/1999	Weatherford International Inc	Y	Dailey International Inc	N
2000						
	230	11/6/2000	Amerada Hess Corp	Y	Lasmo PLC	Y
	231	3/16/2000	BP Amoco PLC	Y	Vastar Resources Inc	Y
	232	12/13/2000	Brown (Tom) Inc	Y	Stellarton Energy Corp	N
	233	6/30/2000	Chesapeake Energy Corp	Y	Gothic Energy Corp	N
	234	10/16/2000	Chevron Corp	Y	Texaco Inc	Y
	235	10/4/2000	Cortez Oil & Gas Inc	N	Home Stake Oil & Gas Co	N
	236	5/26/2000	Devon Energy Corp	Y	Santa Fe Snyder Corp	N
	237	1/3/2000	Equitable Resources Inc	Y	Statoil AS	N
	238	7/10/2000	Forest Oil Corp	Y	Corecenergy Inc	N
	239	4/5/2000	Hunt Oil Co	Y	Ulster Petroleum Ltd	N
	240	12/27/2000	Hunt Oil Co	Y	Berkley Petroleum Corp	Y
	241	5/15/2000	Hunt Oil Co	Y	Newport Petroleum Corp	N
	242	5/4/2000	Intermountain Industries Inc	N	Petroglyph Energy Inc	N
	243	8/29/2000	Key Production Co	Y	Columbus Energy Corp	N
	244	4/24/2000	National Fuel Gas Co	Y	Tri Link Resources Ltd	N
	245	3/20/2000	North Coast Energy Inc	Y	Belden & Blake Corp	Y
	246	1/19/2000	Quicksilver Resources Inc	N	CMS Energy Corp	N
	247	4/17/2000	Samson Investment Co	Y	Calahoo Petroleum Ltd	N
	248	10/20/2000	Stone Energy Corp	Y	Basin Exploration Inc	Y
	249	10/16/2000	Ultra Petroleum Corp	Y	Pendaries Petroleum Ltd	N
	250	4/10/2000	Unocal Corp	Y	Northrock Resources Ltd	N
	251	12/22/2000	USX-Marathon Group	Y	Pennaco Energy Inc	Y
2001						
	252	10/25/2001	3TEC Energy Corp	N	Enex Resources Corp	N
	253	1/3/2001	3TEC Energy Corp	N	Classic Resources Inc	N
	254	1/7/2001	Abraxas Petroleum Corp	N	Grey Wolf Exploration Inc	N
	255	7/10/2001	Amerada Hess Corp	Y	Triton Energy Ltd	Y
	256	2/12/2001	Anadarko Petroleum Corp	Y	Berkley Petroleum Corp	Y
	257	6/25/2001	Anadarko Petroleum Corp	Y	Gulfstream Resources Canada Ltd	Y
	258	1/22/2001	Ascent Energy Inc	N	Pontotoc Production Inc	N
	259	10/24/2001	Aspen Group Resources Corp	N	Endeavour Resources Inc	N
	260	1/25/2001	Bellwether Exploration Co	N	Bargo Energy Co	N
	261	8/31/2001	Blue Dolphin Energy Co	Y	American Resources Offshore Inc	N
	262	6/21/2001	Cabot Oil & Gas Corp	Y	Cody Co	Y
	263	2/8/2001	Calpine Corp	Y	Encal Energy Ltd	Y
	264	10/22/2001	Comstock Resources Inc	Y	DevX Energy Inc	N
	265	5/29/2001	Conoco	Y	Gulf Canada Resources Ltd	Y
	266	8/14/2001	Devon Energy Corp	Y	Mitchell Energy & Development Corp	Y
	267	9/10/2001	Dominion Resources Inc	Y	Louis Dreyfus Natural Gas Corp	Y
	268	1/11/2001	Eagle Capital Internation Ltd	N	Fleming Manufacturing Inc	N
	269	6/14/2001	El Paso Corp	Y	Velvet Exploration Ltd	N
	270	5/23/2001	EOG Resources Inc	Y	Energy Search Inc	Y
	271	6/19/2001	Hunt Oil Co	Y	ChiefTain International Inc	N
	272	5/14/2001	Kerr-McGee	Y	HS Resources Inc	Y
	273	12/18/2001	Magnum Hunter Resources Inc	Y	Prize Energy Corp	Y
	274	3/9/2001	NPC Holdings Inc	N	Vulcan Mineral and Energy Inc	N
	275	1/18/2001	Ocean Energy Inc	Y	Texoil Inc	N
	276	6/21/2001	Penn Virginia Corp	Y	Synergy Oil & Gas Inc	N
	277	11/18/2001	Phillips Petroleum Co	Y	Conoco Inc	Y
	278	2/4/2001	Phillips Petroleum Co	Y	Tosco Corp	Y
	279	3/1/2001	Plains All American Pipeline LP	Y	Murphy Oil Corp	Y
	280	3/30/2001	Pure Resources Inc	Y	Hollywood Energy Corp	N
	281	6/4/2001	Samson Investment Co	N	Courage Energy Inc	N
	282	7/17/2001	Tesoro Petroleum Corp	Y	BP PLC	Y
	283	10/4/2001	Toreador Resources Corp	Y	Madison Oil Co	N
	284	5/25/2001	Unocal Corp	Y	Tethys Energy Inc	N
	285	3/20/2001	Valero Energy Corp	Y	Huntway Refining Co	Y
	286	5/7/2001	Valero Energy Corp	Y	Ultramar Diamond Shamrock Corp	Y
	287	3/28/2001	Vintage Petroleum Inc	Y	Genesis Exploration Ltd	N
	288	6/9/2001	Westport Resources Corp	Y	Bellco Oil & Gas Corp	N
	289	5/7/2001	Williams Cos Inc	Y	Barrett Resources Corp	Y
	290	5/8/2001	Wiser Oil Co	Y	Invasion Energy Inc	N
2002						
	291	2/20/2002	BJ Services Co	Y	Great Lakes Chemical Corp	Y
	292	10/1/2002	Black Hills Corp	Y	Mallon Resources Corp	N
	293	7/19/2002	BREK Energy Corp	Y	Gasco Energy Inc	N
	294	3/11/2002	Chesapeake Energy Corp	Y	Canaan Energy Corp	Y
	295	5/28/2002	Conoco Inc	Y	Gulf Indonesia Resources Ltd	Y

Year	No.	Annoucement Date	Acquirer	Data Available? (Y/N)	Target	Data Available? (Y/N)
	296	2/5/2002	Enterprise Oil PLC	N	Khanty Mansiysk Oil Corp	N
	297	2/21/2002	EOG Resources Inc	Y	Ramarro Resources Inc	N
	298	2/12/2002	Giant Industries Inc	Y	BP PLC	Y
	299	5/29/2002	Newfield Exploration Co	Y	EEX Corp	Y
	300	4/25/2002	Plantation Petroleum Holding LLC	Y	Maynard Oil Co	N
	301	6/3/2002	Private Group	N	Duke Energy Corp	N
	302	8/7/2002	Private Group	N	EXCO Resources Inc	N
	303	4/22/2002	Quintana Minerals Corp	N	Spire Energy LTd	N
	304	3/25/2002	Royal Dutch Petroleum	Y	Pennzoil Quaker State Co	Y
	305	3/18/2002	Santos Lid	Y	Esenjay Exploration Inc	Y
	306	5/28/2002	TEPPCO Partners LP	N	Burlington Resources Inc	N
	307	2/5/2002	Tesoro Petroleum Corp	Y	Valero Energy Corp	Y
	308	5/9/2002	Unocal Corp	Y	Corsair Exploration Inc	N
	309	8/20/2002	Unocal Corp	Y	Pure Resources Inc	Y
	310	4/11/2002	Williams Energy Partners	Y	Williams Cos Inc	Y
	311	1/17/2002	Wyoming Oil & Mineral Inc	N	New Frontier Energy Inc	N
2003						
	312	5/16/2003	American Real Estate Partner LP	N	National Energy Group Inc	N
	313	3/27/2003	Atlantic Oil Collection Services Inc	N	Probex Corp	N
	314	6/11/2003	Capco Energy Inc	N	Carpatsky Petroleum Inc	N
	315	2/24/2003	Devon Energy Corp	Y	Ocean Energy Inc	Y
	316	9/22/2003	DGL Acquisition Corp	N	United States Exploration Inc	N
	317	5/29/2003	Edge Petroleum Corp	Y	Miller Exploration Co	Y
	318	3/31/2003	Evergreen Resources Inc	Y	Carbon Energy Corp	Y
	319	4/21/2003	Madison Dearborn Partners	N	The Carlyle Group In	N
	320	4/22/2003	Marathon Oil Corp	Y	Khanty Mansiysk Oil Corp	N
	321	4/29/2003	Olympic Resources Ltd	N	Whittier Energy Co	N
	322	2/3/2003	Plains Explorations & Production Co	Y	3TEC Energy Corp	N
	323	5/28/2003	Private Group	N	Greka Energy Corp	N
	324	11/25/2003	Private Group	N	Plains Resources Inc	N
	325	5/14/2003	Tom Brown inc	Y	Matador Petroleum Corp	N
	326	7/1/2003	Unit Corp	Y	PetroCorp Inc	Y
	327	5/14/2003	Valero Energy Corp	N	Orion Refining Corp	N
2004						
	328	6/3/2004	Cano Petroleum Inc	Y	Davenport Fiel Unit Inc	N
	329	4/15/2004	EnCana Corp	Y	Tom Brown Inc	Y
	330	5/24/2004	Forest Oil Corp	Y	Wiser Oil Co	Y
	331	4/7/2004	Kerr-McGee	Y	Westport Resources Corp	Y
	332	3/5/2004	Mariner Energy Inc	N	Enron Corp	Y
	333	12/16/2004	Noble Energy Inc	Y	Patina Oil & Gas Corp	Y
	334	6/9/2004	Petro Canada	Y	Prima Energy Corp	Y
	335	5/4/2004	Pioneer Natural Resources	Y	Evergreen Resources Inc	Y
	336	2/12/2004	Plains Explorations & Production Co	Y	Nuevo Energy Company	Y
	337	4/5/2004	PYR Energy Corp	N	Venus Exploration Inc	N
	338	7/14/2004	United Heritage Corp	Y	Imperial Petroleum Inc	N
	339	2/4/2004	Valero Energy Corp	Y	El Paso Corp	Y
	340	11/1/2004	Valero LP	Y	Kanab Pipeline Partners LP	Y
2005						
	341	11/4/2005	Abengoa SA	N	O2Diesel Corp	N
	342	1/21/2005	American Real Estate Partner LP	N	Panaco Inc	N
	343	4/4/2005	Chevron Corp	Y	Unocal	Y
	344	12/12/2005	ConocoPhillips	Y	Burlington Resources Inc	Y
	345	11/8/2005	Delta Petroleum Corp	Y	Castle Energy Corp	Y
	346	1/26/2005	Energy Transfer Partner LP	Y	American Electric Power Co Inc	Y
	347	11/14/2005	Kohlberg Kravis Roberts & Co	N	Vestar Capital Partners	N
	348	10/17/2005	Lothian Oil Inc	N	United Heritage Corp	N
	349	10/18/2005	Magellan Petroleum Corp	Y	Magellan Petroleum Australia	N
	350	3/31/2005	Markwest Energy partners LP	Y	Enterprise Production Partners LP	N
	351	7/4/2005	Mohawk Industries Inc	Y	Unilin System NV	N
	352	1/18/2005	Nal Oil & Gas Trust	N	Exco Holding Inc	N
	353	12/13/2005	Noble Corp	Y	Smedvig ASA	N
	354	9/19/2005	Norsk Hydro ASA	Y	Spinnaker Exploration Co	Y
	355	10/13/2005	Occidental Petroleum Corp	Y	Vintage Petroleum Inc	Y
	356	4/4/2005	Petrohawk Energy Corp	Y	Mission Resources Corp	Y
	357	7/11/2005	Pogo Producing Co	Y	Unocal Corp	Y
	358	12/21/2005	Pogo Producing Co	Y	Prairie Pacific Energy Corp	N
	359	4/5/2005	U Store It LP	N	Liberty Self Stor Inc	N
	360	4/25/2005	Valero Energy Corp	Y	Premcor Inc	Y
	361	8/8/2005	Vulcan Energy Corp	N	Plains All American Pipeline LP	N
2006						
	362	6/23/2006	Anadarko Petroleum Corp	Y	Kerr-McGee Corp	Y
	363	1/23/2006	Helix Energy Solution Group Inc	Y	Remington Oil & Gas Corp	N
	364	1/18/2006	Industrial Enterprise of America	Y	Pitt Penn Oil CO LLC	N
	365	5/30/2006	Kinder Morgan Inc Management	Y	Kinder Morgan Inc	Y
	366	5/15/2006	Lukoil Holding OAO	N	Marathon Oil Corp	N
	367	7/8/2006	MDU Resources Group Inc	Y	Cascade Natural Gas Corp	Y
	368	4/13/2006	Melrose Resources PLC	N	Merlon Petroleum Co	N
	369	6/30/2006	ML Investment LLC	N	Truostar Petroleum Corp	N
	370	2/9/2006	Noble Affiliates Inc	Y	US Exploration Holding LLC	N



Year	No.	Annoucement Date	Acquirer	Data Avalaible? (Y/N)	Target	Data Avalaible? (Y/N)
	371	4/21/2006	Petrohawk Energy Corp	Y	KCS Energy Inc	Y
	372	10/20/2006	Petroleum Development Corp	Y	Unioil Corp	N
	373	6/12/2006	Plains All American Pipeline LP	Y	Pacific Energy Partner LP	Y
	374	6/12/2006	Plains All American Pipeline LP	Y	LB Pacific GP LLC	N
	375	8/28/2006	Western Refining Inc	Y	Giant Industries Inc	N
2007						
	376	1/7/2007	Forest Oil Corp	Y	The Houston Exploration Co	Y
	377	1/29/2007	Samson Investment Co	N	PYR Rnrtgy Corp	N
	378	5/28/2007	Abu Dhabi National Energy Co	N	Pogo Producing Co	N
	379	6/19/2007	General Electric Co	Y	Regency Energy Partners LP	Y
	380	7/17/2007	Plains Exploration & Production Co	Y	Pogo Producing Co	Y
	381	10/2/2007	Blackwood Ventures LLC	N	United Heritage Corp	N
	382	10/16/2007	GeoResources Inc	Y	AROC Energy LP	N
	383	12/3/2007	Quatro Resources Inc	N	Murphy Oil Corp	N
	384	12/31/2007	Trans Meridian International Inc	N	Transmeridian Exploration Inc	N
2008						
	385	10/21/2008	BGH GP Holding LLC	N	Buckeye GP Holding LP	N
	386	7/2/2008	Occidental Petroleum Corp	N	Plains All American Pipeline LP	N
	387	8/15/2008	Soros Fund Management LLC	N	Petroleo Brasileiro SA UMIN	N
	388	4/30/2008	Stone Energy Corp	N	Bois dArc Energy Inc	N

## **Appendix 2**

### **Market Model Result (OLS)**

Year	No	Date	Merger Companies	Market Model			
				$\alpha$	$\beta$	CAR	
1981	1	5/6/1981	Dome Petroleum Ltd Canada	-0.0006756	0.013148		
			Conoco Inc	-0.45	8	0.15351677	
	2	6/26/1981	Seagram Ltd	-0.0016787	0.0140882	-0.27286485	
			Conoco Inc	-1.81	13.82	-0.354593731	
	3	7/7/1981	Du Pont	-0.0007492	0.006329		
			Conoco Inc	-1.04	7.92	0.655061492	
			Conoco Inc	-0.0012077	0.0138291		
	1982	4	2/11/1982	Allied Corp & Continental Group	-1.16	11.93	
				Supron Energy Corp	-0.0001827	0.0118614	0.073869173
5		8/16/1982	Occidental Petroleum Corp	-0.0001034	0.0134023		
			Cities Service Co	-0.09	10.96	0.094082781	
6		11/1/1982	Damson Oil Corp	-0.0002479	0.0126174		
			Juniper Petroleum Corp	-0.26	10.88	-0.182622953	
7		12/20/1982	Mesa Petroleum Co	-0.001585	0.0235819	-0.059346396	
			General American Oil Co of Texas	-0.44	5.53		
8		12/21/1982	Burlington Northern Inc	-0.0011757	0.0123439		
			El Paso Co	-1.43	12.92	-0.009302258	
1983		10	1/3/1983	National Distillers & Chemical Corp	-0.0011227	0.0124487	
				Suburban Propane Gas Corp	-0.47	4.47	1.992921697
		11	1/10/1983	Phillips Petroleum Co	-0.002464	0.0136184	
				General American Oil Co of Texas	-1.2	6.27	3.786164123
		12	2/9/1983	Goodyear Tire and Rubber Cor	-0.0026599	0.0121284	
	Celeron Corp			-1.04	4.48	-0.122551677	
	13	4/4/1983	Internorth Inc	-0.0027748	0.012562		
			Belco Petroleum Corp	-1.35	6.27	0.100243948	
	14	4/22/1983	Northwest Industries Inc	-0.0017627	0.0111985		
			Pogo Producing Co	-0.93	6.03	-0.795371187	
	15	5/23/1983	Diamond Shamrock Corp	-0.0010878	0.0164459		
			Natomas Co	-1.11	17.17	-0.153638334	
			Natomas Co	-0.0023343	0.0103089		
					-1.8	8.13	-0.357043192

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
				-1.44	7.26	0.108224335
	16	6/8/1983	CSX Corp	0.0000189	0.0107446	
				0.02	11.71	0.174635977
			Texas Gas Resources Corp	0.0002595	0.0080846	
				0.19	6.32	-0.39396072
	17	8/26/1983	Burlington Northern Inc	0.0009241	0.0133348	
				0.92	13.37	0.248099575
			El Paso Co	0.000221	0.0063411	
				0.12	3.43	-0.239783402
	18	9/12/1983	Williams Cos	0.000799	0.0093282	
				0.57	6.6	-0.004408209
			Northwest Energy Co	0.0016038	0.0066934	
				1.01	4.14	-0.234004852
	19	10/3/1983	Kaneb Services Inc	-0.0005545	0.0110365	
				-0.41	8.05	-0.043749109
			Moran Energy Inc	-0.0000933	0.0128084	
				-0.04	5.47	-0.337516718
	20	12/15/1983	Lear Petroleum Corp	0.0008801	0.013583	
				0.53	6.47	0.022965306
			Mcrae Consolidated Oil & Gas	-0.0006745	0.009545	
				-0.38	4.32	0.137410636
	21	12/28/1983	Pennzoil Co	-0.0012283	0.0127761	
				-1.14	9.17	0.451159323
			Getty Oil Co	0.0008027	0.0138451	
				0.69	9.22	0.12807436
1984						
	22	1/9/1984	Texaco Inc	0.0333533	-0.0003072	
				192.26	-1.34	0.002656412
			Getty Oil Co	0.0014881	0.0140224	
				1.02	7.29	-0.06645474
	23	1/25/1984	Howell Corp	0.000625	0.0071281	
				0.36	3.02	0.45064492
			Howell Petroleum Corp	0.0002008	0.0093806	
				0.12	4.24	-0.16735669
	24	1/25/1984	Royal Dutch Shell Group Netherlands	-0.00002	0.0108442	
				-0.03	10.52	-0.139976309
			Shell Oil Co	-0.0008317	0.0112781	
				-0.73	7.37	-0.457998651
	25	1/26/1984	Damson Oil Corp	0.0003424	0.0114071	
				0.18	4.36	-0.119390092
			Dorchester Gas Corp	0.0015575	0.0087131	
				0.78	3.22	-0.144254226
	26	3/6/1984	Chevron Corp	-0.0002164	0.0118625	
				-0.23	8.77	0.161191917
			Gulf Corp	0.0016969	0.0110168	
				1.57	7.23	-0.426758356
	27	3/12/1984	Mobil Corp	0.0000115	0.0125829	
				0.01	9.83	0.055356871
			Superior Oil Co	0.0003145	0.0118216	
				0.22	5.86	0.258648025
	28	11/6/1984	Houston Natural Gas Co	-0.0003836	0.004087	
				-0.25	1.84	0.005892661
			Texas Eastern Corp	-0.0030261	-0.0001325	
				-1.06	-0.03	-0.081532917
	29	11/18/1984	Placer Development Ltd Canada	0.0003869	0.0060196	
				0.34	3.66	-0.056542008
			Prairie Production Co	0.0012187	0.0031902	

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
				0.7	1.27	-0.270846724
1985						
	30	2/26/1985	SunShine Mining Co	-0.002196	0.0049393	
				-1.68	2.71	0.347485214
			Woods Petroleum Co	-0.0010166	0.0061986	
				-0.84	3.67	0.041973066
	31	3/4/1985	Coastal Corp	-0.0009495	0.0051893	
				-0.8	3.06	0.1173632
			American Natural Resources Co	-0.0003593	0.0038624	
				-0.2	1.4	-0.311654471
	32	6/19/1985	Tenneco Inc	-0.0005117	0.0087663	
				-0.67	7.5	0.01721036
			Goodyear Tire & Rubber Co	-0.0006987	0.0132929	
				-0.94	11.69	0.019975615
	33	7/19/1985	Diversified Energies Inc	-0.0015482	0.0037015	
				-0.55	0.85	-0.107745849
			Dyco Petroleum Corp	-0.0015482	0.0037015	
				-0.55	0.85	-0.442321374
	34	8/12/1985	Midcon Corp	0.0005703	0.0047892	
				0.7	3.46	0.190320492
			United Energy Resources Inc	0.0012452	0.0019454	
				1.31	1.21	-0.0518644
	35	9/10/1985	Pacific Gas & Electric Co	0.0004792	0.0081489	
				0.64	6.25	-0.031297804
			Pacific Gas Transmission Co	0.000656	0.0066209	
				0.51	2.92	0.111449126
	36	10/22/1985	Burlington Northern Inc	0.0002134	0.0140939	
				0.27	10.26	-0.044466925
			Southland Royalty Co	-0.0011943	0.0116863	
				-0.87	4.94	-0.361113917
	37	12/31/1985	Occidental Petroleum Corp	-0.0001837	0.0090007	
				-0.15	4.11	-0.066191346
			Midcon Corp	0.0006027	0.009173	
				0.44	3.81	-0.290301313
1986						
	38	5/13/1986	Louisiana Land & Exploration Co	-0.0018594	0.0071317	
				-1.4	3.42	-0.118871506
			Inexo Oil Co	-0.0033116	0.0077235	
				-0.99	1.47	-0.186960699
	39	6/12/1986	Triton Energy Corp	-0.000956	0.0031366	
				-0.51	1.09	0.096778243
			Worldwide Energy Corp	-0.0035356	0.0044689	
				-1.17	0.95	0.20263118
	40	12/18/1986	Questar Corp	0.0004767	0.0035126	
				0.51	2.98	-0.057983191
			Universal Resources	-0.0044913	0.0022218	
				0.78	-1.98	0.36772706
1987						
	41	10/5/1987	Arkla Inc	-0.0002945	0.0058918	
				-0.41	6.64	0.245728833
			Entex Inc	-0.0002883	0.0013003	
				-0.17	0.64	-0.463084994
	42	3/27/1987	British Petroleum Co	0.0010339	0.0078083	
				1.1	6.82	-0.345929628
			Standard Oil Co	0.0004346	0.0097234	
				0.42	7.73	-0.183398872
	43	6/23/1987	Conquest Exploration Co	-0.0002541	0.0079445	

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
			Cenergy Corp	-0.12	3.34	-0.131050582
				0.0010124	0.0054092	
				0.55	2.58	0.279168656
	44	1/16/1987	Energy Development Partner Ltd	-0.0040125	0.0019898	
				-1.41	0.41	-0.562474866
			May Energy Partnemrs Ltd	-0.0062236	0.0044557	
				-1.33	0.77	-0.691082809
	45	12/15/1987	Mesa Limited Partnership	-0.0021828	0.0009727	
				-1.39	0.5	0.12678911
			KN Energy Inc	-0.0018985	0.0046513	
				-1.38	5.83	-0.024914204
1988						
	46	7/15/1988	Witco Corp	-0.0018985	0.0074307	
				-0.24	10.71	0.166914379
			Calumet Inds Inc	-0.0009636	0.0072458	
				-0.33	4.54	0.098043746
	47	2/24/1988	British Petroleum Co	0.0007518	0.0056393	
				0.66	8.99	0.015484314
			Lear Petroleum Corp	-0.0034539	0.0092653	
				-1.12	5.41	-0.015025655
	48	9/27/1988	Utilicorp Utd Inc	0.0004482	0.0040338	
				0.45	7.29	0.017919899
			Michigan Energy Resources Co	0.0015051	0.0040334	
				1.35	6.52	-0.017465831
1989						
	49	4/21/1989	Raytheon Company	-0.0005268	0.0086853	
				-1.11	12.28	0.043753792
			Standard Havens	-0.0021866	0.0131479	
				-0.29	1.16	0.011449284
	50	2/22/1989	Panhandle Eastern Corp	-0.000677	0.0081112	
				-0.76	6.71	0.26831177
			Texas Eastern Corp	0.0015961	0.0108454	
				0.8	3.99	-0.104973913
1992						
	51	3/3/1992	Grace (W.R) & Co	0.0007421	0.0121977	
				0.71	8.59	0.024688154
			Grace Energy Corp	-0.0018048	0.0043437	
				-1.18	2.09	-0.51368006
1993						
	52	6/18/1993	Apache Corporation	0.0017024	0.0056277	
				1.28	2.24	-0.358037749
			Hadson Energy Resources Corp	0.0006144	-0.000835	
				0.42	-0.3	0.016434553
1994						
	53	12/13/1994	Williams Cos	0.0003757	0.0125261	
				0.32	6.05	0.18210176
			Transco Energy Co	-0.0005366	0.0076688	
				-0.61	4.96	-0.238378944
1995						
	54	5/4/1995	Barret Resources Corp	0.0018273	0.0029946	
				1.29	1.05	0.409474403
			Plains Petroleum Co	0.0001986	0.000772	
				0.24	0.46	0.150936794
	55	8/25/1995	Enron Crop	-0.0003774	0.0072671	
				-0.41	4.05	-0.06030175
			Coda Energy Inc	-0.0002582	0.0034073	
				-0.15	1.02	-0.168374532

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
1996	56	7/22/1996	Seagull Energy Corp	0.0009448	0.006113	
				0.67	2.66	0.612665917
		Global Natural Resources Inc	0.0015935	0.005931		
			1.36	3.09	-0.181084325	
	57	9/23/1996	Ultramar Corp	0.0002727	0.0059931	
				0.28	4.17	1.404335572
		Diamond Shamrock Inc	0.0001654	0.0054602		
			0.16	3.53	0.125053208	
1997	58	7/17/1997	Burlington Resources Inc	-0.0010406	0.006594	
				-1.28	6.21	-0.096510816
		Louisiana Land & Exploration Co	-0.0013777	0.0076979		
			-1.23	5.3	0.123151899	
	59	5/27/1997	Columbia Gas System Inc	0.0007034	0.0060542	
				0.98	6.38	0.069682335
		Alamco Inc	0.0007012	0.0030799		
			0.57	1.89	-0.275710711	
	60	6/20/1997	Forcenergy	0.002596	0.0064675	
				1.5	2.85	0.494957608
			Edisto Resources Corp	0.0000845	0.0034257	
				0.06	1.92	0.110913694
	61	10/20/1997	Kinder Morgan Energy Partners LP	0.0012424	0.0004824	
				0.41	0.13	-0.300171391
			Santa Fe Pacific Pipeline Partner LP	0.0002694	0.0009403	
				0.42	1.17	-0.407592531
	62	6/24/1997	Louis Dreyfus Natural Gas Corp	0.0004012	0.0054673	
				0.36	3.76	0.136390308
			American Exploration Co	-0.0002816	0.0077711	
				-0.2	4.31	0.446547004
	63	7/7/1997	Meridian Resources Corp	0.0002234	0.0054084	
			0.15	2.84	-0.115048553	
		Cairn Energy USA Inc	-0.0007115	0.0048914		
			-0.42	2.27	-0.286913057	
64	4/7/1997	Mesa Inc	0.0023644	0.010319		
			0.8	2.38	-0.072085882	
		Parker & Parsley Petroleum Co	0.0005227	0.0062366		
			0.42	3.42	-0.140736154	
65	6/17/1997	Santa Fe Energy Resources Inc	0.0011541	0.0041056		
			0.88	2.39	0.041032443	
		McFarland Energy	0.0010616	0.0009854		
			0.78	0.55	-0.24765217	
66	11/24/1997	Williams Cos Inc	-0.0008727	0.0087303		
			-0.46	4.5	-0.130780877	
		Mapco Inc	-0.0003344	0.0037296		
			-0.51	5.51	-0.225110912	
1998	67	5/4/1998	Atlantic Richfield Co	-0.0034233	0.0074876	
				-1.17	2.55	-0.055220236
		Union Texas Petroleum Holding Inc	-0.000319	0.0049377		
			-0.31	4.83	0.162115901	
	68	8/11/1998	British Petroleum Co PLC	-0.0007692	0.0088847	
				-0.86	9.88	0.15345791
			Amoco Corp	-0.0036527	0.0050378	
				-1.27	1.74	0.207463213
	69	12/23/1998	Chevron Corp	0.0000614	0.005302	
			0.06	5.9	-0.098660903	

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
			Rutherford-Moran Oil Corp	-0.0084874	0.0045291	
	70	12/1/1998	Exxon Corp	-1.95	1.03	0.56258595
			Mobil Corp	-0.0084874	0.0050931	
				0.18	6.41	0.051280128
	71	10/15/1998	Kerr-McGee	-0.0003721	0.0059622	
			Oryx Energy co	-0.34	6.57	-0.095072893
				-0.001511	0.0073386	
				-1.62	10.07	0.025201663
	72	6/18/1998	Lyondell Petrochemical Co	-0.003178	0.0099913	
				-1.92	7.73	0.15636055
			Atlantic Richfield Co	0.0000638	0.0073863	
				0.05	5.72	-0.095337074
	73	3/23/1998	Plains Resources Inc	-0.0031095	0.0071617	
				-1.07	2.42	0.020890248
			Goodyear Tire & Rubber Co	-0.0001304	0.0049648	
				-0.1	3.76	-0.011232045
	74	5/29/1998	Pogo Producing Co	-0.0001565	0.0081851	
				-0.2	10.72	-0.145154997
			Arch Petroleum Inc	-0.0026604	0.0092767	
				-2	6.8	0.047865991
	75	11/25/1998	Seagull Energy Corp	-0.0011641	0.0038914	
				-0.49	1.59	-0.074642317
			Ocean Energy Inc	-0.00362	0.0144015	
				-2.28	10.94	-0.217301568
	76	11/16/1998	Vulcan Materials Co	-0.0082906	0.018374	
				-2.03	5.44	0.282141974
			CalMat Co	0.0008179	0.0057351	
				0.87	7.44	-0.134381863
				-0.0006468	0.010393	
				-0.46	9.1	-0.271845245
1999	77	4/1/1999	BP Amoco PLC	-0.0001042	0.006437	
				-0.1	7.66	0.021285618
			Atlantic Richfield Co	-0.0011663	0.0053561	
				-1.03	6.13	-0.197667106
	78	6/1/1999	Crompton & Knowles Corp	-0.0022707	0.0080144	
				-1.29	6.07	-0.058166594
			Witco Corp	-0.0033629	0.0041893	
				-1.91	3.16	0.43737427
	79	5/20/1999	Devon Energy Corp	-0.0011225	0.0062043	
				-0.77	5.67	0.115225702
			PennzEnergy Co	-0.0066993	0.006839	
				-2.17	2.94	-0.202252432
	80	2/24/1999	Dominion Resources Inc	0.0000577	0.0016821	
				0.09	3.29	0.176114012
			Remington Energy Ltd	-0.0034508	0.0037629	
				-1.22	1.68	0.997044461
2000	81	11/6/2000	Amerada Hess Corp	0.0003647	0.0004462	
				0.28	0.48	-0.080070292
			Lasmo PLC	-0.0003676	0.0028306	
				-0.18	1.94	0.03897432
	82	3/16/2000	BP Amoco PLC	-0.0023134	-0.0006854	
				-0.76	-0.25	0.065212108
			Vastar Resources Inc	0.0010886	0.0044285	
				0.72	3.31	-0.189420901
	83	10/16/2000	Chevron Corp	-0.0001988	0.0005548	



Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
			Texaco Inc	-0.16	0.62	-0.117133298
				-0.000736	0.0009903	
				-0.55	1.02	-0.304218786
	84	12/27/2000	Hunt Oil Co	-0.003194	-0.0002439	
				-1.76	-0.2	1.143571848
			Berkley Petroleum Corp	0.0028764	0.0026624	
				1.75	2.46	-0.866738718
	85	3/20/2000	North Coast Energy Inc	0.005927	-0.0053086	
				0.69	-0.7	0.976703667
			Belden & Blake Corp	0.0009932	0.0030552	
				0.6	2.09	-0.154634606
	86	10/20/2000	Stone Energy Corp	0.0007802	0.0014532	
				0.43	1.11	-0.163616629
			Basin Exploration Inc	-0.0004506	0.0038727	
				-0.16	1.92	0.232828426
	87	12/22/2000	USX-Marathon Group	0.0007542	0.0042623	
				-0.16	1.92	0.511589929
			Pennaco Energy Inc	0.0017901	0.005851	
				0.79	3.93	-0.016798887
2001						
	88	7/10/2001	Amerada Hess Corp	0.0009798	0.0001927	
				0.77	0.22	-0.131730633
			Triton Energy Ltd	-0.0004951	0.0044381	
				-0.19	2.47	0.227880377
	89	2/12/2001	Anadarko Petroleum Corp	0.0025137	0.0006562	
				1.18	0.48	-0.302167458
			Berkley Petroleum Corp	0.0031138	0.0029625	
				1.81	2.68	-0.145231038
	90	6/25/2001	Anadarko Petroleum Corp	0.0006604	0.0011004	
				0.33	0.8	0.066496194
			Gulfstream Resources Canada Ltd	0.0020241	0.0016068	
				0.99	1.14	0.030786308
	91	2/8/2001	Calpine Corp	-0.002649	0.0052363	
				-0.55	1.69	-0.02646698
			Encal Energy Ltd	0.0019357	-0.0005414	
				0.83	-0.36	0.006072869
	92	5/29/2001	Conoco	0.0008157	-0.0006065	
				0.61	-0.63	0.224547477
			Gulf Canada Resources Ltd	0.0010761	0.0020228	
				0.6	1.68	0.249057276
	93	8/14/2001	Devon Energy Corp	0.0000365	-0.0004838	
				0.02	-0.45	0.057015805
			Mitchell Energy & Development Corp	0.0014692	0.0015229	
				0.76	1.14	0.086058327
	94	9/10/2001	Dominion Resources Inc	0.0005849	-0.000781	
				0.5	-0.98	-0.151448741
			Louis Dreyfus Natural Gas Corp	0.0001148	0.0022809	
				0.06	1.65	0.138458766
	95	5/23/2001	EOG Resources Inc	0.0018474	0.0004594	
				1	0.37	-0.231981156
			Energy Search Inc	0.0005327	-0.0005674	
				0.2	-0.31	-0.077408609
	96	5/14/2001	Kerr-McGee	0.0010014	0.0005403	
				0.79	0.64	0.098752913
			HS Resources Inc	0.0026802	0.0033177	
				1.49	2.8	-0.401760127
	97	12/18/2001	Magnum Hunter Resources Inc	0.0005136	0.0025346	

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
			Prize Energy Corp	0.26	1.83	0.191043355
				0.0002656	0.0020974	
				0.17	1.92	-0.063271308
	98	11/18/2001	Phillips Petroleum Co	-0.0000393	0.0018063	
			Conoco Inc	-0.03	2.35	0.328096451
				0.0001158	0.001409	
				0.09	1.67	0.320633157
	99	2/4/2001	Phillips Petroleum Co	0.0013186	-0.0004043	
			Tosco Corp	1	-0.48	0.071823005
				0.001067	0.0006987	
				0.77	0.78	0.092484006
	100	3/1/2001	Plains All American Pipeline LP	0.0013664	0.0005171	
			Murphy Oil Corp	1.54	0.9	0.053945725
				0.0010156	-0.0005837	
				0.7	-0.63	0.284460459
	101	7/17/2001	Tesoro Petroleum Corp	0.0008611	0.0030423	
			BP PLC	0.52	2.69	0.146736751
				-0.0005931	0.0010902	
				-0.55	1.48	0.121453672
	102	3/20/2001	Valero Energy Corp	0.0014007	0.0022266	
			Huntway Refining Co	0.8	1.98	0.254526435
				0.0010679	-0.0004779	
				0.27	-0.19	0.420093525
	103	5/7/2001	Valero Energy Corp	0.0021862	0.0021152	
			Ultramar Diamond Shamrock Corp	1.29	1.91	0.625176034
				0.0023898	0.0012327	
				1.78	1.4	0.46254186
	104	5/7/2001	Williams Cos Inc	0.0008556	0.0063192	
			Barrett Resources Corp	0.49	5.53	0.351836123
				0.0027734	0.001371	
				1.22	0.92	-0.076922772
2002						
	106	2/20/2002	BJ Services Co	-0.003752	0.0054329	
			Great Lakes Chemical Corp	-1.01	1.95	-0.106825706
				-0.0011212	0.0083291	
				-1.16	11.42	0.244312356
	107	3/11/2002	Chesapeake Energy Corp	-0.0014175	0.0075417	
			Canaan Energy Corp	-0.67	4.67	0.006997956
				-0.0002404	0.0024961	
				-0.09	1.44	0.610983069
	108	5/28/2002	Conoco Inc	-0.0003161	0.0040668	
			Gulf Indonesia Resources Ltd	-0.27	4.1	-0.113166454
				0.001432	0.0025791	
				0.76	1.6	-0.024171303
	109	2/12/2002	Giant Industries Inc	0.0011072	0.0061493	
			BP PLC	0.57	4.21	0.153490065
				-0.0000781	0.0045368	
				-0.08	6.01	0.012854177
	110	5/29/2002	Newfield Exploration Co	0.0002978	0.0033722	
			EEX Corp	0.21	2.72	-0.065265502
				-0.0032797	0.0151756	
				-1.03	5.47	0.237041183
	111	3/25/2002	Royal Dutch Petroleum	-0.0002773	0.0062525	
			Pennzoil Quaker State Co	-0.29	8.47	0.157398589
				0.0002938	0.0096743	
				0.15	6.21	0.372886999
	112	3/18/2002	Santos Ltd	-0.0006165	0.0028879	

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
			Esenjay Exploration Inc	-0.51	3.14	-0.198640665
				-0.0022755	0.0088133	
	113	2/5/2002	Tesoro Petroleum Corp	-0.79	4.07	-0.038217929
				0.001012	0.0064161	
			Valero Energy Corp	0.56	4.61	-0.060859086
				0.0013887	0.0053635	
	114	8/20/2002	Unocal Corp	0.86	4.31	-0.22486365
				0.000457	0.0065319	
			Pure Resources Inc	0.46	9.28	0.041838554
				-0.0004782	-0.0004756	
	115	4/11/2002	Williams Energy Partners	-0.43	-0.55	0.286894077
				0.0011401	0.0003676	
			Williams Cos Inc	0.82	0.41	0.347889385
				-0.0024444	0.0097843	
				-1.13	5.59	0.446865483
2003						
	116	2/24/2003	Devon Energy Corp	0.0012361	0.0081266	0.043124112
				1.05	10.82	0.011196811
			Ocean Energy Inc	0.0010286	0.0078873	0.090950302
				0.88	10.56	0.031277607
	117	5/29/2003	Edge Petroleum Corp	-0.0008493	-0.0002643	0.174749036
				-0.21	-0.41	-0.337273888
			Miller Exploration Co	0.0111599	0.0147257	0.121353095
				1.1	2.33	0.548171182
	118	3/31/2003	Evergreen Resources Inc	0.0007189	0.0057978	0.016998483
				0.65	8.45	-0.2165611
			Carbon Energy Corp	0.0008221	-0.0004599	0.149331278
				1.18	-1.06	-0.01411679
	119	7/1/2003	Unit Corp	0.0003141	0.0093517	0.008603936
				0.2	9.58	-0.045276399
			PetroCorp Inc	0.001042	0.0002642	0.105511791
				1.32	0.53	0.280796328
2004						
	120	4/15/2004	EnCana Corp	0.0009563	0.0026157	-0.045345768
				1.15	2.59	-0.077171798
			Tom Brown Inc	0.0009457	0.0059137	0.244419456
				1.1	5.67	-0.242217108
	121	5/24/2004	Forest Oil Corp	-0.0002749	0.0074992	-0.01643654
				-0.26	5.75	0.1615002
			Wiser Oil Co	0.0026359	0.002377	0.162264741
				1.95	1.4	0.290491545
	122	4/7/2004	Kerr-McGee	-0.0010599	0.0077495	-0.030355781
				-1.05	12.38	0.033822834
			Westport Resources Corp	0.0006105	0.0057725	-0.044097527
				0.46	6.99	0.016921619
	123	12/16/2004	Noble Energy Inc	0.00085	0.0089076	-0.003002295
				1	7.49	0.054837092
			Patina Oil & Gas Corp	-0.0021542	0.008718	0.197829413
				-0.7	2.04	-0.002768477
	124	6/9/2004	Petro Canada	0.00009	0.0039341	-0.014131948
				0.09	3.08	0.184427801
			Prima Energy Corp	0.0010208	0.0134444	-0.003542335
				0.68	7.1	0.087678717
	125	5/4/2004	Pioneer Natural Resources	0.0007497	0.0066766	-0.07236212
				0.79	5.64	0.070834625
			Evergreen Resources Inc	-0.0005468	-0.000316	-0.072260194
				-0.18	-0.08	0.045929251

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
2004	126	2/12/2004	Plains Explorationa & Production Co	0.0007036	0.0087221	-0.005790094
				0.63	7.32	0.011551743
		Nuevo Energy Company	0.0027215	0.0045259	-0.034362692	
			2.02	3.17	-0.08956926	
	127	2/4/2004	Valero Energy Corp	0.0013955	0.0024694	0.00840826
				1.37	2.3	0.180392619
		El Paso Corp	-0.0022921	0.0179753	-0.019632723	
			-0.86	6.38	0.414181325	
	128	11/1/2004	Valero LP	0.0007387	0.0038243	-0.014638235
				1.05	3.92	-0.075850663
		Kaneb Pipeline Partners LP	0.0003542	0.0039383	0.24760214	
			0.46	3.7	0.118304855	
2005	129	4/4/2005	Chevron Corp	-0.0017654	0.0065085	-0.007839985
				-0.63	1.58	-0.003561564
		Unocal	0.0016368	0.0094129	-0.034882266	
			1.64	6.37	-0.11481766	
	130	12/12/2005	ConocoPhillips	-0.0019102	0.0142087	-0.032777672
				-0.64	3.11	-0.031407103
		Burlington Resources Inc	0.0015175	0.016459	0.143641833	
			1.29	9.13	0.012328111	
	131	11/8/2005	Delta Petroleum Corp	-0.0000793	0.0190054	-0.166637761
				-0.05	7.54	-0.270933109
		Castle Energy Corp	0.0009654	0.0113847	-0.031403984	
			0.5	3.91	-0.273668615	
	132	1/26/2005	Energy Transfer Partner LP	0.0016077	0.0047019	0.061756164
				2.37	4.96	0.056787589
		American Electric Power Co Inc	0.0001734	0.0064689	0.021109026	
			0.3	8.04	0.060218493	
	133	9/19/2005	Norsk Hydro ASA	0.001471	0.0090504	0.015226187
				1.62	6.35	-0.254731348
	Spinnaker Exploration Co	0.0003513	0.0126801	0.355930696		
		0.27	6.22	-0.090544571		
134	10/13/2005	Occidental Petroleum Corp	0.000675	0.0118082	-0.108837937	
			0.7	7.79	-0.11696522	
	Vintage Petroleum Inc	0.0018518	0.0149833	0.18415655		
		1.26	6.44	0.158248659		
135	4/4/2005	Petrohawk Energy Corp	0.0043795	0.0034039	-0.056185615	
			1.15	0.61	-0.270783757	
	Mission Resources Corp	0.0036178	0.0231013	0.036214242		
		1.38	5.96	0.019411766		
136	7/11/2005	Pogo Producing Co	0.0005016	0.016324	-0.052269679	
			0.25	5.41	0.008894771	
	Unocal Corp	0.0016822	0.0086391	-0.045475446		
		1.62	5.5	-0.077046763		
137	4/25/2005	Valero Energy Corp	0.0003326	0.0146929	-0.012637725	
			0.11	3.19	-0.528090724	
	Premcor Inc	0.0017706	0.008586	0.157375787		
		1.49	4.95	-0.431330992		
2006	138	6/23/2006	Anadarko Petroleum Corp	-0.002917	0.0249454	-0.029400688
				-0.99	5.68	0.082429095
		Kerr-McGee Corp	-0.0015237	-0.0006495	0.311636866	
			-0.52	-0.15	0.220189021	
	139	5/30/2006	Kinder Morgan Inc Management	-0.0005937	0.0053879	0.07501641
				-1.06	5.89	-0.004629353
	Kinder Morgan Inc	-0.0001324	0.0116774	0.071879276		

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
2006	140	7/8/2006	MDU Resources Group Inc	-0.21	11.45	0.022041485
				0.0004228	0.0115497	-0.013210934
			Cascade Natural Gas Corp	0.69	13.04	-0.013189107
				-0.0003973	0.0097032	0.221330085
				-0.59	9.87	0.098642029
	141	4/21/2006	Petrohawk Energy Corp	-0.0000353	0.0163339	-0.049691315
				-0.02	6.94	-0.157797341
			KCS Energy Inc	0.0011379	0.0211259	0.066428535
				0.76	8.85	-0.176654932
	142	6/12/2006	Plains All American Pipeline LP	0.0002514	0.0063982	-0.079033297
			0.38	6.08	0.02756825	
Pacific Energy Partner LP			-0.0003149	0.007425	0.050838395	
			-0.44	6.5	-0.128386204	
2007	143	1/7/2007	Forest Oil Corp	-0.0021454	0.0138203	-0.1012686
				-1.26	5.47	0.023605102
			The Houston Exploration Co	-0.0003797	0.0069346	-0.054658689
				-0.36	-0.36	0.189110613
	144	6/19/2007	General Electric Co	-0.0001754	0.0061939	0.022844256
				-0.41	10.08	-0.060695525
			Regency Energy Partners LP	0.0004782	0.0008179	0.218844052
				0.69	0.82	0.077647014
	145	7/17/2007	Plains Exploration & Production Co	-0.0001408	0.0094863	-0.0748448
				-0.14	6.39	-0.328012401
		Pogo Producing Co	-0.0002622	0.0092006	0.099705173	
			-0.25	5.78	0.010673832	

**Appendix 3**  
**CAPM Result (OLS)**

Year	No	Date	Merger Companies	CAPM			
				$\alpha$	$\beta$	CAR	
1981	1	5/6/1981	Dome Petroleum Ltd Canada	0.0043683	0.0130928		
			Conoco Inc	-0.34	7.99	0.154192398	
	2	6/26/1981	Seagram Ltd	-0.0244936	0.0140537	-0.270556981	
			Conoco Inc	-1.19	13.83	-0.355861203	
	3	7/7/1981	Du Pont	-0.0095006	0.0063137		
			Conoco Inc	-0.64	7.92	0.65296504	
			Conoco Inc	-0.0073404	0.0137848		
	1982	4	2/11/1982	Allied Corp & Continental Group	-0.34	11.9	0.074382531
				Supron Energy Corp	0.0143524	0.0118277	
5		8/16/1982	Occidental Petroleum Corp	0.0191258	0.0133625	0.093553291	
			Cities Service Co	0.86	10.95		
6		11/1/1982	Damson Oil Corp	0.0072158	0.0126169		
			Juniper Petroleum Corp	0.4	10.88	-0.182641058	
7		12/20/1982	Mesa Petroleum Co	-0.015675	0.0235716	-0.059060212	
			General American Oil Co of Texas	-0.24	5.53		
8		12/21/1982	Burlington Northern Inc	-0.0114097	0.012347	-0.009714929	
			El Paso Co	-0.68	12.93	1.998697867	
			El Paso Co	-0.0042223	0.0124844		
1983		10	1/3/1983	National Distillers & Chemical Corp	-0.09	4.49	3.529184403
				Suburban Propane Gas Corp	-0.0376097	0.0135289	
		11	1/10/1983	Phillips Petroleum Co	-0.8	6.24	3.529184403
				General American Oil Co of Texas	-0.0472769	0.0120424	
	12	2/9/1983	Goodyear Tire and Rubber Cor	-0.81	4.46	-0.120789461	
			Celeron Corp	-0.0461123	0.0124542		
	13	4/4/1983	Internorth Inc	-0.93	6.22	0.103858984	
			Belco Petroleum Corp	-0.0259572	0.0111299		
	14	4/22/1983	Northwest Industries Inc	-0.56	6	-0.796021874	
			Pogo Producing Co	-0.013681	0.016415		
	15	5/23/1983	Diamond Shamrock Corp	-0.58	17.19	-0.153186042	
			Natomas Co	-0.0487049	0.0102332		
			Natomas Co	-1.55	8.09	-0.355981212	

Year	No	Date	Merger Companies	CAPM		
				$\alpha$	$\beta$	CAR
	16	6/8/1983	CSX Corp	-1.17	7.24	0.10728346
				0.011051	0.0107463	
			Texas Gas Resources Corp	0.39	11.76	0.174616819
				0.0172221	0.0080815	
	17	8/26/1983	Burlington Northern Inc	0.44	6.34	-0.393948993
				0.0446175	0.0133308	
			El Paso Co	1.39	13.38	0.247240288
				0.0112677	0.0063536	
	18	9/12/1983	Williams Cos	0.19	3.43	-0.240003927
				0.0366546	0.0093237	
			Northwest Energy Co	0.83	6.6	-0.004352961
				0.0669744	0.0066582	
	19	10/3/1983	Kaneb Services Inc	1.32	4.12	-0.234331088
				-0.0064911	0.0110341	
			Moran Energy Inc	-0.16	8.06	-0.043710078
				0.0064466	0.0128261	
	20	12/15/1983	Lear Petroleum Corp	0.09	5.48	-0.337682031
				0.0413856	0.0135842	
			Mcrae Consolidated Oil & Gas	0.83	6.48	0.022772997
				-0.0069307	0.0095225	
	21	12/28/1983	Pennzoil Co	-0.13	4.31	0.137453267
				-0.0260974	0.0127727	
			Getty Oil Co	-0.81	9.18	0.451896511
				0.0398547	0.0138447	
				1.15	9.22	0.127766323
1984	22	1/9/1984	Texaco Inc	0.0387688	0.0022215	
				0.21	0.68	0.089240995
			Getty Oil Co	0.0611499	0.0140248	
				1.41	7.3	-0.066775995
	23	1/25/1984	Howell Corp	0.0204465	0.0071559	
				0.39	3.04	0.45084198
			Howell Petroleum Corp	0.0146802	0.0093852	
				0.3	4.24	-0.167322697
	24	1/25/1984	Royal Dutch Shell Group Netherlands	0.0071651	0.010857	
				0.32	10.54	-0.139868331
			Shell Oil Co	-0.0156343	0.0112797	
				-0.46	7.37	-0.457884493
	25	1/26/1984	Damson Oil Corp	0.0219655	0.0114086	
				0.38	4.37	-0.119263919
			Dorchester Gas Corp	0.0554613	0.0087252	
				0.93	3.23	-0.143946904
	26	3/6/1984	Chevron Corp	0.0050291	0.0118613	
				0.18	8.7	0.16106398
			Gulf Corp	0.0656953	0.0110317	
				2.06	7.25	-0.425510924
	27	3/12/1984	Mobil Corp	0.013338	0.0125823	
				0.5	9.84	0.055371569
			Superior Oil Co	0.0226285	0.011822	
				0.54	5.86	0.258619429
	28	11/6/1984	Houston Natural Gas Co	-0.0078449	0.004087	
				-0.19	1.84	0.005033317
			Texas Eastern Corp	-0.0786694	-0.0001429	
				-1.02	-0.03	-0.087308182
	29	11/18/1984	Placer Development Ltd Canada	0.0144642	0.0060223	
				0.47	3.66	-0.056628121
			Prairie Production Co	0.0318704	0.0031965	



Year	No	Date	Merger Companies	CAPM		
				$\alpha$	$\beta$	CAR
				0.68	1.27	-0.270571505
1985						
	30	2/26/1985	SunShine Mining Co	-0.0573684	0.0049064	
				-1.61	2.69	0.34717666
			Woods Petroleum Co	-0.0233342	0.0061871	
				-0.71	3.67	0.04164759
	31	3/4/1985	Coastal Corp	-0.0245649	0.0051893	
				-0.76	3.07	0.116943466
			American Natural Resources Co	-0.0078106	0.0038644	
				-0.16	1.48	-0.311804835
	32	6/19/1985	Tenneco Inc	-0.0101489	0.0087894	
				-0.47	7.54	0.016989674
			Goodyear Tire & Rubber Co	-0.0063456	0.013274	
				-0.3	11.7	0.020212154
	33	7/19/1985	Diversified Energies Inc	-0.0284995	0.0035503	
				-0.35	0.82	-0.10868301
			Dyco Petroleum Corp	-0.0284995	0.0035503	
				-0.35	0.82	-0.443675005
	34	8/12/1985	Midcon Corp	0.0233853	0.0047918	
				0.97	3.47	0.19036623
			United Energy Resources Inc	0.0342845	0.0020136	
				1.22	1.25	-0.052152934
	35	9/10/1985	Pacific Gas & Electric Co	0.0271521	0.0081259	
				1.2	6.24	-0.031546538
			Pacific Gas Transmission Co	0.0279978	0.0066224	
				0.71	2.93	0.11146169
	36	10/22/1985	Burlington Northern Inc	0.0168266	0.0141201	
				0.65	10.28	-0.044546547
			Southland Royalty Co	-0.0348036	0.0117187	
				-0.78	4.96	-0.361072554
	37	12/31/1985	Occidental Petroleum Corp	0.0022411	0.0090056	
				0.05	4.12	-0.066800935
			Midcon Corp	0.0277935	0.0091931	
				0.61	3.82	-0.288548561
1986						
	38	5/13/1986	Louisiana Land & Exploration Co	-0.0675551	0.0072249	
				-1.43	3.46	-0.119213463
			Inexo Oil Co	-0.1198995	0.0078412	
				-1.01	1.49	-0.187535814
	39	6/12/1986	Triton Energy Corp	-0.03461	0.0031653	
				-0.52	1.1	0.096743579
			Worldwide Energy Corp	-0.1275881	0.0045172	
				-1.17	0.96	0.202279981
	40	12/18/1986	Questar Corp	0.0204292	0.0035163	
				0.53	2.98	-0.058006643
			Universal Resources	-0.179205	0.002259	
				-1.92	0.79	0.367937715
1987						
	41	10/5/1987	Arkla Inc	-0.0085308	0.005893	
				-0.25	6.64	0.246813567
			Entex Inc	-0.0175884	0.0013208	
				-0.22	0.65	-0.460938391
	42	3/27/1987	British Petroleum Co	0.0527887	0.0078197	
				1.26	6.83	-0.345858391
			Standard Oil Co	0.0230206	0.0097449	
				0.5	7.76	-0.183487235
	43	6/23/1987	Conquest Exploration Co	-0.0070278	0.0079503	

Year	No	Date	Merger Companies	CAPM		
				$\alpha$	$\beta$	CAR
			Cenergy Corp	-0.07 0.0466424	3.34 0.0054275	-0.131050622
	44	1/16/1987	Energy Development Partner Ltd	0.54 -0.1302393	2.59 0.0019296	0.279320731
			May Energy Partnemrs Ltd	-1.34 -0.2869076	0.39 0.0046104	-0.559402657
	45	12/15/1987	Mesa Limited Partnership	-1.45 -0.0748805	0.79 0.0009541	-0.691863291
			KN Energy Inc	-1.16 -0.0860222	0.48 0.0046388	0.126803787
1988				-1.34	5.82	-0.024834185
	46	7/15/1988	Witco Corp	-0.0095869 -0.16	0.0074276 10.7	0.166597171
			Calumet Inds Inc	-0.0530416 -0.39	0.0072343 4.53	0.098752443
	47	2/24/1988	British Petroleum Co	0.030879 0.57	0.0056427 8.99	0.016383677
			Lear Petroleum Corp	-0.1662769 -1.12	0.0092315 5.39	-0.022371006
	48	9/27/1988	Utilicorp Utd Inc	0.0122758 0.28	0.0040323 7.28	0.017902118
			Michigan Energy Resources Co	0.0692632 1.39	0.004043 6.53	-0.017370005
1989						
	49	4/21/1989	Raytheon Company	-0.0126903 -0.74	0.0086907 12.3	0.043795401
			Standard Havens	-0.0622765 -0.23	0.0131184 1.16	0.011110146
	50	2/22/1989	Panhandle Eastern Corp	-0.0170403 -0.5	0.0081074 6.71	0.268042726
			Texas Eastern Corp	0.0733898 0.95	0.0108441 3.99	-0.104316222
1992						
	51	3/3/1992	Grace (W.R) & Co	0.0477383 0.92	0.0122042 8.6	0.024631021
			Grace Energy Corp	-0.0772198 -1.02	0.0043149 2.08	-0.514853194
1993						
	52	6/18/1993	Apache Corporation	0.1620602 1.38	0.0056114 2.23	-0.359806822
			Hadson Energy Resources Corp	0.0462103 0.36	-0.0008154 -0.29	0.015908737
1994						
	53	12/13/1994	Williams Cos	0.0308351 0.38	0.0125246 6.05	0.182121405
			Transco Energy Co	-0.0451676 -0.76	0.0076658 4.96	-0.238122437
1995						
	54	5/4/1995	Barret Resources Corp	0.0997778 1.29	0.0029766 1.04	0.40872737
			Plains Petroleum Co	0.0063928 0.14	0.0007912 0.47	0.150908375
	55	8/25/1995	Enron Crop	-0.0059742 -0.13	0.0072362 4.02	-0.060225983
			Coda Energy Inc	0.0033604 1.01	Dropped	

Year	No	Date	Merger Companies	CAPM			
				$\alpha$	$\beta$	CAR	
1996	56	7/22/1996	Seagull Energy Corp	0.0560705	0.0060978		
			Global Natural Resources Inc	0.0843397	0.0059265	0.612902422	
	57	9/23/1996	Ultramarc Corp	0.0205554	0.0059895	-0.181050532	
			Diamond Shamrock Inc	0.0155115	0.0054545	1.415708595	
				0.3	3.52	0.125084739	
1997	58	7/17/1997	Burlington Resources Inc	-0.044071	0.0065913		
			Louisiana Land & Exploration Co	-0.0671416	0.0077293	-0.096535629	
	59	5/27/1997	Columbia Gas System Inc	0.0380527	0.0060591	0.123185981	
			Alamco Inc	0.0379472	0.0030767	0.071927488	
	60	6/20/1997	Forcenergy	0.1392858	0.0064465	-0.273414264	
			Edisto Resources Corp	0.0034063	0.0034405	0.494407954	
	61	10/20/1997	Kinder Morgan Energy Partners LP	0.0735214	0.0004311	0.111014382	
			Santa Fe Pacific Pipeline Partner LP	0.0142716	0.0009399	-0.301708046	
	62	6/24/1997	Louis Dreyfus Natural Gas Corp	0.0216962	0.0054806	-0.407618192	
			American Exploration Co	-0.007912	0.007778	0.136193686	
	63	7/7/1997	Meridian Resources Corp	0.0172684	0.0054053	0.446705513	
			Cairn Energy USA Inc	-0.0343872	0.0049064	-0.115273525	
	64	4/7/1997	Mesa Inc	0.1272236	0.0103223	-0.286212034	
			Parker & Parsley Petroleum Co	0.0331915	0.0062343	-0.071543134	
	65	6/17/1997	Santa Fe Energy Resources Inc	0.0639248	0.0040928	-0.140599712	
			McFarland Energy	0.0534278	0.0009819	0.040861934	
	66	11/24/1997	Williams Cos Inc	-0.0452795	0.0087564	-0.247610657	
			Mapco Inc	-0.0101333	0.003725	-0.129747154	
	1998	67	5/4/1998	Atlantic Richfield Co	-0.1472645	0.0074487	-0.224907455
				Union Texas Petroleum Holding Inc	-0.0151146	0.0049527	
	68	8/11/1998	British Petroleum Co PLC	-0.0301323	0.0088872	0.161985342	
			Amoco Corp	-0.1849668	0.0050555	0.153410749	
69	12/23/1998	Chevron Corp	0.0157155	0.0052972	0.207167607		
			0.27	5.9	-0.098622574		

Year	No	Date	Merger Companies	CAPM		
				$\alpha$	$\beta$	CAR
			Rutherford-Moran Oil Corp	-0.4264833	0.004556	
				1.03	-1.95	0.5584205
	70	12/1/1998	Exxon Corp	0.0165729	0.0050919	
				0.34	6.42	0.043816297
			Mobil Corp	-0.0072464	0.0059547	
				-0.13	6.57	-0.094878485
	71	10/15/1998	Kerr-McGee	-0.0686684	0.007348	
				-1.46	10.08	0.025425787
			Oryx Energy co	-0.1498473	0.0100109	
				-1.79	7.75	0.157336868
	72	6/18/1998	Lyondell Petrochemical Co	0.0098712	0.0073877	
				0.15	5.72	-0.095374496
			Atlantic Richfield Co	-0.1364334	0.0071411	
				-0.93	2.41	0.021391689
	73	3/23/1998	Plains Resources Inc	-0.0049257	0.004974	
				-0.07	3.76	-0.011174002
			Goodyear Tire & Rubber Co	0.003874	0.0081768	
				0.1	10.7	-0.14527928
	74	5/29/1998	Pogo Producing Co	-0.1265466	0.0092877	
				-1.89	6.81	0.045633314
			Arch Petroleum Inc	-0.0580454	0.003903	
				-0.48	1.59	-0.075763349
	75	11/25/1998	Seagull Energy Corp	-0.1625413	0.0143749	
				-1.99	10.92	-0.211317382
			Ocean Energy Inc	-0.36948	0.0182998	
				-1.76	5.41	0.293528243
	76	11/16/1998	Vulcan Materials Co	0.035544	0.0057498	
				0.74	7.46	-0.134791783
			CalMat Co	-0.0351206	0.0103998	
				-0.49	9.11	-0.271999623
1999						
	77	4/1/1999	BP Amoco PLC	0.0102255	0.0064327	
				0.17	7.66	0.021208154
			Atlantic Richfield Co	-0.0427351	0.0053419	
				-0.7	6.11	-0.198902566
	78	6/1/1999	Crompton & Knowles Corp	-0.1375011	0.0080145	
				-1.42	6.08	-0.056158382
			Witco Corp	-0.1805892	0.0041679	
				-1.86	3.14	0.441224578
	79	5/20/1999	Devon Energy Corp	-0.044065	0.0061886	
				-0.55	5.65	0.115312034
			PennzEnergy Co	-0.3519701	0.0067842	
				-2.08	2.91	-0.203261511
	80	2/24/1999	Dominion Resources Inc	0.0066875	0.0016814	
				0.19	3.29	0.176045206
			Remington Energy Ltd	-0.1713031	0.0037288	
				-1.12	1.67	0.999374493
2000						
	81	11/6/2000	Amerada Hess Corp	0.0129539	0.0004506	
				0.21	0.48	-0.079728909
			Lasmo PLC	-0.0173675	0.0028272	
				-0.18	1.94	0.038667904
	82	3/16/2000	BP Amoco PLC	-0.131047	-0.0006737	
				-0.8	-0.25	0.06506757
			Vastar Resources Inc	0.0609852	0.004429	
				0.75	3.31	-0.189433368
	83	10/16/2000	Chevron Corp	-0.0088586	0.0005527	

Year	No	Date	Merger Companies	CAPM		
				$\alpha$	$\beta$	CAR
			Texaco Inc	-0.15 -0.0306095	0.62 0.0009813	-0.117057226
			Hunt Oil Co	-0.49 -0.1563758	1.01 -0.0002703	-0.303931565
84	12/27/2000		Berkley Petroleum Corp	-1.94 0.1461598	-0.23 0.0026874	1.151023532
			North Coast Energy Inc	2.01 0.2987721	2.49 -0.0053026	-0.866972594
85	3/20/2000		Belden & Blake Corp	0.65 0.0512191	-0.7 0.0030599	0.976592751
			Stone Energy Corp	0.58 0.0462931	2.09 0.001462	-0.154619337
86	10/20/2000		Basin Exploration Inc	0.55 -0.0120075	1.12 0.0038651	-0.162796815
			USX-Marathon Group	-0.09 0.0370386	1.92 0.0042671	0.232750032
			Pennaco Energy Inc	0.21 0.0735688	1.61 0.0058595	0.511233737
				0.73 0.0454474	3.94 0.0001939	-0.017010458
2001			Amerada Hess Corp	0.78 -0.0529843	0.22 0.0044143	-0.131950204
			Triton Energy Ltd	-0.44 0.100969	2.46 0.000664	0.227729985
89	2/12/2001		Anadarko Petroleum Corp	1.1 0.138086	0.49 0.0029756	-0.301541029
			Berkley Petroleum Corp	1.86 0.0306681	2.69 0.0010992	-0.144794922
90	6/25/2001		Anadarko Petroleum Corp	0.34 0.0716708	0.8 0.0015888	0.066101545
			Gulfstream Resources Canada Ltd	0.77 -0.1013998	1.13 0.0052262	0.030176665
91	2/8/2001		Calpine Corp	-0.49 0.0828265	1.69 -0.0005326	-0.026295643
			Encal Energy Ltd	0.82 0.0430217	-0.35 -0.0006011	0.005839254
92	5/29/2001		Conoco	0.69 0.0453002	-0.62 0.0020265	0.224513607
			Gulf Canada Resources Ltd	0.56 0.0010926	1.68 -0.0004836	0.249861999
93	8/14/2001		Devon Energy Corp	0.01 0.0907628	-0.45 0.0015378	0.057000602
			Mitchell Energy & Development Corp	0.98 0.0386016	1.15 -0.0007707	0.085684797
94	9/10/2001		Dominion Resources Inc	0.68 0.0105997	-0.97 0.0022835	-0.152239034
			Louis Dreyfus Natural Gas Corp	0.11 0.0772139	1.65 0.0004612	0.138292047
95	5/23/2001		EOG Resources Inc	0.93 0.0297826	0.37 -0.0005626	-0.231680235
			Energy Search Inc	0.25 0.0440033	-0.31 0.000543	-0.077266533
96	5/14/2001		Kerr-McGee	0.78 0.1256881	0.65 0.0033276	0.098892474
			HS Resources Inc	1.58 0.1185442	2.8 0.0025888	-0.400717448
97	12/18/2001		Magnum Hunter Resources Inc			

Year	No	Date	Merger Companies	CAPM		
				$\alpha$	$\beta$	CAR
			Prize Energy Corp	1.03 0.058399	1.87 0.0021233	0.190393032
	98	11/18/2001	Phillips Petroleum Co	0.64 -0.0013427	1.95 0.0018051	-0.063597597
			Conoco Inc	-0.02 0.00802	2.35 0.0014101	0.328104547
	99	2/4/2001	Phillips Petroleum Co	0.12 0.0556211	1.67 -0.0003976	0.320543123
			Tosco Corp	0.98 0.0464621	-0.47 0.0007042	0.075914572
	100	3/1/2001	Plains All American Pipeline LP	0.77 0.0582603	0.79 0.0005203	0.095866857
			Murphy Oil Corp	1.51 0.0381999	0.91 -0.0005834	0.053986028
	101	7/17/2001	Tesoro Petroleum Corp	0.61 0.0570113	-0.62 0.003053	0.284549211
			BP PLC	0.75 -0.0224437	2.7 0.0010934	0.146711789
	102	3/20/2001	Valero Energy Corp	-0.45 0.0543854	1.48 0.0022218	0.121871744
			Huntway Refining Co	0.71 0.0455185	1.97 -0.0004769	0.25388808
	103	5/7/2001	Valero Energy Corp	0.26 0.0856241	-0.19 0.0021122	0.419755899
			Ultramar Diamond Shamrock Corp	1.15 0.0983005	1.91 0.0012329	0.625219842
	104	5/7/2001	Williams Cos Inc	1.66 0.0407993	1.4 0.0063191	0.462892676
			Barrett Resources Corp	0.53 0.1263603	5.53 0.0013793	0.352077194
				1.27	0.93	-0.074182301
2002						
	106	2/20/2002	BJ Services Co	-0.302904 -1.15	0.0053195 1.9	-0.106328421
			Great Lakes Chemical Corp	-0.067724 -0.98	0.0083077 11.37	0.244723946
	107	3/11/2002	Chesapeake Energy Corp	-0.0957384 -0.6	0.0075157 4.65	0.005141888
			Canaan Energy Corp	-0.0085253 -0.07	0.0024954 1.44	0.610934722
	108	5/28/2002	Conoco Inc	-0.0675702 -0.62	0.0040312 4.06	-0.113264487
			Gulf Indonesia Resources Ltd	0.1150624 0.65	0.0026166 1.62	-0.023744079
	109	2/12/2002	Giant Industries Inc	0.1170785 0.87	0.0062026 4.24	0.153125691
			BP PLC	0.0176185 0.25	0.0045517 6.02	0.01296442
	110	5/29/2002	Newfield Exploration Co	-0.0095016 -0.07	0.0033532 2.7	-0.065300386
			EEX Corp	-0.4968014 -1.65	0.0149017 5.38	0.237033898
	111	3/25/2002	Royal Dutch Petroleum	-0.0281763 -0.38	0.0062447 8.46	0.157682033
			Pennzoil Quaker State Co	0.0043109 0.03	0.0096747 6.21	0.372881673
	112	3/18/2002	Santos Ltd	-0.0532802	0.0028698	

Year	No	Date	Merger Companies	CAPM		
				$\alpha$	$\beta$	CAR
			Esenjay Exploration Inc	-0.57	3.12	-0.198774713
				-0.1929317	0.0087485	
				-0.88	4.04	-0.040426946
	113	2/5/2002	Tesoro Petroleum Corp	0.0888365	0.0064519	
				0.72	4.63	-0.061772143
			Valero Energy Corp	0.1040222	0.0054002	
				0.94	4.33	-0.224997023
	114	8/20/2002	Unocal Corp	0.0322697	0.0065259	
				0.29	9.25	0.041869069
			Pure Resources Inc	-0.0294598	-0.0004833	
				-0.34	-0.56	0.287313026
	115	4/11/2002	Williams Energy Partners	0.0462938	0.0003691	
				0.77	0.41	0.347790337
			Williams Cos Inc	-0.1990059	0.0097584	
				-1.12	5.57	0.446856934
2003						
	116	2/24/2003	Devon Energy Corp	0.211907	0.0081296	
				1.1	10.83	0.011261861
			Ocean Energy Inc	0.188659	0.0078925	
				0.98	10.57	0.031385988
	117	5/29/2003	Edge Petroleum Corp	-0.2351351	-0.0002806	
				-0.65	-0.22	-0.333817979
			Miller Exploration Co	1.815554	0.0147796	
				1.02	2.34	0.506740346
	118	3/31/2003	Evergreen Resources Inc	0.130121	0.0058025	
				0.71	8.46	-0.216638441
			Carbon Energy Corp	0.1344265	-0.000456	
				1.15	-1.05	-0.014238993
	119	7/1/2003	Unit Corp	0.0768965	0.0093542	
				0.28	9.58	-0.043215703
			PetroCorp Inc	0.1340122	0.0002737	
				0.95	0.55	0.284490815
2004						
	120	4/15/2004	EnCana Corp	0.2813017	0.002591	
				1.3	2.57	-0.076920402
			Tom Brown Inc	0.2246686	0.005934	
				1.01	5.69	-0.242350896
	121	5/24/2004	Forest Oil Corp	-0.0131833	0.0074718	
				-0.05	5.73	0.161802873
			Wiser Oil Co	0.7748435	0.0023594	
				2.16	1.4	0.286244878
	122	4/7/2004	Kerr-McGee	-0.1765902	0.0077436	
				-1.04	12.37	0.033910068
			Westport Resources Corp	0.1144267	0.0057765	
				0.51	6.99	0.016904825
	123	12/16/2004	Noble Energy Inc	0.1778731	0.0089103	
				0.97	7.49	0.05490431
			Patina Oil & Gas Corp	-0.4001375	0.0087004	
				-0.6	2.03	-0.002586351
	124	6/9/2004	Petro Canada	0.0386821	0.0039318	
				0.14	3.08	0.184424001
			Prima Energy Corp	0.2337237	0.0134807	
				0.58	7.12	0.087663386
	125	5/4/2004	Pioneer Natural Resources	0.2285155	0.0066676	
				0.91	5.64	0.074051313
			Evergreen Resources Inc	-0.1644295	-0.0003079	
				-0.21	-0.08	0.043566199

Year	No	Date	Merger Companies	CAPM		
				$\alpha$	$\beta$	CAR
	126	2/12/2004	Plains Exploration & Production Co	0.1136644	0.0087671	
				0.42	7.36	0.012135875
			Nuevo Energy Company	0.6758464	0.0045272	
				2.07	3.17	-0.089223327
	127	2/4/2004	Valero Energy Corp	0.2874923	0.0025113	
				1.17	2.34	0.183383015
			El Paso Corp	-0.5356197	0.0179586	
				-0.83	6.38	0.40780284
	128	11/1/2004	Valero LP	0.2032337	0.0038317	
				1.22	3.93	-0.081606531
			Kaneb Pipeline Partners LP	0.1294257	0.0039342	
				0.71	3.7	0.114752396
2005						
	129	4/4/2005	Chevron Corp	-0.2188195	0.0064561	
				-0.48	1.56	-0.003561724
			Unocal	0.3540834	0.0094091	
				2.19	6.4	-0.114991974
	130	12/12/2005	ConocoPhillips	-0.1598497	0.0142331	
				-0.61	3.11	-0.03042063
			Burlington Resources Inc	0.1384405	0.0164622	
				1.33	9.12	0.012029933
	131	11/8/2005	Delta Petroleum Corp	0.0349377	0.0189846	
				0.22	7.54	-0.271131806
			Castle Energy Corp	0.1481354	0.011361	
				0.82	3.91	-0.273924131
	132	1/26/2005	Energy Transfer Partner LP	0.3703097	0.0046661	
				2.78	4.94	0.057329267
			American Electric Power Co Inc	0.035168	0.0064688	
				0.31	8.04	0.060228404
	133	9/19/2005	Norsk Hydro ASA	0.1639243	0.0090582	
				1.71	6.36	-0.254526034
			Spinnaker Exploration Co	0.0911991	0.0126239	
				0.66	6.19	-0.09041666
	134	10/13/2005	Occidental Petroleum Corp	0.0810405	0.0118214	
				0.85	7.81	-0.116708735
			Vintage Petroleum Inc	0.2148704	0.0150098	
				1.47	6.46	0.158492461
	135	4/4/2005	Petrohawk Energy Corp	0.4633326	0.0035722	
				0.75	0.64	-0.270429928
			Mission Resources Corp	0.4350057	0.023228	
				1.02	5.99	0.019704326
	136	7/11/2005	Pogo Producing Co	0.1112815	0.0163068	
				0.44	5.41	0.008923115
			Unocal Corp	0.2387093	0.008645	
				1.82	5.51	-0.076423159
	137	4/25/2005	Valero Energy Corp	0.1583253	0.0146952	
				0.33	3.19	-0.530275225
			Premcor Inc	0.2932755	0.0086282	
				1.62	4.98	-0.433601945
2006						
	138	6/23/2006	Anadarko Petroleum Corp	-0.2111592	0.0249751	
				-1.13	5.7	0.083060626
			Kerr-McGee Corp	-0.1229841	-0.0006349	
				-0.66	-0.15	0.219339535
	139	5/30/2006	Kinder Morgan Inc Management	-0.0449719	0.0053992	
				-1.22	5.92	-0.005843364
			Kinder Morgan Inc	-0.012468	0.0117025	



Year	No	Date	Merger Companies	CAPM		
				$\alpha$	$\beta$	CAR
	140	7/8/2006	MDU Resources Group Inc	-0.3 0.0396171	11.49 0.0115518	0.021678817
			Cascade Natural Gas Corp	1.04 -0.0069239	13.05 0.0096886	-0.013409111
	141	4/21/2006	Petrohawk Energy Corp	-0.16 -0.0008291	9.86 0.0163703	0.098629632
			KCS Energy Inc	-0.01 0.0757703	6.96 0.0212	-0.157371585
	142	6/12/2006	Plains All American Pipeline LP	0.72 0.0291204	8.88 0.0063879	-0.176215959
			Pacific Energy Partner LP	0.68 -0.0079966	6.07 0.0074128	0.027829938
				-0.17	6.49	-0.128250377
2007						
	143	1/7/2007	Forest Oil Corp	-0.0951152 -1.05	0.0137987 5.46	0.025639367
			The Houston Exploration Co	-0.0165261 -0.29	0.0069414 4.39	0.189338853
	144	6/19/2007	General Electric Co	-0.0024984 -0.12	0.0061932 10.08	-0.060702318
			Regency Energy Partners LP	0.0266833 0.77	0.0008115 0.81	0.077581507
	145	7/17/2007	Plains Exploration & Production Co	0.0032372 0.07	0.0094829 6.39	-0.328043829
			Pogo Producing Co	-0.0050336 -0.1	0.0092051 5.79	0.010723398

## **Appendix 4**

### **Fama-French Three Factors Model Result (OLS)**

Year	No	Date	Merger Companies	Fama-French 3 Factors Model				
				$\alpha$	$\beta$	s	h	CAR
1981	1	5/6/1981	Dome Petroleum Ltd Canada	0.0002483	0.0159599	-0.0025909	0.0084772	0.1147
			Conoco Inc	0.16	5.55	-0.62	1.82	
	2	6/26/1981	Seagram Ltd	-0.0002388	0.0079067	-0.009127	-0.0099007	-0.1918
			Conoco Inc	-0.26	4.6	-3.62	-3.59	
	3	7/7/1981	Du Pont	-0.0007272	0.0090097	0.0032919	0.0045852	-0.3476
			Conoco Inc	-1	6.65	1.68	2.14	
	3	7/7/1981	Du Pont	0.000193	0.0076855	-0.008983	-0.0097473	0.6169
			Conoco Inc	0.19	3.99	-3.22	-3.21	
	3	7/7/1981	Du Pont	0.0007671	0.0137514	-0.0043769	0.0063759	0.0769
Conoco Inc			0.82	7.82	-1.75	2.31		
3	7/7/1981	Du Pont	0.0012111	0.0070384	-0.0084982	-0.0103034	0.1015	
		Conoco Inc	1.11	3.44	-2.92	-3.21		
1982	4	2/11/1982	Allied Corp & Continental Group	0.0004053	0.0113097	-0.0072587	0.0004042	-0.1683
			Supron Energy Corp	0.42	5.33	-2.85	0.13	
	5	8/16/1982	Occidental Petroleum Corp	0.0013213	0.0041049	-0.0024713	-0.037373	-0.2905
			Cities Service Co	0.37	0.53	-0.26	-3.24	
	5	8/16/1982	Occidental Petroleum Corp	-0.0005189	0.0105446	-0.0006956	-0.0028021	0.0165
			Cities Service Co	-0.63	5.35	-0.31	-1.08	
	6	11/1/1982	Damson Oil Corp	-0.0001958	-0.0017745	-0.0085662	-0.0210618	2.3207
			Juniper Petroleum Corp	-0.08	-0.31	-1.31	-2.82	
	6	11/1/1982	Damson Oil Corp	-0.0013373	0.0139811	0.0131152	-0.0097592	3.6498
			Juniper Petroleum Corp	-0.66	3.22	2.21	-1.7	
	6	11/1/1982	Damson Oil Corp	-0.0017846	0.011626	0.006038	-0.0060693	-0.1453
			Juniper Petroleum Corp	-0.69	2.1	0.8	-0.83	
	7	12/20/1982	Mesa Petroleum Co	-0.0011427	0.003403	-0.0062246	-0.0181252	0.1115
			General American Oil Co of Texas	-0.55	0.86	-1.17	-3.12	
	7	12/20/1982	Mesa Petroleum Co	0.0001521	-0.0006833	-0.0061296	-0.0253209	-0.7638
			General American Oil Co of Texas	0.08	-0.19	-1.27	-4.83	
	8	12/21/1982	Burlington Northern Inc	0.0000762	0.0123603	-0.0049233	-0.0061188	-0.1284
			El Paso Co	0.08	6.45	-1.92	-2.19	
	8	12/21/1982	Burlington Northern Inc	-0.0019763	0.011087	0.0084662	-0.0056502	-0.3804
El Paso Co			-1.53	4.45	2.54	-1.55		
1983	10	1/3/1983	National Distillers & Chemical Corp	-0.0003109	0.0078677	-0.0006361	0.004988	0.2282
			Suburban Propane Gas Corp	-0.38	5.05	-0.31	2.19	
	10	1/3/1983	National Distillers & Chemical Corp	0.002371	0.0026658	-0.0001821	-0.011419	0.1029
			Suburban Propane Gas Corp	1.71	1.01	-0.05	-2.96	
	11	1/10/1983	Phillips Petroleum Co	0.0003792	-0.001457	-0.0203949	-0.0165175	-0.2698
			General American Oil Co of Texas	0.26	-0.52	-5.47	-4	
	11	1/10/1983	Phillips Petroleum Co	0.0017611	-0.0027969	-0.0066669	-0.0260505	-0.3067
			General American Oil Co of Texas	0.82	-0.68	-1.23	-4.32	
	12	2/9/1983	Goodyear Tire and Rubber Cor	0.0007851	0.0159315	-0.0003232	0.0095262	0.1940
			Celeron Corp	0.72	8.14	-0.12	3.13	
	12	2/9/1983	Goodyear Tire and Rubber Cor	-0.0010465	0.0120462	0.0118398	0.0007086	-0.1864
			Celeron Corp	-0.61	3.85	2.81	0.15	
	13	4/4/1983	Internorth Inc	-0.0022193	0.0134772	0.0060654	0.0073513	-0.2570
			Belco Petroleum Corp	-1.95	6.57	2.18	2.01	
	13	4/4/1983	Internorth Inc	-0.0000334	0.0060062	0.0071132	-0.0099223	-0.0181
			Belco Petroleum Corp	-0.02	1.59	1.39	-1.47	
	14	4/22/1983	Northwest Industries Inc	-0.0021768	2.16E-03	-0.007554	-0.0139495	-0.0822
			Pogo Producing Co	-1.3	0.72	-1.87	-2.53	
	14	4/22/1983	Northwest Industries Inc	-0.0018865	4.28E-03	-0.0001078	-0.0146975	-0.1074
Pogo Producing Co			-1.01	1.27	-0.02	-2.38		
15	5/23/1983	Diamond Shamrock Corp	-0.0003905	0.0097751	-0.0031171	-0.0014725	-0.3183	
		Natomas Co	-0.26	3.69	-0.88	-0.3		
15	5/23/1983	Diamond Shamrock Corp	-0.0011624	0.0094594	-0.0100581	-0.0024311	0.1522	
		Natomas Co	-0.55	2.56	-2.03	-0.35		
16	6/8/1983	CSX Corp	-0.0002703	0.0134528	0.0036093	0.0049032	0.1483	
		Texas Gas Resources Corp	-0.26	7.67	1.53	1.48		
16	6/8/1983	CSX Corp	0.0004463	0.0083884	0.000513	0.0004206	-0.3963	
		Texas Gas Resources Corp	0.31	3.41	0.16	0.09		
17	8/26/1983	Burlington Northern Inc	0.0012618	0.0134251	0.0006949	-0.0004564	0.2409	
		El Paso Co	1.16	7.06	0.27	-0.13		
17	8/26/1983	Burlington Northern Inc	0.002445	-8.02E-06	-0.0134904	-0.0062277	-0.2478	
		El Paso Co	1.23	0	-2.84	-0.95		
18	9/12/1983	Williams Cos	0.0009436	9.93E-03	0.0006995	0.0012489	-0.0018	
		Northwest Energy Co	0.63	3.76	0.19	0.25		
18	9/12/1983	Williams Cos	0.0016509	7.20E-03	0.0012155	0.000383	-0.2303	
		Northwest Energy Co	0.96	2.38	0.3	0.07		
19	10/3/1983	Kaneb Services Inc	-0.0006256	1.22E-02	0.0040298	-0.0004598	-0.0287	
		Kaneb Services Inc	-0.43	4.8	1.16	-0.1		

Year	No	Date	Merger Companies	Fama-French 3 Factors Model				
				$\alpha$	$\beta$	$s$	$h$	CAR
1984	20	12/15/1983	Moran Energy Inc	0.0015711	8.39E-03	-0.0086847	-0.0052749	
				0.64	1.93	-1.46	-0.64	-0.3640
			Lear Petroleum Corp	0.0004791	1.80E-02	0.0115526	0.0031889	
		0.27	5.04	2.37	0.53	0.0368		
			Mcrae Consolidated Oil & Gas	-0.0008211	1.19E-02	0.0058444	0.0020222	
				-0.44	3.14	1.13	0.32	0.1475
	21	12/28/1983	Pennzoil Co	-0.0008785	1.26E-02	-0.0064741	0.0053523	
				-0.77	5.42	-2.02	1.35	0.4697
			Getty Oil Co	0.0011316	1.38E-02	-0.008316	0.0073248	
				0.93	5.54	-2.43	1.73	0.1505
	22	1/9/1984	Texaco Inc	0.0333189	-2.57E-04	-0.0007888	0.0008561	
				182.64	-0.68	-1.5	1.34	-0.0017
			Getty Oil Co	0.001428	1.58E-02	-0.0094991	0.0133731	
				0.95	5.12	-2.2	2.55	-0.1267
	23	1/25/1984	Howell Corp	0.0002353	1.06E-02	0.009335	0.0024217	
				0.13	2.72	1.73	0.37	0.5170
			Howell Petroleum Corp	0.0001779	1.13E-02	0.0049696	0.0013203	
				0.1	3.05	0.97	0.22	-0.1338
	24	1/25/1984	Royal Dutch Shell Group Netherlands	-0.0005003	1.45E-02	0.0021454	0.009075	
				-0.62	8.62	0.92	3.24	-0.1358
			Shell Oil Co	-0.0011408	1.37E-02	-0.0037385	0.0104643	
				-0.96	5.49	-1.08	2.52	-0.4985
	25	1/26/1984	Damson Oil Corp	-0.0005041	1.76E-02	0.0122299	0.0080135	
				-0.25	4.09	2.06	1.12	-0.0446
			Dorchester Gas Corp	0.0007953	1.38E-02	0.0068399	0.0091088	
				0.37	3.06	1.1	1.22	-0.0862
	26	3/6/1984	Chevron Corp	-0.0011773	1.57E-02	-0.0060466	0.0143206	
				-1.24	7.5	-2.22	4.34	0.2212
			Gulf Corp	0.0010742	1.32E-02	-0.0049308	0.0099948	
				0.95	5.38	-1.53	2.57	-0.3821
27	3/12/1984	Mobil Corp	-0.0012146	1.80E-02	-0.0049429	0.0175396		
			-1.39	9.22	-1.97	5.72	0.0626	
		Superior Oil Co	-9.46E-06	1.26E-02	-0.008799	0.0080857		
			-0.01	3.78	-2.06	1.55	0.2457	
28	11/6/1984	Houston Natural Gas Co	-7.15E-04	1.26E-02	0.0072193	0.0129044		
			-0.46	2.97	1.4	2.43	0.0483	
		Texas Eastern Corp	-3.75E-03	5.16E-03	-0.0012112	0.0132309		
			-1.29	0.65	-0.13	1.33	-0.0074	
29	11/18/1984	Placer Development Ltd Canada	7.41E-04	1.41E-02	0.0146763	0.0050453		
			0.65	4.64	3.92	1.31	-0.0708	
		Prairie Production Co	1.06E-03	4.86E-03	-0.0001931	0.0040988		
			0.59	1.02	-0.03	0.68	-0.2765	
1985	30	2/26/1985	SunShine Mining Co	-2.27E-03	1.13E-02	0.0110058	0.0040816	
				-1.74	3.03	2.41	0.85	0.3076
			Woods Petroleum Co	-1.24E-03	1.48E-02	0.0102058	0.010276	
		-1.03	4.31	2.43	2.34	-0.0074		
	31	3/4/1985	Coastal Corp	-1.34E-03	1.72E-02	0.0132033	0.015468	
				-1.16	5.1	3.21	3.59	-0.0038
			American Natural Resources Co	-7.98E-04	1.19E-02	-0.0007811	0.0203459	
				-0.44	2.27	-0.12	3.03	-0.4001
	32	6/19/1985	Tenneco Inc	-1.07E-03	1.43E-02	-0.0002777	0.012536	
				-1.41	6.1	-0.1	4.41	0.1198
			Goodyear Tire & Rubber Co	-1.82E-04	1.27E-02	-0.0005675	-0.0007652	
				-0.24	5.32	-0.2	-0.26	0.0142
	33	7/19/1985	Diversified Energies Inc	-4.04E-04	-4.03E-03	-0.0047575	-0.0122897	
				-0.14	-0.44	-0.43	-1.13	-0.1565
			Dyco Petroleum Corp	-4.04E-04	-4.03E-03	-0.0047575	-0.0122897	
				-0.14	-0.44	-0.43	-1.13	-0.4939
	34	8/12/1985	Midcon Corp	2.86E-04	7.94E-03	0.0026879	0.0048942	
				0.33	2.93	0.78	1.54	0.1680
			United Energy Resources Inc	1.60E-03	1.85E-03	0.0050095	-0.0063531	
				1.62	0.59	1.26	-1.73	-0.0540
	35	9/10/1985	Pacific Gas & Electric Co	5.15E-04	7.02E-03	-0.0076181	0.0061034	
				0.69	2.95	-2.5	2.14	-0.0792
			Pacific Gas Transmission Co	5.27E-04	1.41E-02	0.0162659	0.0001814	
				0.4	3.36	3.04	0.04	0.2087
	36	10/22/1985	Burlington Northern Inc	7.34E-04	1.13E-02	-0.0055882	-0.0014119	
				0.91	4.63	-1.72	-0.45	-0.0516
			Southland Royalty Co	-8.73E-04	1.13E-02	-0.0018102	0.001001	
				-0.62	2.69	-0.32	0.18	-0.3691

Year	No	Date	Merger Companies	Fama-French 3 Factors Model						
				$\alpha$	$\beta$	s	h	CAR		
1985	37	12/31/1985	Occidental Petroleum Corp	-3.93E-04	1.44E-02	0.0012878	0.0138565	-0.1183		
			Midcon Corp	-0.32	4.03	0.26	2.82			
	1986	38	5/13/1986	Louisia Land & Exploration Co	6.47E-04	1.17E-02	0.0003071		0.0068528	
				Inexco Oil Co	0.47	2.94	0.06		1.25	
	39	6/12/1986	Triton Energy Corp	-1.47E-03	7.63E-03	-0.0047372	0.0119668		0.1191	
			Worldwide Energy Corp	-1.11	2.5	-1.03	2.35			
	40	12/18/1986	Questar Corp	-4.49E-03	2.99E-02	0.0367578	0.0330866		0.0469	
			Universal Resources	-1.38	3.97	3.24	2.63			
	1987	41	10/5/1987	Arkla Inc	-1.22E-03	9.96E-03	0.0076016		0.0180589	0.1697
				Entex Inc	-0.66	2.35	1.2		2.53	
42		3/27/1987	British Petroleum Co	-4.43E-03	1.62E-02	0.0226017	0.0100196	-0.3004		
			Standard Oil Co	-1.46	2.34	2.19	0.86			
43		6/23/1987	Conquest Exploration Co	5.43E-04	6.87E-03	0.0065945	0.0032581	-0.1225		
			Cenergy Corp	0.58	3.67	2.36	0.92			
44		1/16/1987	Energy Development Partner Ltd	-4.39E-03	7.39E-03	0.0109109	0.0036462	0.1815		
			May Energy Partnemrs Ltd	-1.91	1.62	1.6	0.42			
45		12/15/1987	Mesa Limited Partnership	-2.23E-04	1.14E-02	0.0088606	0.0073023	-0.6430		
			KN Energy Inc	-0.32	8.29	4.52	2.81			
1988	46	7/15/1988	Witco Corp	-4.25E-04	1.36E-02	0.0210173	0.0134357	0.1518		
			Calumet Inds Inc	-0.27	4.29	4.65	2.25			
	47	2/24/1988	British Petroleum Co	1.04E-03	1.03E-02	0.0009368	0.0082391	0.0151		
			Lear Petroleum Corp	1.11	5.29	0.32	2.38			
	48	9/27/1988	Utilicorp Utd Inc	2.36E-04	1.47E-02	0.0001182	0.0191093	0.0125		
			Michigan Energy Resources Co	0.24	7.23	0.04	5.26			
	49	4/21/1989	Raytheon Company	-1.14E-04	1.29E-02	0.0074479	0.0092954	-0.0236		
			Standard Havens	-0.05	3.35	1.3	1.27			
	50	2/22/1989	Panhandle Eastern Corp	6.93E-04	1.18E-02	0.004629	0.0204318	0.2566		
			Texas Eastern Corp	0.38	3.53	0.94	3.22			
1992	51	3/3/1992	Grace (W.R) & Co	-4.33E-03	5.46E-03	0.0018596	0.0102096	-0.1259		
			Grace Energy Corp	-1.52	0.73	0.16	0.94			
1993	52	6/18/1993	Apache Corporation	-7.38E-03	9.05E-03	-0.0064925	0.031908	-0.3379		
			Hadson Energy Resources Corp	-1.57	0.97	-0.46	1.78			
1994	53	12/13/1994	Williams Cos	-2.52E-03	1.46E-03	-0.0025042	0.0069153	0.0319		
				-1.59	0.46	-0.53	1.16			

Year	No	Date	Merger Companies	Fama-French 3 Factors Model				
				$\alpha$	$\beta$	s	h	CAR
1995			Transco Energy Co	0.52	5.86	0.96	1.31	0.1678
				-0.0003586	9.81E-03	0.0052062	0.0067826	
	54	5/4/1995	Barret Resources Corp	-0.41	5.41	1.93	1.78	-0.2638
				0.0018963	2.47E-03	0.0032676	-0.0079579	
				1.35	0.7	0.66	-1.41	0.4166
		Plains Petroleum Co	0.0003312	3.24E-03	0.006494	0.003243		
			0.4	1.59	2.27	0.99	5.2500	
55	8/25/1995	Enron Crop	-0.0001489	6.82E-03	-0.0029896	0.0020048		
			-0.16	2.9	-0.97	0.56	-0.0735	
			-0.0003961	6.19E-03	0.0094233	-0.0004409		
1996			Coda Energy Inc	-0.23	1.41	1.65	-0.07	-0.1533
				0.0005955	1.62E-02	0.0144074	0.018154	
56	7/22/1996	Seagull Energy Corp	0.44	4.79	3.77	3.5	0.5504	
			0.0016646	7.75E-03	0.0059609	0.0016967		
			1.42	2.67	1.81	0.38	-0.1977	
57	9/23/1996	Ultramar Corp	0.0003693	8.97E-03	0.0074935	0.0039185		
			0.38	3.7	2.9	1.09	1.3644	
1997			Diamond Shamrock Inc	0.0002195	8.62E-03	0.0061371	0.004726	
				0.21	3.28	2.18	1.2	0.0983
				-0.0010896	0.00897	0.0029057	0.0029258	
58	7/17/1997	Burlington Resources Inc	-1.3	3.87	1.26	0.92	-0.0875	
			-0.0017069	1.26E-02	0.0041353	0.0076757		
59	5/27/1997	Louisiana Land & Exploration Co	-1.49	4	1.31	1.78	0.1272	
			0.0003896	1.07E-02	0.0023042	0.00846		
			0.54	5.55	1.2	3.08	0.0126	
60	6/20/1997	Alamco Inc	0.0008923	3.67E-03	0.0022925	-0.0001252		
			0.71	1.09	0.68	-0.03	-0.2693	
61	10/20/1997	Forcenergy	0.0027869	5.62E-03	-0.0009113	-0.0012417		
			1.56	1.19	-0.19	-0.19	0.4987	
			0.0000525	8.08E-03	0.0075002	0.0052358		
62	6/24/1997	Edisto Resources Corp	0.04	2.2	2.05	1.01	0.0861	
			0.0027029	-8.41E-03	-0.0052087	-0.0176493		
			0.85	-0.99	-0.59	-1.52	-0.3796	
63	7/7/1997	Kinder Morgan Energy Partners LP	-0.0005497	7.02E-03	0.008015	0.0056628		
			-0.84	4.02	4.39	2.37	-0.3071	
			0.0000265	1.19E-02	0.0065369	0.0095123		
64	4/7/1997	Louis Dreyfus Natural Gas Corp	0.02	3.96	2.18	2.26	0.1179	
			0.0000635	8.28E-03	0.0032537	-0.0010183		
			0.04	2.21	0.87	-0.19	0.4476	
65	6/17/1997	Meridian Resources Corp	-0.0004114	1.59E-02	0.0121282	0.0142556		
			-0.27	3.9	2.93	2.52	-0.0823	
			-0.0009236	1.10E-02	0.0086588	0.0071359		
66	11/24/1997	Cairn Energy USA Inc	-0.54	2.35	1.82	1.1	-0.2778	
			0.0022869	1.30E-02	0.0005014	0.0054921		
			0.76	1.6	0.06	0.47	-0.0686	
67	5/4/1998	Parker & Parsley Petroleum Co	0.0001646	1.42E-02	0.0094818	0.0122428		
			0.13	4.23	2.72	2.53	-0.1479	
			0.000801	8.35E-03	0.0026219	0.0074043		
68	8/11/1998	Santa Fe Energy Resources Inc	0.6	2.35	0.75	1.47	0.0695	
			0.0007618	5.86E-03	0.0051617	0.0071971		
			0.55	1.58	1.41	1.37	-0.2372	
69	12/23/1998	Williams Cos Inc	-0.0006109	7.45E-03	0.0074499	0.0059954		
			-0.32	1.89	-2.08	0.92	-0.1488	
			-0.0005429	6.02E-03	0.0023688	0.0038239		
1998			Mapco Inc	-0.8	4.35	1.49	1.66	-0.2323
				-0.0040909	1.27E-02	0.0035956	0.0109988	
70	12/1/1998	Exxon Corp	-1.36	2.19	0.51	1.1	-0.0937	
			-0.0004966	6.87E-03	0.0056765	0.0004589		
			-0.48	3.42	2.33	0.13	0.1611	
68	8/11/1998	British Petroleum Co PLC	-0.0008956	1.15E-02	0.000582	0.0064486		
			-0.99	7.15	0.28	2.21	0.1340	
			-0.0039106	4.28E-03	-0.0058939	0.0016612		
69	12/23/1998	Amoco Corp	-1.34	0.82	-0.89	0.18	0.1711	
			-0.0002366	5.76E-03	-0.0046962	0.0026958		
			-0.22	3.53	-2.52	0.83	-0.0434	
70	12/1/1998	Rutherford-Moran Oil Corp	-0.0091412	1.55E-02	0.0191502	0.0156957		
			-2.07	1.9	1.88	1.1	0.7083	
			-0.0002658	4.92E-03	-0.005061	0.0010041		

Year	No	Date	Merger Companies	Fama-French 3 Factors Model				
				$\alpha$	$\beta$	s	h	CAR
			Mobil Corp	-0.28	3.55	-3.12	0.37	0.0476
				-0.0008129	5.68E-03	-0.0053279	0.0007916	
	71	10/15/1998	Kerr-McGee	-0.75	3.57	-2.86	0.25	-0.0894
				-0.0014758	7.79E-03	-0.00035	0.0013039	
			Oryx Energy co	-1.52	5.51	-0.2	0.46	0.0349
				-0.002592	1.28E-02	0.0044255	0.0056324	
	72	6/18/1998	Lyondell Petrochemical Co	-1.52	5.13	1.41	1.12	-0.0014
				-0.0003212	1.13E-02	0.003914	0.0075458	
			Atlantic Richfield Co	-0.25	4.65	1.31	1.76	-0.1229
				-0.0036564	1.08E-02	0.0001774	0.0095233	
	73	3/23/1998	Plains Resources Inc	-1.23	1.93	0.03	0.97	0.0127
				-0.0006599	1.05E-02	0.0096428	0.0063893	
			Goodyear Tire & Rubber Co	-0.48	3.95	3.08	1.42	-0.0021
				-0.0007767	1.42E-02	0.0054482	0.0113171	
	74	5/29/1998	Pogo Producing Co	-1.01	9.47	3.08	4.44	-0.0622
				-0.0031487	1.49E-02	0.0098857	0.0074498	
			Arch Petroleum Inc	-2.33	5.76	3.08	1.64	0.0510
				-0.0006164	2.35E-03	0.0044855	-0.0076314	
	75	11/25/1998	Seagull Energy Corp	-0.25	0.5	0.77	-0.92	-0.0929
				-0.0025055	2.11E-02	0.0119013	0.0139687	
			Ocean Energy Inc	-1.62	9.3	4.47	3.1	-0.2946
				-0.006908	2.50E-02	0.0135495	0.0133229	
	76	11/16/1998	Vulcan Materials Co	-1.68	4.14	1.91	1.11	0.1741
				0.0011383	1.03E-02	0.0048791	0.0103872	
			CalMat Co	1.23	7.63	3.08	3.88	-0.1097
				0.000333	1.50E-02	0.0097967	0.0089325	
				0.24	7.44	4.18	2.25	-0.2190
1999	77	4/1/1999	BP Amoco PLC	0.0002983	9.52E-03	0.0003894	0.0076032	
				0.27	6.14	0.22	2.56	-0.0081
			Atlantic Richfield Co	-0.0007248	8.64E-03	0.0008041	0.0079488	
				-0.63	5.36	0.43	2.57	-0.2204
	78	6/1/1999	Crompton & Knowles Corp	-0.0009555	1.74E-02	0.0089632	0.0182248	
				-0.57	8.09	3.49	5.09	-0.0548
			Witco Corp	-0.0026634	1.03E-02	0.0034781	0.0127139	
				-1.52	4.62	1.3	3.42	0.4609
	79	5/20/1999	Devon Energy Corp	0.0000952	1.28E-02	0.0089696	0.0119534	
				0.07	7.05	4.14	3.97	15.2300
			PennzEnergy Co	-0.0063698	9.76E-03	0.0004134	0.0064262	
				-2.03	2.42	0.09	0.96	-0.2043
	80	2/24/1999	Dominion Resources Inc	-0.000012	4.16E-03	-0.00264	0.0070925	
				-0.02	4.76	-2.61	4.2	0.2016
			Remington Energy Ltd	-0.0022702	1.10E-02	0.0086051	0.0152804	
				-0.79	2.7	1.83	1.95	1.0077
2000	81	11/6/2000	Amerada Hess Corp	-0.0001208	8.95E-03	0.0040261	0.0150118	
				-0.1	5.42	2.36	5.86	-0.1125
			Lasmo PLC	-0.0008288	1.12E-02	0.004671	0.0149668	
				-0.41	4.15	1.67	3.56	0.0151
	82	3/16/2000	BP Amoco PLC	-0.0028958	5.58E-03	0.0077239	0.0085597	
				-0.91	1.08	1.43	1.25	0.0090
			Vastar Resources Inc	0.0011828	1.60E-02	0.0097801	0.0176295	
				0.79	6.58	3.85	5.5	-0.2497
	83	10/16/2000	Chevron Corp	-0.0004673	7.25E-03	0.0005347	0.0117591	
				-0.41	4.7	0.34	4.85	-0.0110
			Texaco Inc	-0.0010676	9.14E-03	0.0009529	0.0143603	
				-0.88	5.59	0.57	5.6	-0.1768
	84	12/27/2000	Hunt Oil Co	-0.0034877	1.37E-03	0.0019155	0.0029348	
				-1.88	0.57	0.77	0.8	1.1931
			Berkley Petroleum Corp	0.0018505	9.57E-03	0.0005134	0.0111095	
				1.15	4.55	0.24	3.5	-0.6494
	85	3/20/2000	North Coast Energy Inc	0.0036473	8.92E-03	0.0208334	0.0181525	
				0.41	0.61	1.35	0.94	0.5239
			Belden & Blake Corp	0.0009722	1.33E-02	0.0087869	0.0157859	
				0.58	4.9	3.06	4.36	-0.2218
	86	10/20/2000	Stone Energy Corp	0.0000189	1.07E-02	0.0096426	0.0174576	
				0.01	4.55	3.99	4.73	-0.4114
			Basin Exploration Inc	-0.0010371	1.40E-02	0.0053348	0.0182868	
				-0.38	3.77	1.4	3.15	0.0031
	87	12/22/2000	USX-Marathon Group	0.0004128	6.91E-03	0.0029478	0.004791	
				0.1	1.28	0.53	0.59	0.5420
			Pennaco Energy Inc	0.0009542	1.20E-02	0.0045899	0.0106384	

Year	No	Date	Merger Companies	Fama-French 3 Factors Model				
				$\alpha$	$\beta$	s	h	CAR
2001				0.42	3.98	1.49	2.33	0.0627
	88	7/10/2001	Amerada Hess Corp	-0.0008828	9.78E-03	0.0066251	0.0138458	
				-0.7	5.01	2.62	5.39	-0.1670
			Triton Energy Ltd	-0.0039666	2.16E-02	0.0190569	0.0253025	
				-1.52	5.35	3.65	4.77	0.0097
	89	2/12/2001	Anadarko Petroleum Corp	0.0001389	1.35E-02	0.0100365	0.0212024	
				0.07	4.98	3.56	5.43	-0.1857
			Berkley Petroleum Corp	0.0020377	9.39E-03	-0.0011826	0.0092863	
				1.2	4.21	-0.51	2.88	-0.0994
	90	6/25/2001	Anadarko Petroleum Corp	-0.0024737	1.69E-02	0.0118351	0.0230109	
				-1.25	5.58	2.93	5.72	-0.0515
			Gulfstream Resources Canada Ltd	0.0004397	8.83E-03	0.0100722	0.0108583	
				0.21	2.71	2.32	2.51	-0.0203
	91	2/8/2001	Calpine Corp	-0.0034112	1.08E-02	-0.0000512	0.0082848	
				-0.7	1.68	-0.01	0.89	0.0715
			Encal Energy Ltd	0.0017433	4.63E-04	0.0012012	0.0017603	
				0.73	0.15	0.36	0.38	0.0227
	92	5/29/2001	Conoco	0.0006869	1.11E-03	0.0015342	0.0032333	
				0.51	0.62	0.83	1.14	0.2646
			Gulf Canada Resources Ltd	-0.0008037	1.08E-02	0.0099724	0.0129695	
				-0.44	3.83	2.75	3.48	0.2031
	93	8/14/2001	Devon Energy Corp	-0.0002948	1.32E-03	0.0016859	0.0031828	
				-0.18	0.6	0.75	0.97	0.0851
			Mitchell Energy & Development Corp	-0.0004877	1.30E-02	0.008042	0.0169482	
				-0.25	4.37	2.12	4.26	0.1164
	94	9/10/2001	Dominion Resources Inc	-0.001043	0.0101656	-0.00000853	0.0158244	
				-1.01	6.45	0	7.44	0.2821
			Louis Dreyfus Natural Gas Corp	-0.002807	1.85E-02	1.67E-02	0.0245038	
				-1.44	6.24	4.35	6.12	0.9454
	95	5/23/2001	EOG Resources Inc	-0.0004818	1.36E-02	6.35E-03	0.0188425	
				-0.26	4.97	1.78	5.18	-0.2347
			Energy Search Inc	-0.0002046	3.25E-03	2.99E-03	0.0055755	
				-0.07	0.77	0.55	1	-0.0793
	96	5/14/2001	Kerr-McGee	-0.0009308	1.13E-02	8.53E-03	0.0159433	
				-0.77	6.33	3.64	6.67	0.1322
			HS Resources Inc	0.0004705	1.63E-02	7.77E-03	0.0190542	
				0.27	6.33	2.29	5.51	-0.3712
	97	12/18/2001	Magnum Hunter Resources Inc	-0.0009828	1.04E-02	1.07E-02	0.0156444	
				-0.51	4.95	3.04	4.89	0.1439
			Prize Energy Corp	-0.0004369	6.62E-03	4.00E-03	0.0088775	
				-0.28	3.89	1.4	3.43	-0.0910
	98	11/18/2001	Phillips Petroleum Co	-0.0006269	5.52E-03	4.99E-03	0.0068109	
				-0.55	4.33	2.45	3.67	0.3652
			Conoco Inc	-0.0005425	5.86E-03	4.23E-03	0.0080495	
				-0.44	4.2	1.9	3.97	0.3653
	99	2/4/2001	Phillips Petroleum Co	0.0003334	5.78E-03	7.63E-05	0.0092055	
				0.26	3.44	0.04	3.77	0.0458
			Tosco Corp	-0.0002023	8.47E-03	2.75E-03	0.012167	
				-0.15	4.77	1.48	4.72	0.0573
	100	3/1/2001	Plains All American Pipeline LP	0.0008217	2.86E-03	3.89E-04	0.003523	
				0.9	2.39	0.31	2.06	0.0327
			Murphy Oil Corp	-0.0010287	8.19E-03	5.55E-03	0.0141598	
				-0.72	4.38	2.85	5.29	0.1932
	101	7/17/2001	Tesoro Petroleum Corp	-0.0009022	1.18E-02	1.34E-02	0.0132996	
				-0.55	4.65	4.2	3.95	0.2275
			BP PLC	-0.0014018	5.57E-03	2.41E-03	0.0064751	
				-1.27	3.28	1.13	2.88	0.2068
	102	3/20/2001	Valero Energy Corp	-0.0005939	1.09E-02	4.78E-03	0.0137193	
				-0.34	4.72	1.95	4.17	0.1088
			Huntway Refining Co	0.0005173	2.28E-03	5.23E-03	0.0051454	
				0.12	0.42	0.9	0.66	0.3971
	103	5/7/2001	Valero Energy Corp	0.0004843	1.20E-02	6.10E-03	0.0146079	
				0.29	4.95	1.91	4.46	0.4718
			Ultramar Diamond Shamrock Corp	0.0007689	1.09E-02	2.98E-03	0.0139879	
				0.59	5.84	1.21	5.54	0.3047
	104	5/7/2001	Williams Cos Inc	-0.00142	1.97E-02	1.05E-02	0.0200232	
				-0.85	8.11	3.27	6.1	0.1589
			Barrett Resources Corp	0.0010351	1.18E-02	3.39E-03	0.0149941	
				0.45	3.56	0.78	3.37	-0.2265
2002								
	106	2/20/2002	BJ Services Co	-0.0044076	7.60E-03	1.31E-02	0.004495	



Year	No	Date	Merger Companies	Fama-French 3 Factors Model				
				$\alpha$	$\beta$	s	h	CAR
				-1.18	1.87	1.91	0.65	-0.0775
			Great Lakes Chemical Corp	-0.0016398	1.34E-02	1.09E-03	0.0118901	
				-1.86	13.88	0.67	7.27	0.1278
	107	3/11/2002	Chesapeake Energy Corp	-0.002433	1.17E-02	1.73E-02	0.0089435	
				-1.18	5.24	4.55	2.29	0.0324
			Canaan Energy Corp	0.000065	1.69E-03	-4.46E-03	-0.0016228	
				0.02	0.43	-0.86	-0.3	0.6228
	108	5/28/2002	Conoco Inc	-0.000061	3.49E-03	-2.18E-03	-0.0016872	
				-0.05	2.75	-0.99	-0.65	-0.1178
			Gulf Indonesia Resources Ltd	0.001074	4.47E-03	8.50E-04	0.0065032	
				0.56	2.18	0.24	1.55	0.0162
	109	2/12/2002	Giant Industries Inc	-0.0002773	1.30E-02	1.12E-02	0.0153588	
				-0.15	6.33	3.26	4.49	0.0527
			BP PLC	-0.0005997	7.26E-03	4.44E-03	0.0061152	
				-0.6	6.71	2.45	3.39	0.0130
	110	5/29/2002	Newfield Exploration Co	-0.0000243	3.68E-03	5.40E-03	0.0003403	
				-0.02	2.36	1.97	0.11	-0.0795
			EEX Corp	-0.005095	1.95E-02	2.05E-02	0.012304	
				-1.59	5.66	3.39	1.74	0.2205
	111	3/25/2002	Royal Dutch Petroleum	-0.0007326	9.38E-03	5.18E-03	0.0079261	
				-0.79	9.44	3.04	4.4	0.1839
			Pennzoil Quaker State Co	-0.0005753	1.32E-02	1.45E-02	0.0081707	
				-0.29	6.25	4	2.13	0.4514
	112	3/18/2002	Santos Ltd	-0.0008117	3.82E-03	2.99E-03	0.0020902	
				-0.66	2.89	1.32	0.9	-0.2060
			Esenjay Exploration Inc	-0.002698	1.15E-02	5.32E-03	0.0063862	
				-0.93	3.71	1	1.17	-0.0475
	113	2/5/2002	Tesoro Petroleum Corp	-0.0001213	1.11E-02	1.14E-02	0.0103997	
				-0.07	5.6	3.45	3.2	-0.0301
			Valero Energy Corp	0.0003793	1.08E-02	5.46E-03	0.0123089	
				0.24	6.15	1.87	4.26	-0.2477
	114	8/20/2002	Unocal Corp	0.000579	6.23E-03	-2.84E-03	0.0001283	
				0.59	7.21	-1.67	0.07	0.0426
			Pure Resources Inc	-0.0004903	-3.53E-04	-1.32E-04	0.0003386	
				-0.44	-0.29	-0.06	0.15	0.2856
	115	4/11/2002	Williams Energy Partners	0.0011864	1.69E-04	-7.49E-04	-0.0004676	
				0.82	0.09	-0.38	-0.17	0.3515
			Williams Cos Inc	-0.0027207	1.27E-02	1.33E-03	0.0081543	
				-1.25	5.32	0.33	1.83	0.4954
2003								
	116	2/24/2003	Devon Energy Corp	0.0012558	9.03E-03	-9.93E-04	0.0056815	
				1.07	9.55	-0.49	2.46	-0.0233
			Ocean Energy Inc	0.0010529	8.89E-03	8.62E-04	0.0046002	
				0.9	9.39	0.42	1.99	0.0019
	117	5/29/2003	Edge Petroleum Corp	-0.0006802	2.57E-03	1.01E-02	0.0059128	
				-0.34	1.55	2.8	1.38	-0.3611
			Miller Exploration Co	0.012345	1.99E-02	-3.50E-03	0.0331497	
				1.22	2.41	-0.2	1.54	0.7643
	118	3/31/2003	Evergreen Resources Inc	0.0008939	7.27E-03	6.40E-03	0.0020072	
				0.83	8.34	3.38	0.94	-0.2073
			Carbon Energy Corp	0.0008495	-1.92E-04	-5.18E-04	0.0018904	
				1.22	-0.34	-0.42	1.37	-0.0222
	119	7/1/2003	Unit Corp	0.0006031	1.26E-02	9.28E-03	0.0103516	
				0.4	10.44	3.48	3.19	-0.1333
			PetroCorp Inc	0.0010512	2.96E-04	3.40E-05	0.0002271	
				1.33	0.46	-0.02	0.13	0.2802
2004								
	120	4/15/2004	EnCana Corp	0.0005691	3.28E-03	-1.02E-04	0.0100527	
				0.69	3.11	-0.07	3.67	-0.1062
			Tom Brown Inc	0.0003874	6.15E-03	2.33E-03	0.011416	
				0.46	5.7	1.5	4.08	-0.2682
	121	5/24/2004	Forest Oil Corp	-0.0005706	7.10E-03	1.96E-03	0.0134462	
				-0.56	4.99	0.98	3.84	0.1710
			Wiser Oil Co	0.0022949	1.63E-03	3.04E-03	0.0132576	
				1.72	0.87	1.16	2.89	0.3073
	122	4/7/2004	Kerr-McGee	-0.0009421	8.30E-03	-3.29E-04	0.0032399	
				-0.93	10.19	-0.19	1.61	0.0292
			Westport Resources Corp	0.0009162	8.53E-03	8.96E-03	0.0063211	
				0.71	8.18	3.97	2.46	0.0379
	123	12/16/2004	Noble Energy Inc	0.0002907	8.00E-03	5.79E-03	0.0168547	
				0.38	6.19	3.28	7.92	0.0867
			Patina Oil & Gas Corp	-0.0026869	9.97E-03	2.25E-04	0.0150129	

Year	No	Date	Merger Companies	Fama-French 3 Factors Model				
				$\alpha$	$\beta$	s	h	CAR
2004	124	6/9/2004	Petro Canada	-0.87	1.91	0.03	1.74	0.0352
				-0.000337	3.26E-03	1.99E-03	0.0150217	
				-0.35	2.34	1.02	4.25	0.1365
			Prima Energy Corp	0.0003993	8.52E-03	1.49E-02	0.0080292	
	125	5/4/2004	Pioneer Natural Resources	0.28	4.22	5.24	1.57	-0.0216
				0.0003744	7.35E-03	-3.14E-04	0.0114274	
			Evergreen Resources Inc	0.4	5.82	-0.18	3.65	0.0832
				-0.0011744	-1.92E-03	7.35E-03	0.0065765	
	126	2/12/2004	Plains Exploration & Production Co	-0.38	-0.47	1.27	0.64	-0.0053
				0.000057	9.93E-03	5.26E-03	0.009863	
			Nuevo Energy Company	0.05	8.02	2.72	2.81	0.1332
				0.0017122	6.56E-03	7.12E-03	0.0165621	
127	2/4/2004	Valero Energy Corp	1.32	4.51	3.13	4.01	0.0895	
			0.000657	4.26E-03	2.21E-03	0.0140413		
		El Paso Corp	0.65	3.83	1.25	4.32	0.0385	
			-0.0028694	2.02E-02	-6.10E-04	0.0177592		
128	11/1/2004	Valero LP	-1.05	6.7	-0.13	2.02	0.2524	
			0.0003291	3.70E-03	1.61E-03	0.0092002		
		Kaneb Pipeline Partners LP	0.48	3.11	1.03	4.48	-0.0585	
			0.0000761	2.24E-03	4.69E-03	0.0069947		
2005			0.1	1.71	2.72	3.09	7.6200	
	129	4/4/2005	Chevron Corp	-0.0030481	1.21E-02	-5.04E-03	0.0228098	
				-1.09	2.44	-0.7	2.86	0.0432
			Unocal	0.0007402	1.03E-02	5.41E-03	0.0184082	
				0.8	6.22	2.27	6.94	-0.0728
	130	12/12/2005	ConocoPhillips	-0.0033236	1.73E-02	-3.25E-03	0.0419211	
				-1.15	3.36	-0.41	4.33	-0.0038
			Burlington Resources Inc	0.0002946	1.82E-02	3.86E-04	0.0383308	
				0.32	10.98	0.15	12.31	0.0570
	131	11/8/2005	Delta Petroleum Corp	-0.0015288	1.65E-02	1.58E-02	0.0380161	
				-1.04	6.48	3.92	8.13	-0.0922
			Castle Energy Corp	-0.0003018	1.04E-02	9.46E-03	0.0315932	
			-0.16	3.3	1.9	5.45	-0.1439	
132	1/26/2005	Energy Transfer Partner LP	0.0014798	4.78E-03	1.50E-03	0.0063579		
			2.22	4.1	0.91	3.36	0.0603	
		American Electric Power Co Inc	-0.0000649	8.84E-03	-3.53E-03	0.0081045		
			-0.12	9.38	-2.65	5.29	0.0514	
133	9/19/2005	Norsk Hydro ASA	0.000772	9.92E-03	3.51E-03	0.0147957		
			0.89	6.39	1.49	5.68	-0.2795	
		Spinnaker Exploration Co	-0.0013521	1.31E-02	1.33E-02	0.0342391		
			-1.25	6.79	4.53	10.57	-0.1692	
134	10/13/2005	Occidental Petroleum Corp	-0.0004037	1.47E-02	1.13E-03	0.0302341		
			-0.55	11.16	0.57	13.55	0.0034	
		Vintage Petroleum Inc	0.0003462	1.45E-02	1.59E-02	0.0414057		
			0.29	6.88	4.98	11.59	0.2779	
135	4/4/2005	Petrohawk Energy Corp	0.0041446	2.51E-03	4.71E-03	0.0056279		
			1.08	0.37	0.47	0.51	-0.2582	
		Mission Resources Corp	0.0030192	1.74E-02	2.23E-02	0.0181262		
			1.17	3.77	3.35	2.45	0.0690	
136	7/11/2005	Pogo Producing Co	-0.0001594	1.11E-02	2.57E-02	0.018594		
			-0.08	3.24	5.03	3.35	0.1997	
		Unocal Corp	0.0007503	1.08E-02	4.82E-03	0.0185968		
			0.77	6.17	1.85	6.59	0.0098	
137	4/25/2005	Valero Energy Corp	-0.0000535	1.29E-02	9.82E-03	0.0124812		
			-0.02	2.31	1.18	1.39	-0.4533	
		Premcor Inc	0.0007883	8.85E-03	8.16E-03	0.0219139		
			0.72	4.62	2.86	7.14	-0.3550	
2006	138	6/23/2006	Anadarko Petroleum Corp	-0.0035398	2.54E-02	7.55E-04	0.0352861	
				-1.22	4.92	0.09	3.16	0.0005
			Kerr-McGee Corp	-0.0023846	7.40E-04	-2.24E-03	0.0309155	
				-0.82	0.14	-0.28	2.78	0.1820
	139	5/30/2006	Kinder Morgan Inc Management	-0.0010858	4.92E-03	2.79E-03	0.0132625	
				-2.08	5.11	1.94	6.77	-0.0168
			Kinder Morgan Inc	-0.0005106	1.21E-02	9.47E-05	0.0142932	
				-0.88	11.28	0.06	6.52	0.0077
	140	7/8/2006	MDU Resources Group Inc	0.0002415	1.19E-02	-2.91E-04	0.0124955	
				0.42	11.72	-0.18	5.54	-0.0032
			Cascade Natural Gas Corp	-0.000299	8.60E-03	3.10E-03	0.0016073	
				-0.44	7.19	1.64	0.61	0.1151
141	4/21/2006	Petrohawk Energy Corp	-0.0005247	1.52E-02	6.87E-03	0.0350346		

Year	No	Date	Merger Companies	Fama-French 3 Factors Model				
				$\alpha$	$\beta$	$s$	$h$	CAR
				-0.39	6.1	1.78	7	-0.1914
			KCS Energy Inc	0.0004885	2.12E-02	5.06E-03	0.0515468	
				0.4	9.49	1.46	11.52	-0.2324
	142	6/12/2006	Plains All American Pipeline LP	-0.0000795	6.34E-03	1.01E-03	0.01145	
				-0.12	5.42	0.57	4.68	0.0355
			Pacific Energy Partner LP	-0.0007115	6.15E-03	4.68E-03	0.0046843	
				-1.02	4.85	2.43	4.53	-0.1215
2007								
	143	1/7/2007	Forest Oil Corp	-0.0031938	1.43E-02	6.23E-03	0.026052	
				-1.88	4.44	1.33	3.68	-0.0073
			The Houston Exploration Co	-0.0017761	8.49E-03	4.91E-03	0.0296935	
				-1.79	4.51	1.8	7.17	0.1491
	144	6/19/2007	General Electric Co	-0.0000412	0.0073598	-5.39E-03	-7.81E-03	
				-0.1	10.23	-4.41	-3.91	-0.0462
			Regency Energy Partners LP	0.0003725	0.0012403	4.42E-04	5.31E-03	
				0.54	1.02	0.21	1.57	0.0868
	145	7/17/2007	Plains Exploration & Production Co	-3.20E-06	0.0099623	1.86E-03	1.07E-02	
				0	5.87	0.62	2.1	-0.3055
			Pogo Producing Co	-2.09E-04	0.0104843	2.12E-03	1.97E-02	
				-0.2	5.89	0.67	3.67	0.0574

## **Appendix 5**

### **Fama-French Four Factors Model Result (OLS)**

No	Date	Merger Companies	Fama-French 4 Factors Model						CAR
			$\alpha$	$\beta$	s	h	u		
1981	1	5/6/1981	Dome Petroleum Ltd Canada	-0.0000115	0.0153575	-0.001844	0.0177535	0.0105418	
			Conoco Inc	-0.01	5.4	-0.44	3.11	2.73	0.0453
	2	6/26/1981	Seagram Ltd	-0.000844	0.0086093	0.0030604	0.0074048	0.0035394	5.33
			Conoco Inc	-1.16	6.31	1.56	2.84	1.87	-0.2671
	3	7/7/1981	Du Pont	-0.0001199	0.0066124	-0.0096033	-0.002191	0.0094854	3.6
			Conoco Inc	-0.12	3.47	-3.52	-0.6	3.6	0.6427
				0.0010044	0.0146	-0.003676	-0.0003991	-0.0083712	
				1.1	8.41	-1.5	-0.12	-3.51	0.0537
				0.000949	0.0061013	-0.0092722	-0.0028217	0.0092445	
				0.89	3.01	-3.24	-0.73	3.33	0.1335
1982	4	2/11/1982	Allied Corp & Continental Group	0.0004075	0.0116425	-0.0057957	0.0013085	-0.0052743	
			Supron Energy Corp	0.42	5.51	-2.2	0.41	-2.05	-0.1732
	5	8/16/1982	Occidental Petroleum Corp	0.0013064	0.0030064	-0.0073254	-0.0403683	0.0175179	1.86
			Cities Service Co	0.37	0.39	-0.76	-3.49	1.79	-0.2982
	6	11/1/1982	Damson Oil Corp	-0.0004069	0.0103534	-0.0003394	-0.0020463	-0.0019569	-0.81
			Juniper Petroleum Corp	-0.48	5.21	-0.15	-0.74	-0.15	2.3678
	7	12/20/1982	Mesa Petroleum Co	-0.000651	-0.0009976	-0.0100139	-0.024133	0.0079522	1.15
			General American Oil Co of Texas	-0.27	-0.18	-1.51	-3.05	1.15	2.3678
	8	12/21/1982	Burlington Northern Inc	-0.0003252	0.0097075	0.009987	-0.0015492	-0.0172453	-3.73
			El Paso Co	-0.16	2.21	1.71	-0.26	-3.73	3.5124
				-0.0013238	0.0096803	0.0046137	-0.0023312	-0.0078519	-1.3
				-0.51	1.69	0.6	-0.3	-1.3	-0.1655
				0.0002981	0.0016607	-0.0067834	-0.0113971	-0.0145154	-3.95
				0.15	0.43	-1.31	-1.93	-3.95	0.1418
				0.0012083	-0.0019604	-0.0065392	-0.0203893	-0.0106399	-3.17
				0.65	-0.55	-1.38	-3.79	-3.17	-0.7670
				0.0001931	0.0122189	-0.0049679	-0.0055755	-0.0011748	-1.91
				0.19	6.33	-1.94	-1.91	-0.64	-0.1289
				-0.000893	0.0097762	0.0080529	-0.0006172	-0.0108837	-4.79
				-0.71	4.07	2.52	-0.17	-4.79	-0.4061
1983	10	1/3/1983	National Distillers & Chemical Corp	-0.0001067	0.0076689	-0.0006649	0.005832	-0.0019658	
			Suburban Propane Gas Corp	-0.13	4.91	-0.32	2.47	-1.36	0.2238
	11	1/10/1983	Phillips Petroleum Co	0.0025277	0.0025132	-0.0002043	-0.0107714	-0.0015085	-0.61
			General American Oil Co of Texas	1.79	0.95	-0.06	-2.69	-0.61	0.1007
	12	2/9/1983	Goodyear Tire and Rubber Cor	0.0016797	-0.0026868	-0.0205147	-0.0108072	-0.0127979	-5.14
			Celeron Corp	1.18	-1	-5.78	-2.64	-5.14	0.0108
	13	4/4/1983	Internorth Inc	0.0027962	-0.0037759	-0.0067622	-0.021505	-0.0101874	-2.71
			Belco Petroleum Corp	1.3	-0.93	-1.26	-3.48	-2.71	-0.0655
	14	4/22/1983	Northwest Industries Inc	0.0002046	0.0167297	-0.0000656	0.0073309	0.0063953	3.78
			Pogo Producing Co	0.19	8.72	-0.03	2.43	3.78	0.1676
	15	5/23/1983	Diamond Shamrock Corp	0.0001657	0.0103794	0.0113018	0.0052931	-0.0133556	-5.06
			Natomas Co	0.1	3.46	2.81	1.12	-5.06	-0.1343
	16	6/8/1983	CSX Corp	-0.0018128	0.0127829	0.0056804	0.0077415	-0.0038076	2.13
			Texas Gas Resources Corp	-1.58	6.2	2.06	2.13	-2.15	-0.2456
	17	8/26/1983	Northwest Industries Inc	0.0008815	0.0044435	0.0062465	-0.0090441	-0.0085704	-2.64
			Pogo Producing Co	0.42	1.17	1.23	-1.36	-2.64	0.0079
	18	9/12/1983	Williams Cos	-0.0011466	0.000381	-0.0084819	-0.013708	-0.0097396	-3.91
			Northwest Energy Co	-0.7	0.13	-2.15	-2.56	-3.91	-0.1802
	19	10/3/1983	Kaneb Services Inc	-0.0006647	0.002176	-0.0012084	-0.0144111	-0.0115521	-4.15
			Moran Energy Inc	-0.36	0.66	-0.27	-2.41	-4.15	-0.2249
	20	12/15/1983	Lear Petroleum Corp	0.0008026	0.0081715	-0.003728	-0.0014154	-0.0113054	-5.25
			Mcray Consolidated Oil & Gas	0.55	3.23	-1.11	-0.3	-5.25	-0.2238
	21	12/28/1983	Pennzoil Co	0.0004577	0.0072817	-0.0108876	-0.0023536	-0.0153529	-5.08
				0.22	2.05	-2.3	-0.36	-5.08	0.2292
				-0.0004009	0.0136088	0.0035719	0.0047862	0.0019645	1.31
				-0.39	7.76	1.52	1.45	1.31	0.1442
				0.0009657	0.0077679	0.000662	0.0008859	-0.0078151	-3.8
				0.69	3.24	0.21	0.2	-3.8	-0.3730
				0.0012138	0.0134926	0.0010155	-0.0009312	-0.0017329	-1.13
				1.11	7.09	0.39	-0.26	-1.13	0.2625
				0.0022795	0.0002249	-0.0123848	-0.0078655	-0.0059774	-2.14
				1.15	0.07	-2.61	-1.2	-2.14	-0.1772
				0.0009255	0.0100614	0.0016338	-0.0012502	-0.0051686	-2.27
				0.62	3.84	0.46	-0.24	-2.27	-0.0038
				0.0016094	0.0074995	0.0033488	-0.0053232	-0.0118012	-0.94
				0.97	2.58	0.84	-0.94	-0.94	-4.68
				-0.00085	0.0125711	0.0063233	-0.0072768	-0.013121	-6.33
				-0.63	5.32	1.94	-1.58	-6.33	0.0201
				0.0013309	0.0087855	-0.0062298	-0.0125713	-0.0140436	-3.78
				0.55	2.07	-1.07	-1.52	-3.78	-0.3148
				0.0001065	0.0195371	0.0146105	-0.0027838	-0.012175	-0.45
				0.06	5.54	3	-0.45	-0.45	-0.0153
				-0.0011504	0.0132766	0.0085467	-0.003256	-0.0107593	-0.5
				-0.62	3.52	1.64	-0.5	-2.79	0.0968
				-0.0013455	0.0142906	-0.0031382	-0.0013598	-0.0130704	

No	Date	Merger Companies	Fama-French 4 Factors Model						
			$\alpha$	$\beta$	s	h	u	CAR	
1984		Getty Oil Co	-1.26	6.47	-1.02	-0.35	-5.76	0.3977	
			0.0005665	0.0158084	-0.004279	-0.0007976	-0.0158166		
	22	1/9/1984	Texaco Inc	0.0333224	-0.0002761	-0.0008192	0.0009188	0.0001328	
				182.03	-0.72	-1.53	1.38	0.33	-0.0025
	23	1/25/1984	Howell Corp	0.001076	0.017775	-0.0064219	0.0070089	-0.0134807	
				0.74	5.89	-1.52	1.33	-4.26	-0.0460
	24	1/25/1984	Royal Dutch Shell Group Netherlands	0.0000442	0.0131461	0.012394	-0.0024524	-0.011816	
				0.02	3.31	2.27	-0.37	-2.69	0.5665
	25	1/26/1984	Damson Oil Corp	-0.0000465	0.0141911	0.0085611	-0.004402	-0.0138725	
				-0.03	3.82	1.68	-0.71	-3.38	-0.0760
26	3/6/1984	Chevron Corp	-0.0006483	0.0164622	0.0045148	0.0052999	-0.009152		
			-0.85	9.95	1.99	1.91	-5.01	-0.0990	
27	3/12/1984	Mobil Corp	-0.0013977	0.0170869	0.000374	0.0039117	-0.0158854		
			-1.25	7.09	0.11	0.97	-5.97	-0.4342	
28	11/6/1984	Houston Natural Gas Co	-0.0007003	0.0200902	0.0152033	0.003267	-0.0115112		
			-0.34	4.58	2.53	0.45	-2.38	-0.0476	
29	11/18/1984	Placer Development Ltd Canada	0.000475	0.0164541	0.0102966	0.0037022	-0.0128091		
			0.22	3.6	1.64	0.48	-2.57	-0.0846	
30	2/26/1985	SunShine Mining Co	-0.0014818	0.0189396	-0.0026196	0.0106242	-0.0118719		
			-1.62	8.96	-0.97	3.27	-4.87	0.1151	
31	3/4/1985	Coastal Corp	0.0010485	0.0134998	-0.0046329	0.009634	-0.001059		
			0.92	5.21	-1.39	2.39	-0.35	-0.3829	
32	6/19/1985	Tenneco Inc	-0.0014183	0.0206404	-0.0019893	0.0152168	-0.0088966		
			-1.66	10.25	-0.78	5.01	-3.92	0.0440	
33	7/19/1985	Diversified Energies Inc	-0.0001562	0.0144348	-0.0066713	0.0064124	-0.0064088		
			-0.11	4.12	-1.5	1.21	-1.62	0.2334	
34	8/12/1985	Midcon Corp	-0.0006562	0.0096885	0.0062184	0.0153548	-0.0100131		
			-0.42	2.18	1.21	2.83	-2	0.0472	
35	9/10/1985	Pacific Gas & Electric Co	-0.0037459	0.0050088	-0.0012626	0.0133566	-0.0005136		
			-1.29	0.6	-0.13	1.31	-0.05	-0.0075	
36	10/22/1985	Burlington Northern Inc	0.000725	0.0118646	0.0137956	0.0069759	-0.0070815		
			0.64	3.66	3.67	1.75	-1.85	-0.0761	
37	12/31/1985	Occidental Petroleum Corp	0.0010547	0.0041509	-0.0004768	0.0047207	-0.0022812		
			0.59	0.81	-0.08	0.75	-0.38	-0.2779	
38	5/13/1986	Louisiana Land & Exploration Co	-0.0016352	0.0052896	0.0073702	0.0096517	-0.0142543		
			-1.24	1.21	1.56	1.85	-2.54	0.3860	
39	6/12/1986	Triton Energy Corp	-0.0020176	0.0221307	0.0146248	0.0035054	0.0173263		
			-1.68	5.54	3.39	0.74	3.39	-0.0918	
40	12/18/1986	Questar Corp	-0.0013114	0.0168125	0.0129833	0.0157793	-0.000816		
			-1.12	4.12	2.99	3.33	-0.16	-0.0091	
41	3/12/1984	Superior Oil Co	-0.0014183	0.0206404	-0.0019893	0.0152168	-0.0088966		
			-1.66	10.25	-0.78	5.01	-3.92	0.0440	
42	11/6/1984	Houston Natural Gas Co	-0.0001562	0.0144348	-0.0066713	0.0064124	-0.0064088		
			-0.11	4.12	-1.5	1.21	-1.62	0.2334	
43	11/6/1984	Houston Natural Gas Co	-0.0006562	0.0096885	0.0062184	0.0153548	-0.0100131		
			-0.42	2.18	1.21	2.83	-2	0.0472	
44	11/18/1984	Placer Development Ltd Canada	-0.0037459	0.0050088	-0.0012626	0.0133566	-0.0005136		
			-1.29	0.6	-0.13	1.31	-0.05	-0.0075	
45	11/18/1984	Placer Development Ltd Canada	0.000725	0.0118646	0.0137956	0.0069759	-0.0070815		
			0.64	3.66	3.67	1.75	-1.85	-0.0761	
46	12/31/1985	Occidental Petroleum Corp	0.0010547	0.0041509	-0.0004768	0.0047207	-0.0022812		
			0.59	0.81	-0.08	0.75	-0.38	-0.2779	
47	2/26/1985	SunShine Mining Co	-0.0016352	0.0052896	0.0073702	0.0096517	-0.0142543		
			-1.24	1.21	1.56	1.85	-2.54	0.3860	
48	3/4/1985	Coastal Corp	-0.0020176	0.0221307	0.0146248	0.0035054	0.0173263		
			-1.68	5.54	3.39	0.74	3.39	-0.0918	
49	6/19/1985	Tenneco Inc	-0.0013114	0.0168125	0.0129833	0.0157793	-0.000816		
			-1.12	4.12	2.99	3.33	-0.16	-0.0091	
50	8/12/1985	Midcon Corp	-0.0014183	0.0206404	-0.0019893	0.0152168	-0.0088966		
			-1.66	10.25	-0.78	5.01	-3.92	0.0440	
51	11/6/1984	Houston Natural Gas Co	-0.0001562	0.0144348	-0.0066713	0.0064124	-0.0064088		
			-0.11	4.12	-1.5	1.21	-1.62	0.2334	
52	11/6/1984	Houston Natural Gas Co	-0.0006562	0.0096885	0.0062184	0.0153548	-0.0100131		
			-0.42	2.18	1.21	2.83	-2	0.0472	
53	11/18/1984	Placer Development Ltd Canada	-0.0037459	0.0050088	-0.0012626	0.0133566	-0.0005136		
			-1.29	0.6	-0.13	1.31	-0.05	-0.0075	
54	11/18/1984	Placer Development Ltd Canada	0.000725	0.0118646	0.0137956	0.0069759	-0.0070815		
			0.64	3.66	3.67	1.75	-1.85	-0.0761	
55	12/31/1985	Occidental Petroleum Corp	0.0010547	0.0041509	-0.0004768	0.0047207	-0.0022812		
			0.59	0.81	-0.08	0.75	-0.38	-0.2779	
56	2/26/1985	SunShine Mining Co	-0.0016352	0.0052896	0.0073702	0.0096517	-0.0142543		
			-1.24	1.21	1.56	1.85	-2.54	0.3860	
57	3/4/1985	Coastal Corp	-0.0020176	0.0221307	0.0146248	0.0035054	0.0173263		
			-1.68	5.54	3.39	0.74	3.39	-0.0918	
58	6/19/1985	Tenneco Inc	-0.0013114	0.0168125	0.0129833	0.0157793	-0.000816		
			-1.12	4.12	2.99	3.33	-0.16	-0.0091	
59	8/12/1985	Midcon Corp	-0.0014183	0.0206404	-0.0019893	0.0152168	-0.0088966		
			-1.66	10.25	-0.78	5.01	-3.92	0.0440	
60	11/6/1984	Houston Natural Gas Co	-0.0001562	0.0144348	-0.0066713	0.0064124	-0.0064088		
			-0.11	4.12	-1.5	1.21	-1.62	0.2334	
61	11/6/1984	Houston Natural Gas Co	-0.0006562	0.0096885	0.0062184	0.0153548	-0.0100131		
			-0.42	2.18	1.21	2.83	-2	0.0472	
62	11/18/1984	Placer Development Ltd Canada	-0.0037459	0.0050088	-0.0012626	0.0133566	-0.0005136		
			-1.29	0.6	-0.13	1.31	-0.05	-0.0075	
63	11/18/1984	Placer Development Ltd Canada	0.000725	0.0118646	0.0137956	0.0069759	-0.0070815		
			0.64	3.66	3.67	1.75	-1.85	-0.0761	
64	12/31/1985	Occidental Petroleum Corp	0.0010547	0.0041509	-0.0004768	0.0047207	-0.0022812		
			0.59	0.81	-0.08	0.75	-0.38	-0.2779	
65	2/26/1985	SunShine Mining Co	-0.0016352	0.0052896	0.0073702	0.0096517	-0.0142543		
			-1.24	1.21	1.56	1.85	-2.54	0.3860	
66	3/4/1985	Coastal Corp	-0.0020176	0.0221307	0.0146248	0.0035054	0.0173263		
			-1.68	5.54	3.39	0.74	3.39	-0.0918	
67	6/19/1985	Tenneco Inc	-0.0013114	0.0168125	0.0129833	0.0157793	-0.000816		
			-1.12	4.12	2.99	3.33	-0.16	-0.0091	
68	8/12/1985	Midcon Corp	-0.0014183	0.0206404	-0.0019893	0.0152168	-0.0088966		
			-1.66	10.25	-0.78	5.01	-3.92	0.0440	
69	11/6/1984	Houston Natural Gas Co	-0.0001562	0.0144348	-0.0066713	0.0064124	-0.0064088		
			-0.11	4.12	-1.5	1.21	-1.62	0.2334	
70	11/6/1984	Houston Natural Gas Co	-0.0006562	0.0096885	0.0062184	0.0153548	-0.0100131		
			-0.42	2.18	1.21	2.83	-2	0.0472	
71	11/18/1984	Placer Development Ltd Canada	-0.0037459	0.0050088	-0.0012626	0.0133566	-0.0005136		
			-1.29	0.6	-0.13	1.31	-0.05	-0.0075	
72	11/18/1984	Placer Development Ltd Canada	0.000725	0.0118646	0.0137956	0.0069759	-0.0070815		
			0.64	3.66	3.67	1.75	-1.85	-0.0761	
73	12/31/1985	Occidental Petroleum Corp	0.0010547	0.0041509	-0.0004768	0.0047207	-0.0022812		
			0.59	0.81	-0.08	0.75	-0.38	-0.2779	
74	2/26/1985	SunShine Mining Co	-0.0016352	0.0052896	0.0073702	0.0096517	-0.0142543		
			-1.24	1.21	1.56	1.85	-2.54	0.3860	
75	3/4/1985	Coastal Corp	-0.0020176	0.0221307	0.0146248	0.0035054	0.0173263		
			-1.68	5.54	3.39	0.74	3.39	-0.0918	
76	6/19/1985	Tenneco Inc	-0.0013114	0.0168125	0.0129833	0.0157793	-0.000816		
			-1.12	4.12	2.99	3.33	-0.16	-0.0091	
77	8/12/1985	Midcon Corp	-0.0014183	0.0206404	-0.0019893	0.0152168	-0.0088966		
			-1.66	10.25	-0.78	5.01	-3.92	0.0440	
78	11/6/1984	Houston Natural Gas Co	-0.0001562	0.0144348	-0.0066713	0.0064124	-0.0064088		
			-0.11	4.12	-1.5	1.21	-1.62	0.2334	
79	11/6/1984	Houston Natural Gas Co	-0.0006562	0.0096885	0.0062184	0.0153548	-0.0100131		
			-0.42	2.18	1.21	2.83	-2	0.0472	
80	11/18/1984	Placer Development Ltd Canada	-0.0037459	0.0050088	-0.0012626	0.0133566	-0.0005136		
			-1.29	0.6	-0.13	1.31	-0.05	-0.0075	
81	11/18/1984	Placer Development Ltd Canada	0.000725	0.0118646	0.0137956	0.0069759	-0.0070815		
			0.64	3.66	3.67	1.75	-1.85	-0.0761	
82	12/31/1985	Occidental Petroleum Corp	0.0010547	0.0041509	-0.0004768	0.0047207	-0.0022812		
			0.59	0.81	-0.08	0.75			

No	Date	Merger Companies	Fama-French 4 Factors Model					u	CAR
			$\alpha$	$\beta$	s	h			
1987		Universal Resources	0.85	3.96	2.57	0.19	-2.02	-0.0862	
			-0.0033123	0.0097828	0.0133568	-0.0068774	-0.0208865		
	41	10/5/1987	Arkla Inc	-0.0002197	0.0114087	0.0088668	0.0072833	-0.0002439	
			Entex Inc	-0.32	8.07	4.51	2.79	-0.11	0.3107
				-0.0003829	0.014092	0.0211123	0.013146	-0.003075	
				-0.24	4.33	4.67	2.19	-0.07	-0.3252
	42	3/27/1987	British Petroleum Co	0.0011456	0.0108185	0.0011453	0.0055759	-0.0073143	
			Standard Oil Co	1.25	5.64	0.4	1.58	-2.98	-0.2966
			0.0004213	0.0156293	0.0004735	0.0145732	-0.0124581		
			0.45	8.02	0.16	4.07	-5	-0.0798	
43	6/23/1987	Conquest Exploration Co	-0.0001364	0.0131938	0.0076501	0.0086054	-0.0023286		
		Cenergy Corp	-0.06	3.36	1.33	1.14	-0.4	-0.1797	
			0.0005927	0.0131143	0.0055271	0.0173664	-0.0103444		
			0.33	3.89	1.12	2.69	-2.09	0.2275	
44	1/16/1987	Energy Development Partner Ltd	-0.0055667	0.0059606	0.0026539	0.007762	0.0144672		
		May Energy Partnemrs Ltd	-1.87	0.79	0.23	0.71	1.44	-0.5504	
			-0.0060495	0.0108833	-0.0047549	0.0178395	-0.0258407		
			-1.28	1.17	-0.34	0.93	-2.02	-0.5188	
45	12/15/1987	Mesa Limited Partnership	-0.0024381	0.0016347	-0.0023176	0.0060745	-0.0016704		
		KN Energy Inc	-1.52	0.51	-0.49	0.96	-0.39	0.1418	
			-0.0012798	0.0101187	0.0075399	0.0100344	-0.0049884		
			-0.97	6.75	4.7	2.46	-1.49	-0.1292	
1988									
46	7/15/1988	Witco Corp	0.0000492	0.0118188	0.0129928	0.0046757	0.0020528		
		Calumet Inds Inc	0.05	11.48	10.66	1.45	1.04	0.1461	
			-0.0003463	0.0072104	0.0061795	-0.0144902	-0.002099		
			-0.12	2.5	1.81	-1.6	-0.38	0.1136	
47	2/24/1988	British Petroleum Co	0.0008982	0.0049863	0.0008463	0.0029798	0.0051616		
		Lear Petroleum Corp	0.79	4.32	0.64	0.88	2.1	0.0272	
			-0.0028356	0.0186235	0.02144	0.0355624	0.0123303		
			-0.99	6.36	6.36	4.16	1.98	0.0137	
48	9/27/1988	Utilicorp Utd Inc	0.0006211	0.006662	0.0068192	0.0009526	-0.0014774		
		Michigan Energy Resources Co	0.67	6.97	6.08	0.32	-0.84	0.0149	
			0.0016743	0.0065144	0.0071422	0.0036161	0.0017085		
			1.59	5.99	5.6	1.06	0.86	-0.0261	
1989									
49	4/21/1989	Raytheon Company	-0.0004017	0.0099137	0.001217	-0.000818	0.005462		
		Standard Havens	-0.83	6.6	0.66	-0.27	2.05	0.0403	
			-0.0030362	0.043542	0.046312	0.0028791	0.0328449		
			-0.39	1.8	1.56	0.06	0.77	-0.1291	
50	2/22/1989	Panhandle Eastern Corp	-0.0004697	0.0075796	-0.0035409	0.000347	0.0080086		
		Texas Eastern Corp	-0.52	3.03	-1.16	0.07	1.67	0.2496	
			0.0010125	0.0171422	0.0063554	0.0192857	-0.0042391		
			0.49	3.03	0.92	1.68	-0.39	-0.1230	
1992									
51	3/3/1992	Grace (W.R) & Co	0.0003543	0.0153336	0.0073627	0.0066048	-0.0005441		
		Grace Energy Corp	0.34	8.63	2.84	1.95	-0.18	0.0358	
			-0.0018809	0.0108928	0.0097088	0.001808	-0.0138795		
			-1.23	4.26	2.6	0.37	-3.16	-0.5398	
1993									
52	6/18/1993	Apache Corporation	0.0004756	0.0106417	0.0066766	0.009531	0.001726		
		Hadson Energy Resources Corp	0.34	3.19	1.67	2.18	0.43	-0.3386	
			0.0002493	0.0029455	0.0034621	0.0082459	-0.0044239		
			0.16	0.79	0.77	1.69	-1	0.0328	
1994									
53	12/13/1994	Williams Cos	0.0005691	0.0127639	0.001431	0.0076828	0.0058631		
		Transco Energy Co	0.48	4.67	0.36	1.49	1.26	0.2014	
			-0.0003231	0.0110912	0.0068951	0.0059864	-0.0048415		
			-0.37	5.47	2.34	1.56	-1.4	-0.2881	
1995									
54	5/4/1995	Barret Resources Corp	0.0019143	0.002466	0.0033039	-0.0085823	-0.0014238		
		Plains Petroleum Co	1.35	0.7	0.67	-1.37	-0.24	0.4095	
			0.0002902	0.0032376	0.0064109	0.0046707	0.0032556		
			0.35	1.58	2.24	1.29	0.93	0.1615	
55	8/25/1995	Enron Crop	-0.0000502	0.0067662	-0.0031933	0.0001175	-0.0031086		
		Coda Energy Inc	-0.05	2.87	-1.04	0.03	-0.85	-0.0674	
			0.0009493	0.0062521	0.0094704	-0.0003363	-0.0661431		
			0.05	1.4	1.64	-0.05	-0.08	-0.1534	
1996									
56	7/22/1996	Seagull Energy Corp	0.000775	0.0177485	0.0142965	0.0165723	-0.0059716		
		Global Natural Resources Inc	0.57	5.01	3.75	3.13	-1.45	0.5082	
			0.0016911	0.0079805	0.0059445	0.0014633	-0.000881		
			1.44	2.61	1.8	0.32	-0.25	-0.2035	
57	9/23/1996	Ultramar Corp	0.0003638	0.0089059	0.0074921	0.0039353	0.000217		
		Diamond Shamrock Inc	0.37	3.48	2.89	1.09	0.07	1.3649	
			0.000141	0.0077639	0.006117	0.0049652	0.0030909	0.0399	
			0.13	2.8	2.18	1.26	0.98		

No	Date	Merger Companies	Fama-French 4 Factors Model					CAR
			$\alpha$	$\beta$	s	h	u	
1997								
58	7/17/1997	Burlington Resources Inc	-0.0010971	0.0086788	0.0031297	0.0029608	0.0015731	
		Louisiana Land & Exploration Co	-1.31	3.67	1.34	0.93	0.63	-0.0838
			-0.0017164	0.012278	0.0044184	0.0077199	0.001988	
			-1.5	3.8	1.38	1.79	0.58	6.0500
59	5/27/1997	Columbia Gas System Inc	0.000363	0.0098294	0.00252	0.0084049	0.0033192	
		Alamco Inc	0.51	4.93	1.31	3.07	1.54	-0.0066
			0.0008293	0.0016876	0.0028021	-0.0002554	0.0078367	
			0.66	0.49	0.84	-0.05	2.09	-0.3060
60	6/20/1997	Forcenergy	0.0028275	0.003359	-0.000133	-0.0015128	0.0091166	
		Edisto Resources Corp	1.59	0.69	-0.03	-0.23	1.75	0.5086
			0.0000655	0.007359	0.0077488	0.0051492	0.0029123	
			0.05	1.93	2.1	0.99	0.71	0.0884
61	10/20/1997	Kinder Morgan Energy Partners LP	0.0026999	-0.0087478	-0.0048116	-0.0175518	0.0020631	
		Santa Fe Pacific Pipeline Partner LP	0.84	-1.01	-0.53	-1.5	0.21	-0.3901
			-0.0005569	0.0061958	0.0089764	0.0058988	0.004995	
			-0.86	3.52	4.86	2.5	2.5	-0.3325
62	6/24/1997	Louis Dreyfus Natural Gas Corp	0.000024	0.0124764	0.0062868	0.0095739	-0.0025776	
		American Exploration Co	0.02	4.03	2.08	2.27	-0.78	0.1124
			0.0000698	0.0066982	0.0038938	-0.0011759	0.0065973	
			0.05	1.74	1.03	-0.22	1.6	0.4621
63	7/7/1997	Meridian Resources Corp	-0.0004156	0.015311	0.0125078	0.0142602	0.0029772	
		Cairn Energy USA Inc	-0.28	3.66	2.99	2.52	0.67	-0.0889
			-0.0009326	0.0097217	0.0094636	0.0071457	0.0063119	
			-0.54	2.03	1.97	1.1	1.24	-0.2918
64	4/7/1997	Mesa Inc	0.0022408	0.0096103	0.0003711	0.0046698	0.0089862	
		Parker & Parsley Petroleum Co	0.75	1.08	0.04	0.4	0.92	-0.0437
			0.0001573	0.0136528	0.0094611	0.0121127	0.0014221	
			0.13	3.71	2.71	2.5	0.35	-0.1449
65	6/17/1997	Santa Fe Energy Resources Inc	0.0008333	0.0066274	0.0032231	0.0072064	0.0069809	
		McFarland Energy	0.63	1.81	0.92	1.44	1.79	0.0522
			0.0007687	0.0054948	0.0052908	0.0071546	0.0014988	
			0.55	1.43	1.43	1.36	0.37	-0.2412
66	11/24/1997	Williams Cos Inc	-0.0005641	0.0084021	-0.0105019	0.0054547	-0.0057511	
		Mapco Inc	-0.29	2.06	-2.25	0.83	-0.92	-0.1434
			-0.0005206	0.0064721	0.0018362	0.0035666	-0.0027367	
			-0.77	4.53	1.12	1.55	-1.25	-0.2223
1998								
67	5/4/1998	Atlantic Richfield Co	-0.0005206	0.0064721	0.0018362	0.0035666	-0.0027367	
		Union Texas Petroleum Holding Inc	-1.36	2.37	0.27	1.14	-0.96	-0.0739
			-0.0004972	0.0069928	0.0055495	0.0004865	-0.0007339	
			-0.48	3.34	2.21	0.14	-0.21	0.1598
68	8/11/1998	British Petroleum Co PLC	-0.0002892	0.0127934	-0.0012733	0.0059532	-0.0093627	
		Amoco Corp	-0.32	7.9	-0.61	2.09	-3.42	0.1389
			-0.0030636	0.006104	-0.0084853	0.0009693	-0.0130766	
			-1.03	1.14	-1.24	0.1	-1.44	0.1724
69	12/23/1998	Chevron Corp	0.0001876	0.0053706	-0.007676	0.0020089	-0.0079156	
		Rutherford-Moran Oil Corp	0.17	3.36	-3.81	0.63	-3.47	-0.1550
			-0.0094622	0.0146111	0.020184	0.0159173	0.0059001	
			-2.11	1.73	1.92	1.11	0.41	0.6796
70	12/1/1998	Exxon Corp	-0.0000915	0.0047615	-0.0069654	0.0006965	-0.0053104	
		Mobil Corp	-0.1	3.47	-3.95	0.26	-2.62	0.0410
			-0.0005879	0.0054709	-0.0077848	0.0003949	-0.0068508	
			-0.55	3.49	-3.86	0.13	-2.96	-0.0957
71	10/15/1998	Kerr-McGee	-0.0005384	0.0085666	-0.003091	0.0003145	-0.0122008	
		Oryx Energy co	-0.57	6.34	-1.75	0.12	-5.27	-0.0681
			-0.0016203	0.0136085	0.0015844	0.0046068	-0.0126462	
			-0.95	5.5	0.49	0.93	-2.99	-0.1079
72	6/18/1998	Lyondell Petrochemical Co	-0.0000419	0.0122975	0.0030464	0.007439	-0.0056318	
		Atlantic Richfield Co	-0.03	4.84	1	1.74	-1.32	-0.1615
			-0.0031594	0.0125457	-0.0013662	0.0093332	-0.0100191	
			-1.05	2.14	-0.19	0.95	-1.02	-0.0549
73	3/23/1998	Plains Resources Inc	-0.0006896	0.0102281	0.0100514	0.0063795	0.0020348	
		Goodyear Tire & Rubber Co	-0.5	3.73	3.08	1.41	0.46	-0.0032
			-0.0007705	0.0143025	0.0053631	0.0113191	-0.0004236	
			-1	9.22	2.91	4.43	-0.17	-0.0619
74	5/29/1998	Pogo Producing Co	-0.0029216	0.0165256	0.0084983	0.0072888	-0.0091036	
		Arch Petroleum Inc	-2.17	6.13	2.61	1.61	-2.01	0.0459
			-0.0004279	0.003691	0.00333	-0.0077651	-0.0075557	
			-0.17	0.75	0.56	-0.94	-0.91	-0.0981
75	11/25/1998	Seagull Energy Corp	-0.0022414	0.0208842	0.0087216	0.0134863	-0.0088503	
		Ocean Energy Inc	-1.46	9.3	3.02	3.03	-2.66	-0.2761
			-0.0068113	0.024937	0.0123848	0.0131463	-0.0032415	
			-1.65	4.12	1.59	1.1	-0.36	0.1800
76	11/16/1998	Vulcan Materials Co	0.001163	0.0103179	0.0041678	0.0102961	-0.0020323	
		CalMat Co	1.26	7.6	2.4	3.84	-0.99	-0.1225
			0.0004114	0.0148633	0.0075366	0.0086431	-0.0064577	
			0.3	7.44	2.95	2.19	-2.13	-0.2610
1999								



No	Date	Merger Companies	Fama-French 4 Factors Model					CAR
			$\alpha$	$\beta$	$s$	$h$	$u$	
77	4/1/1999	BP Amoco PLC	0.0004843	0.0081461	-0.0029581	0.0040649	-0.0072249	0.0099
		Atlantic Richfield Co	0.45	5.24	-1.51	1.33	-3.74	
78	6/1/1999	Crompton & Knowles Corp	-0.0004848	0.0068606	-0.0035159	0.0033824	-0.009324	-0.2026
		Witco Corp	-0.44	4.31	-1.75	1.08	-4.72	
79	5/20/1999	Devon Energy Corp	-0.0011797	0.0155768	0.0063028	0.0136398	-0.0047156	0.5299
		PennZEnergy Co	-0.7	6.51	2.11	3.07	-1.73	
80	2/24/1999	Dominion Resources Inc	-0.0031685	0.0061998	-0.0025168	0.002382	-0.0106262	2.9500
		Remington Energy Ltd	-1.86	2.55	-0.83	0.53	-3.84	
81	11/6/2000	Amerada Hess Corp	-0.0001981	0.0092929	0.0038553	0.0032333	-0.0091201	0.9741
		Lasmo PLC	-0.14	4.76	1.58	0.9	-4.15	
82	3/16/2000	BP Amoco PLC	-0.006783	0.0048251	-0.0067912	-0.005858	-0.0128477	0.0457
		Vastar Resources Inc	-2.18	1.09	-1.23	-0.72	-2.57	
83	10/16/2000	Chevron Corp	-0.0001562	0.0046111	-0.0013966	0.0082282	0.0026926	0.2130
		Texaco Inc	-0.26	5.2	-1.24	4.73	2.39	
84	12/27/2000	Hunt Oil Co	-0.001837	0.009612	0.0048684	0.0118672	-0.0080923	0.9099
		Berkley Petroleum Corp	-0.64	2.32	0.92	1.46	-1.53	
85	3/20/2000	North Coast Energy Inc	-0.000313	0.0080368	0.0023981	0.0154622	0.0023129	-0.1632
		Belden & Blake Corp	-0.25	4.49	1.14	5.99	1.31	
86	10/20/2000	Stone Energy Corp	-0.0007158	0.0117709	0.0056281	0.014702	-0.0013598	0.0008
		Basin Exploration Inc	-0.35	4	1.62	3.46	-0.47	
87	12/22/2000	USX-Marathon Group	-0.0024995	0.0058994	0.0087339	0.0020974	-0.0082384	0.8886
		Pennaco Energy Inc	-0.79	1.15	1.61	0.26	-1.56	
88	7/10/2001	Amerada Hess Corp	0.0012504	0.0160087	0.0099526	0.0165258	-0.0014071	-0.1590
		Triton Energy Ltd	0.84	6.59	3.88	4.4	-0.56	
89	2/12/2001	Anadarko Petroleum Corp	-0.0007218	0.0061155	-0.0013259	0.0123252	0.0027197	-0.2087
		Berkley Petroleum Corp	-0.62	3.59	-0.67	5.04	1.56	
90	6/25/2001	Anadarko Petroleum Corp	-0.012982	0.0081122	-0.0007336	0.0148735	0.0024652	0.0231
		Gulfstream Resources Canada Ltd	-1.06	4.5	-0.35	5.74	1.33	
91	2/8/2001	Calpine Corp	-0.0032017	0.0025238	0.0040165	0.0030099	-0.0027127	0.0974
		Encal Energy Ltd	-1.71	0.98	1.34	0.82	-1.26	
92	5/29/2001	Conoco	0.0019523	0.0099765	0.0012611	0.0111362	-0.0009654	0.3123
		Gulf Canada Resources Ltd	1.2	4.43	0.48	3.5	-0.52	
93	8/14/2001	Devon Energy Corp	0.0029454	0.0084364	0.0192002	0.0288609	0.0136405	0.2039
		Mitchell Energy & Development Corp	0.33	0.58	1.24	1.27	0.91	
94	9/10/2001	Dominion Resources Inc	0.0013797	0.0136238	0.009735	0.0095699	-0.007918	0.2676
		Louis Dreyfus Natural Gas Corp	0.83	5.07	3.41	2.29	-2.87	
95	5/23/2001	EOG Resources Inc	-0.0001695	0.0099819	0.0084162	0.0178291	0.0017803	-0.3406
		Energy Search Inc	-0.1	3.87	2.8	4.78	0.68	
96	5/14/2001	Kerr-McGee	-0.0006981	0.0152632	0.0075418	0.0176182	-0.0032035	-0.0242
			-0.25	3.76	1.59	3	-0.78	

No	Date	Merger Companies	Fama-French 4 Factors Model					CAR
			$\alpha$	$\beta$	s	h	u	
			-0.7	6.04	3.15	5.96	1.68	0.1631
		HS Resources Inc	0.0006868	0.015264	0.0054369	0.0162493	0.0034576	
			0.4	5.95	1.58	4.58	2.84	-0.2989
97	12/18/2001	Magnum Hunter Resources Inc	-0.0006742	0.0113959	0.0106118	0.0118522	0.0038941	
			-0.35	5.28	3.01	3.12	1.83	0.1594
		Prize Energy Corp	-0.0005981	0.0060979	0.0040749	0.0108581	-0.0020338	
			-0.38	3.48	1.43	3.52	-1.18	-0.0987
98	11/18/2001	Phillips Petroleum Co	-0.0005463	0.0057982	0.0049663	0.0057578	0.00135	
			-0.48	4.49	2.44	2.84	1.28	0.3557
		Conoco Inc	-0.0003845	0.0064116	0.0041779	0.0059841	0.0026474	
			-0.31	4.57	1.89	2.72	2.31	0.3463
99	2/4/2001	Phillips Petroleum Co	0.0003163	0.0060287	0.0004825	0.0094557	-0.000414	
			0.25	3.35	0.24	3.74	-0.39	0.0545
		Tosco Corp	-0.0001419	0.0075995	0.001309	0.0112815	0.0014652	
			-0.1	4.01	0.61	4.24	1.31	0.0264
100	3/1/2001	Plains All American Pipeline LP	0.0007998	0.0030966	0.0007799	0.0038113	-0.0003754	
			0.87	2.42	0.54	2.12	-0.53	0.0303
		Murphy Oil Corp	-0.0009619	0.0074709	0.0043587	0.0132814	0.0011441	
			-0.67	3.74	1.93	4.73	1.04	0.2016
101	7/17/2001	Tesoro Petroleum Corp	-0.000887	0.0118157	0.0133101	0.0131835	0.0001631	
			-0.54	4.64	4.14	3.78	0.13	0.2271
		BP PLC	-0.0014229	0.0055848	0.002488	0.0066358	-0.0002257	
			-1.29	3.28	1.16	2.85	-0.28	0.2073
102	3/20/2001	Valero Energy Corp	-0.0005623	0.0104889	0.0039677	0.0131021	0.0007553	
			-0.32	4.27	1.4	3.78	0.58	0.1122
		Huntway Refining Co	0.0007518	-0.0011154	-0.0008268	0.0005591	0.0056123	
			0.18	-0.19	-0.12	0.07	1.83	0.4332
103	5/7/2001	Valero Energy Corp	0.0005585	0.0116294	0.0052306	0.0136402	0.0012063	
			0.3	4.73	1.58	4	1.02	0.4409
		Ultramar Diamond Shamrock Corp	0.000853	0.0105017	0.0019959	0.0128906	0.0013678	
			0.66	5.55	0.78	4.91	1.5	0.2712
104	5/7/2001	Williams Cos Inc	-0.0013797	0.0195072	0.0100082	0.0194977	0.000655	
			-0.82	7.91	3.01	5.7	0.55	0.1425
		Barrett Resources Corp	0.0012407	0.0106913	0.0009717	0.012312	0.0033433	
			0.55	3.22	0.22	2.67	2.09	-0.2970
2002								
106	2/20/2002	BJ Services Co	-0.0043195	0.0119882	0.0132647	-0.006755	0.0116136	
			-1.17	2.65	1.95	-0.79	2.16	0.0258
		Great Lakes Chemical Corp	-0.0016472	0.0130043	0.0010764	0.0128424	-0.0009831	
			-1.87	12.05	0.66	6.25	-0.77	0.1184
107	3/11/2002	Chesapeake Energy Corp	-0.0024731	0.0154004	0.0174192	-0.0001558	0.0095586	
			-1.22	6.21	4.66	-0.03	3.2	-0.0974
		Canaan Energy Corp	0.0002518	0.0007042	-0.0066767	-0.004144	0.0031611	
			0.09	0.18	-1.25	-0.75	1.64	0.5698
108	5/28/2002	Conoco Inc	-0.0002047	0.005005	-0.0019843	-0.0036331	0.0030732	
			-0.17	3.16	-0.9	-1.27	1.59	-0.1262
		Gulf Indonesia Resources Ltd	0.0008888	0.006427	0.0010987	0.0039959	0.0039598	
			0.47	2.5	0.31	0.86	1.26	0.0079
109	2/12/2002	Giant Industries Inc	-0.0002876	0.0122456	0.0112007	0.0174648	-0.0020855	
			-0.15	5.37	3.25	3.96	-0.76	0.0485
		BP PLC	-0.0005632	0.0099361	0.0045737	-0.0013807	0.007423	
			-0.6	8.73	2.66	-0.63	5.4	-0.0020
110	5/29/2002	Newfield Exploration Co	-0.0001665	0.0054317	0.0055817	-0.0019015	0.0035366	
			-0.11	2.78	2.04	-0.54	1.49	-0.0935
		EEX Corp	-0.0051806	0.0205112	0.0206408	0.0109542	0.0021294	
			-1.61	4.74	3.4	1.4	0.4	0.2124
111	3/25/2002	Royal Dutch Petroleum	-0.0008295	0.0120042	0.0053421	0.0020018	0.006444	
			-0.94	11.01	3.28	0.95	4.91	0.2103
		Pennzoil Quaker State Co	-0.0006149	0.0143068	0.0145923	0.0057499	0.0026331	
			-0.31	5.88	4.01	1.23	0.9	0.4620
112	3/18/2002	Santos Ltd	-0.0008058	0.0031268	0.0029403	0.0037363	-0.0017703	
			-0.65	2.09	1.3	1.3	-0.98	-0.2124
		Esenjay Exploration Inc	-0.002717	0.013762	0.0054962	0.0010415	0.0057477	
			-0.94	3.91	1.03	0.15	1.35	-0.0244
113	2/5/2002	Tesoro Petroleum Corp	-0.0000116	0.013109	0.0114803	0.004753	0.0055371	
			-0.01	6	3.51	1.13	2.11	0.0140
		Valero Energy Corp	0.0004796	0.0126848	0.0055745	0.0071458	0.0050629	
			0.3	6.52	1.92	1.92	2.17	-0.2107
114	8/20/2002	Unocal Corp	0.0003079	0.0075496	-0.0024116	-0.0010994	0.002914	
			0.31	7.11	-1.42	-0.54	2.11	0.0631
		Pure Resources Inc	-0.0005222	0.0004526	-0.0000979	-0.0014269	0.0019403	
			-0.47	0.32	-0.05	-0.54	1.16	0.2864
115	4/11/2002	Williams Energy Partners	0.0011433	0.0006357	0.0000201	0.0000996	-0.0007387	
			0.79	0.31	0.01	0.03	-0.66	0.3465
		Williams Cos Inc	-0.0026888	0.0116766	0.0012906	0.0102354	-0.0024005	
			-1.23	4.12	0.32	1.92	-0.71	0.4738
2003								
116	2/24/2003	Devon Energy Corp	0.0011547	0.0108106	0.0000508	0.0046574	0.0035375	
			1	9.03	0.02	2	2.39	-0.0106

No	Date	Merger Companies	Fama-French 4 Factors Model					CAR
			$\alpha$	$\beta$	s	h	u	
		Ocean Energy Inc	0.0010199	0.0094706	0.0012024	0.0042658	0.0011552	
			0.87	7.83	0.58	1.81	0.77	0.0063
117	5/29/2003	Edge Petroleum Corp	-0.0008188	0.0000691	0.0082638	0.0065434	-0.0046501	
			-0.4	0.03	2.22	1.52	-1.72	-0.3345
		Miller Exploration Co	0.0121366	0.0161545	-0.0061946	0.0340978	-0.0069919	
			1.19	1.46	-0.33	1.58	-0.51	0.8191
118	3/31/2003	Evergreen Resources Inc	0.0008204	0.0086224	0.0071557	0.001256	0.0026726	
			0.76	7.75	3.73	0.58	1.94	-0.1865
		Carbon Energy Corp	0.0008371	0.0000341	-0.0003915	0.0017644	0.0004481	
			1.2	0.05	-0.31	1.25	0.5	-0.0186
119	7/1/2003	Unit Corp	0.001001	0.0162147	0.0118884	0.0099861	0.0066637	
			0.68	10.08	4.35	3.14	3.29	-0.1716
		PetroCorp Inc	0.0011075	0.0008011	0.0003357	0.0001753	0.000943	
			1.39	0.93	0.23	0.1	0.87	0.2749
2004								
120	4/15/2004	EnCana Corp	0.0001425	0.0036355	0.0016203	0.0113804	-0.0033092	
			0.17	3.41	0.93	4.05	-1.94	-0.0946
		Tom Brown Inc	-0.0001505	0.006594	0.0044976	0.0130903	-0.0041731	
			-0.17	6.08	2.53	4.58	-2.41	-0.2540
121	5/24/2004	Forest Oil Corp	-0.0012295	0.0087395	0.005618	0.0156587	-0.0076456	
			-1.21	5.87	2.46	4.47	-3.16	0.2036
		Wiser Oil Co	0.0016116	0.0033341	0.0068313	0.015552	-0.0079288	
			1.19	1.69	2.26	3.35	-2.47	0.3386
122	4/7/2004	Kerr-McGee	-0.0009961	0.0092126	0.0001743	0.0027338	0.0017937	
			-0.99	8.8	0.1	1.34	1.38	0.0258
		Westport Resources Corp	0.000933	0.0082418	0.0087996	0.0064788	-0.000559	
			0.72	6.14	3.81	2.48	-0.34	0.0389
123	12/16/2004	Noble Energy Inc	0.000519	0.0069869	0.0034344	0.0127312	0.0053264	
			0.69	5.25	1.76	4.9	2.7	0.0887
		Patina Oil & Gas Corp	-0.0027889	0.0104223	0.0012788	0.0168551	-0.0023797	
			-0.9	1.91	0.16	1.58	-0.29	0.0345
124	6/9/2004	Petro Canada	-0.0002808	0.0030009	0.0015071	0.0147391	0.0010147	
			-0.28	1.95	0.65	4.08	0.39	0.1360
		Prima Energy Corp	0.0000861	0.0099441	0.0175648	0.0096051	-0.0056595	
			0.06	4.48	5.26	1.84	-1.52	-0.0168
125	5/4/2004	Pioneer Natural Resources	0.0000145	0.0078936	0.0012448	0.0127688	-0.0032731	
			0.01	6.04	0.61	3.94	-1.57	0.1030
		Evergreen Resources Inc	-0.00269	0.0003682	0.0139193	0.0122251	-0.0137831	
			-0.86	0.09	2.11	1.16	-2.03	0.0729
126	2/12/2004	Plains Exploration & Production Co	-0.00019	0.0097474	0.0065778	0.0108789	-0.0025105	
			-0.17	7.81	2.94	3.01	-1.17	0.1151
		Nuevo Energy Company	0.0018274	0.0066496	0.0065007	0.0160886	0.0011702	
			1.38	4.52	2.46	3.78	0.46	0.0980
127	2/4/2004	Valero Energy Corp	0.0004923	0.0040522	0.0033077	0.0148066	-0.0021476	
			0.48	3.6	1.63	4.46	-1.12	0.0546
		El Paso Corp	-0.0036061	0.0192517	0.0042907	0.0211822	-0.009605	
			-1.32	6.34	0.79	2.37	-1.86	0.3347
128	11/1/2004	Valero LP	0.0002391	0.0041492	0.0025997	0.0104656	-0.002056	
			0.35	3.32	1.46	4.51	-1.17	-0.0437
		Kaneb Pipeline Partners LP	0.0000702	0.0022688	0.004759	0.0070767	-0.0001333	
			0.09	1.64	2.42	2.76	-0.07	0.1347
2005								
129	4/4/2005	Chevron Corp	-0.0029827	0.0113462	-0.0073822	0.0178777	0.0055471	
			-1.07	2.23	-0.94	1.71	0.73	0.0357
		Unocal	0.0008587	0.0088513	0.0011575	0.0094634	0.0100603	
			0.96	5.41	0.46	2.82	4.13	-0.0857
130	12/12/2005	ConocoPhillips	-0.0035456	0.0139198	-0.0070888	0.0264743	0.0135498	
			-1.22	2.49	-0.84	1.89	1.53	0.0353
		Burlington Resources Inc	-0.0000968	0.0122001	-0.0063739	0.0110947	0.0238914	
			-0.12	7.99	-2.78	2.91	9.88	0.1294
131	11/8/2005	Delta Petroleum Corp	-0.0015828	0.0120576	0.0094535	0.0154082	0.0193245	
			-1.11	4.52	2.27	2.2	4.24	-0.1654
		Castle Energy Corp	-0.0003455	0.0068337	0.0043539	0.0133127	0.0156256	
			-0.19	2.02	0.83	1.5	2.71	-0.2043
132	1/26/2005	Energy Transfer Partner LP	0.0014923	0.0046922	0.0013135	0.0059954	0.0004285	
			2.23	3.86	0.72	2.48	0.24	0.0601
		American Electric Power Co Inc	-0.0001248	0.0092392	-0.0026463	0.0098493	-0.0020623	
			-0.23	9.43	-1.81	5.06	-1.44	0.0529
133	9/19/2005	Norsk Hydro ASA	0.0007623	0.0084287	0.0007104	0.0050665	0.0084897	
			0.9	5.29	0.29	1.28	3.22	-0.3032
		Spinnaker Exploration Co	-0.0013669	0.0108164	0.008979	0.0193824	0.0129639	
			-1.31	5.52	2.96	3.98	3.99	-0.2040
134	10/13/2005	Occidental Petroleum Corp	-0.0004745	0.0117082	-0.0046261	0.0115473	0.0164258	
			-0.72	9.48	-2.4	3.72	7.88	-0.0990
		Vintage Petroleum Inc	0.0002398	0.0100448	0.0072524	0.0133426	0.0246676	
			0.22	5.01	2.31	2.65	7.28	0.1439
135	4/4/2005	Petrohawk Energy Corp	0.0042893	0.000762	-0.0004871	-0.0052962	0.0122863	
			1.11	0.11	-0.04	-0.37	1.18	-0.2785
		Mission Resources Corp	0.0031863	0.0153927	0.0162937	0.005512	0.0141872	

No	Date	Merger Companies	Fama-French 4 Factors Model					
			$\alpha$	$\beta$	s	h	u	CAR
136	7/11/2005	Pogo Producing Co	1.24	3.28	2.25	0.57	2.03	0.0448
			0.0000514	0.0082828	0.0195476	0.0024298	0.0155149	
137	4/25/2005	Unocal Corp	0.03	2.36	3.59	0.31	2.94	0.1957
			0.0009346	0.0082826	-0.0005616	0.0044553	0.0135733	
137	4/25/2005	Valero Energy Corp	1.01	4.81	-0.21	1.17	5.23	0.0080
			0.0001046	0.0108171	0.0038101	-0.0012809	0.0147352	
2006		Premcor Inc	0.03	1.9	0.42	-0.11	1.71	-0.4177
			0.0009221	0.0070794	0.0030747	0.0102634	0.0124744	
138	6/23/2006	Anadarko Petroleum Corp	0.87	3.74	1.03	2.57	4.35	-0.3256
			-0.003059	0.0178157	-0.0067887	0.0152475	0.0200004	
139	5/30/2006	Kerr-McGee Corp	-1.06	3.02	-0.79	1.13	2.56	0.0777
			-0.0022901	-0.0007453	-0.0037174	0.026979	0.0200004	
139	5/30/2006	Kinder Morgan Inc Management	-0.79	-0.13	-0.43	1.98	0.5	0.0527
			-0.0010403	0.0041256	0.0020304	0.010953	0.0023559	
140	7/8/2006	Kinder Morgan Inc	-2	3.82	1.35	4.49	1.58	-0.0213
			-0.0003685	0.0096613	-0.0022729	0.0070832	0.0073548	
140	7/8/2006	MDU Resources Group Inc	-0.66	8.28	-1.4	2.69	4.56	-0.0047
			0.0003071	0.0106354	-0.0015789	0.0092911	0.0033423	
141	4/21/2006	Cascade Natural Gas Corp	0.53	9.01	-0.92	3.45	2.14	-0.0039
			-0.0003896	0.0104029	0.004884	0.0060357	-0.0046188	
141	4/21/2006	Petrohawk Energy Corp	-0.58	7.53	2.44	1.91	-2.53	0.1155
			-0.000703	0.0095101	0.0022899	0.0168124	0.0177833	
142	6/12/2006	KCS Energy Inc	-0.54	3.47	0.59	2.64	4.39	0.0646
			0.0001543	0.0104532	-0.0035279	0.0174016	0.0333229	
142	6/12/2006	Plains All American Pipeline LP	0.15	4.98	-1.19	3.57	10.73	0.2428
			-0.0000671	0.0061624	0.0008357	0.0109574	0.0005136	
2007		Pacific Energy Partner LP	-0.1	4.64	0.44	3.66	0.29	0.0304
			-0.0006081	0.0046519	0.0032378	0.0078886	0.0042838	
143	1/7/2007	Forest Oil Corp	-0.88	3.26	1.6	2.46	2.23	-0.1558
			-0.0021759	0.0090593	0.0023652	0.0153411	0.0127496	
144	6/19/2007	The Houston Exploration Co	-1.27	2.44	0.49	1.92	2.75	0.0073
			-0.0014972	0.0070542	0.0038547	0.0267594	0.0034926	
144	6/19/2007	General Electric Co	-1.47	3.22	1.35	5.65	1.27	-0.0525
			-0.0001066	0.0080167	-0.005032	-0.006729	-0.002928	
145	7/17/2007	Regency Energy Partners LP	-0.26	10.38	-4.11	-3.3	-2.22	-0.0525
			0.0004053	0.0009117	0.0002608	0.0047714	0.0014645	
145	7/17/2007	Plains Exploration & Production Co	0.58	0.69	0.12	1.37	0.65	0.0899
			0.000143	0.0085961	0.0017627	0.0087969	0.0074355	
		Pogo Producing Co	0.15	4.74	0.59	1.7	2.04	-0.3064
			9.31E-06	0.0084415	0.0019772	0.0167986	0.0111173	
			0.01	4.48	0.64	3.12	2.94	0.0572

**Appendix 6**  
**Durbin-Watson Result**

Year	No	Date	Merger Companies	Market Model	CAPM	Fama-French Model	Fama-French 4 Factors	
1981	1	5/6/1981	Dome Petroleum Ltd Canada	1.752863	1.751993	1.801873	1.87561	
			Conoco Inc	1.764937	1.766383	1.898322	1.909184	
	2	6/26/1981	Seagram Ltd	2.032236	2.032081	2.003239	2.003408	
			Conoco Inc	1.834664	1.832083	1.98441	2.000433	
	3	7/7/1981	Du Pont	1.864039	1.864545	1.905517	1.921759	
			Conoco Inc	1.722688	1.721281	1.878167	1.86401	
1982	4	2/11/1982	Allied Corp & Continental Group	2.011613	2.011749	2.041394	2.074425	
			Supron Energy Corp	2.0594	2.060748	2.174507	2.192544	
	5	8/16/1982	Occidental Petroleum Corp	2.101954	2.101384	2.108732	2.118943	
			Cities Service Co	2.101954	2.101384	2.108732	2.118943	
	6	11/1/1982	Damson Oil Corp	2.177111	2.174818	2.218586	2.325577	
			Juniper Petroleum Corp	2.295646	2.294433	2.339967	2.31439	
	7	12/20/1982	Mesa Petroleum Co	1.938729	1.935564	1.933868	1.958658	
			General American Oil Co of Texas	1.64746	1.645739	1.741477	1.816773	
	8	12/21/1982	Burlington Northern Inc	1.919655	1.922473	1.916116	1.919187	
			El Paso Co	1.785177	1.787259	1.786837	1.904244	
	1983	10	1/3/1983	National Distillers & Chemical Corp	1.941316	1.942359	1.94588	1.94995
				Suburban Propane Gas Corp	2.034244	2.029003	2.085933	2.084806
11		1/10/1983	Phillips Petroleum Co	1.903238	1.905284	1.803735	1.941065	
			General American Oil Co of Texas	1.64962	1.649857	1.744958	1.767563	
12		2/9/1983	Goodyear Tire and Rubber Cor	1.851024	1.853174	1.926964	2.040691	
			Celeron Corp	1.971266	1.974717	1.992961	2.161306	
13		4/4/1983	Internorth Inc	1.922139	1.922163	1.906805	1.932474	
			Belco Petroleum Corp	1.74953	1.749511	1.77431	1.821053	
14		4/22/1983	Northwest Industries Inc	1.854129	1.850202	1.861458	1.919173	
			Pogo Producing Co	1.886064	1.891203	1.85793	1.932154	
15		5/23/1983	Diamond Shamrock Corp	1.921395	1.922636	1.912816	2.067674	
			Natomas Co	1.879144	1.87944	1.861024	2.004724	
16		6/8/1983	CSX Corp	1.941384	1.941412	1.945389	1.958438	
			Texas Gas Resources Corp	1.846197	1.846354	1.846134	1.929374	
17		8/26/1983	Burlington Northern Inc	1.939629	1.940389	1.93568	1.947016	
			El Paso Co	1.789563	1.789426	1.818568	1.858036	
18		9/12/1983	Williams Cos	1.755639	1.756102	1.755997	1.806889	
			Northwest Energy Co	1.820926	1.823915	1.813709	1.911941	
19		10/3/1983	Kaneb Services Inc	1.767931	1.768053	1.773303	1.970395	
			Moran Energy Inc	1.948755	1.948571	1.938147	1.99578	
20		12/15/1983	Lear Petroleum Corp	1.427709	1.427982	1.394053	1.42328	
	Mcrae Consolidated Oil & Gas		1.736745	1.736452	1.737234	1.775748		
21	12/28/1983	Pennzoil Co	2.061513	2.062892	2.074919	2.081335		

Year	No	Date	Merger Companies	Market Model	CAPM	Fama-French Model	Fama-French 4 Factors
1984			Getty Oil Co	1.689391	1.689679	1.673774	1.769011
	22	1/9/1984	Texaco Inc	0.1140195	0.0077946	0.1463279	0.1459131
			Getty Oil Co	1.94283	1.943594	1.935861	2.03605
	23	1/25/1984	Howell Corp	1.971882	1.971509	1.958246	1.971537
			Howell Petroleum Corp	1.643497	1.643559	1.646549	1.698458
	24	1/25/1984	Royal Dutch Shell Group Netherlands	1.579203	1.579112	1.552582	1.680964
			Shell Oil Co	1.882678	1.88321	1.849107	1.861044
	25	1/26/1984	Damson Oil Corp	1.942512	1.942532	1.95781	2.018642
			Dorchester Gas Corp	1.962018	1.962065	1.968938	2.014628
	26	3/6/1984	Chevron Corp	1.671549	1.671479	1.694301	1.716427
			Gulf Corp	1.96672	1.970022	2.071108	2.068309
	27	3/12/1984	Mobil Corp	1.792106	1.792138	1.693256	1.754275
			Superior Oil Co	2.310494	2.310645	2.287681	2.29145
	28	11/6/1984	Houston Natural Gas Co	1.972738	1.972852	2.03597	2.044851
		Texas Eastern Corp	1.823029	1.822299	1.873893	1.873503	
29	11/18/1984	Placer Development Ltd Canada	1.984344	1.984071	1.944982	1.955918	
		Prairie Production Co	1.814131	1.813444	1.829724	1.835827	
1985	30	2/26/1985	SunShine Mining Co	2.122556	2.12362	2.125714	2.14175
			Woods Petroleum Co	2.013865	2.014887	2.049675	2.060609
	31	3/4/1985	Coastal Corp	1.687216	1.688752	1.719444	1.716996
			American Natural Resources Co	1.959589	1.959667	1.985189	2.015033
	32	6/19/1985	Tenneco Inc	1.919557	1.921641	1.966942	1.993533
			Goodyear Tire & Rubber Co	2.241718	2.241822	2.243834	2.249328
	33	7/19/1985	Diversified Energies Inc	2.104372	2.102882	2.121827	2.12754
			Dyco Petroleum Corp	1.905192	1.906029	1.930949	1.95487
	34	8/12/1985	Midcon Corp	1.955216	1.956309	1.951073	2.011053
			United Energy Resources Inc	1.844827	1.841313	1.8324	1.905696
	35	9/10/1985	Pacific Gas & Electric Co	2.264705	2.267417	2.205622	2.229418
			Pacific Gas Transmission Co	2.312341	2.312498	2.289154	2.288336
	36	10/22/1985	Burlington Northern Inc	1.974396	1.974068	1.944882	1.945811
			Southland Royalty Co	2.061282	2.063732	2.066002	2.062661
37	12/31/1985	Occidental Petroleum Corp	1.934973	1.935012	1.942929	1.963669	
		Midcon Corp	1.818424	1.818474	1.838863	1.85331	
1986	38	5/13/1986	Louisiana Land & Exploration Co	1.807316	1.809331	1.816135	1.996831
			Inexco Oil Co	2.111675	2.112555	2.11046	2.143263
	39	6/12/1986	Triton Energy Corp	1.730623	1.730951	1.789267	1.870246
			Worldwide Energy Corp	2.502998	2.503966	2.537861	2.595348
	40	12/18/1986	Questar Corp	2.026122	2.025618	1.996412	2.03652

Year	No	Date	Merger Companies	Market Model	CAPM	Fama-French Model	Fama-French 4 Factors
			Universal Resources	1.866789	1.865258	1.871542	1.863939
1987							
	41	10/5/1987	Arka Inc	2.197302	2.197372	2.239289	2.240617
			Entex Inc	2.187672	2.188	2.276956	2.27411
	42	3/27/1987	British Petroleum Co	1.786429	1.785751	1.814536	1.833705
			Standard Oil Co	1.973503	1.972542	1.926245	1.998271
	43	6/23/1987	Conquest Exploration Co	2.344825	2.344902	2.363452	2.368009
			Cenergy Corp	1.869371	1.868817	1.984435	2.022913
	44	1/16/1987	Energy Development Partner Ltd	2.074857	2.073516	2.087526	2.097903
			May Energy Partnemrs Ltd	2.5425	2.545828	2.570969	2.62662
	45	12/15/1987	Mesa Limited Partnership	2.369487	2.36391	2.372581	2.377412
			KN Energy Inc	1.796634	1.796613	1.823228	1.847701
1988							
	46	7/15/1988	Witco Corp	2.110186	2.110486	1.718551	1.737735
			Calumet Inds Inc	2.679161	2.679981	2.689604	2.691824
	47	2/24/1988	British Petroleum Co	1.724275	1.723204	1.74406	1.778762
			Lear Petroleum Corp	1.852485	1.853935	1.937918	1.961914
	48	9/27/1988	Utilicorp Utd Inc	2.290029	2.288287	2.156522	2.154481
			Michigan Energy Resources Co	1.892615	1.89158	1.954252	1.96069
1989							
	49	4/21/1989	Raytheon Company	2.039895	2.042309	2.039884	2.075259
			Standard Havens	1.912203	1.912064	1.915837	1.918747
	50	2/22/1989	Panhandle Eastern Corp	2.180571	2.180134	2.214233	2.2054
			Texas Eastern Corp	1.785445	1.785664	1.780355	1.778986
1992							
	51	3/3/1992	Grace (W.R) & Co	1.978912	1.978789	1.969156	1.970675
			Grace Energy Corp	1.877847	1.876243	1.912662	1.927109
1993							
	52	6/18/1993	Apache Corporation	2.074226	2.075093	2.114937	2.112795
			Hadson Energy Resources Corp	2.299731	2.299313	2.297692	2.284882
1994							
	53	12/13/1994	Williams Cos	2.345892	2.345555	2.370698	2.374487
			Transco Energy Co	2.273399	2.277849	2.328407	2.349634
1995							
	54	5/4/1995	Barret Resources Corp	1.917065	1.916538	1.928743	1.925877
			Plains Petroleum Co	1.841965	1.841524	1.851989	1.850414
	55	8/25/1995	Enron Crop	2.273916	2.273273	2.291238	2.290041
			Coda Energy Inc	2.631437	2.63117	2.676735	2.676868
1996							
	56	7/22/1996	Seagull Energy Corp	1.964894	1.965532	2.024231	2.040664
			Global Natural Resources Inc	1.998217	1.999009	2.018527	2.019654
	57	9/23/1996	Ultramar Corp	2.270407	2.270606	2.292393	2.290433
			Diamond Shamrock Inc	2.099326	2.099358	2.055539	2.067335
1997							
	58	7/17/1997	Burlington Resources Inc	1.926314	1.925635	1.895326	1.894378



Year	No	Date	Merger Companies	Market Model	CAPM	Fama-French Model	Fama-French 4 Factors
			Louisiana Land & Exploration Co	1.770575	1.772187	1.803226	1.81339
	59	5/27/1997	Columbia Gas System Inc	1.914338	1.913531	1.906188	1.896913
			Alamco Inc	1.95506	1.955182	1.963061	1.983223
	60	6/20/1997	Forcenergy	1.458218	1.45916	1.461938	1.476439
			Edisto Resources Corp	2.221684	2.221736	2.215977	2.213907
	61	10/20/1997	Kinder Morgan Energy Partners LP	1.932988	1.933626	1.93786	1.938207
			Santa Fe Pacific Pipeline Partner LP	2.253465	2.253444	2.302336	2.264877
	62	6/24/1997	Louis Dreyfus Natural Gas Corp	1.974427	1.974286	1.970926	1.959789
			American Exploration Co	2.007063	2.007174	1.986583	1.979767
	63	7/7/1997	Meridian Resources Corp	1.889154	1.889137	1.840531	1.843698
			Caim Energy USA Inc	1.885549	1.88591	1.88305	1.901313
	64	4/7/1997	Mesa Inc	1.863037	1.863027	1.868439	1.855391
			Parker & Parsley Petroleum Co	2.225333	2.225402	2.19234	2.189296
	65	6/17/1997	Santa Fe Energy Resources Inc	2.160064	2.160508	2.178638	2.201002
			McFarland Energy	2.517971	2.518484	2.526561	2.530096
	66	11/24/1997	Williams Cos Inc	1.836138	1.836718	1.811311	1.804002
			Mapco Inc	2.411565	2.410967	2.412494	2.435039
1998							
	67	5/4/1998	Atlantic Richfield Co	2.025735	2.023731	2.039305	2.051853
			Union Texas Petroleum Holding Inc	2.329465	2.329846	2.359013	2.35982
	68	8/11/1998	British Petroleum Co PLC	1.769768	1.769756	1.752159	1.764424
			Amoco Corp	2.072662	2.073052	2.078276	2.107882
	69	12/23/1998	Chevron Corp	2.157247	2.157648	2.108013	2.037386
			Rutherford-Moran Oil Corp	2.139126	2.139553	2.143069	2.143174
	70	12/1/1998	Exxon Corp	2.057732	2.057972	1.994378	1.925065
			Mobil Corp	2.191088	2.190585	2.177938	2.094847
	71	10/15/1998	Kerr-McGee	2.015868	2.016434	2.022376	2.005241
			Oryx Energy co	2.01314	2.012792	2.023008	2.087274
	72	6/18/1998	Lyondell Petrochemical Co	1.968676	1.968683	1.971421	1.994107
			Atlantic Richfield Co	2.029297	2.027781	2.03845	2.049589
	73	3/23/1998	Plains Resources Inc	2.072567	2.072615	2.119179	2.118003
			Goodyear Tire & Rubber Co	2.227109	2.226738	2.311802	2.311746
	74	5/29/1998	Pogo Producing Co	2.364587	2.365448	2.441339	2.434618
			Arch Petroleum Inc	2.440161	2.440349	2.473874	2.470469
	75	11/25/1998	Seagull Energy Corp	1.959436	1.954898	2.015534	1.958771
			Ocean Energy Inc	1.920542	1.914978	1.91029	1.911697
	76	11/16/1998	Vulcan Materials Co	1.990825	1.988168	1.983464	1.991868
			CalMat Co	2.080682	2.082735	2.128694	2.14924
1999							
	77	4/1/1999	BP Amoco PLC	1.928776	1.929456	1.952735	1.923919
			Atlantic Richfield Co	2.053461	2.04991	2.105048	2.077472

Year	No	Date	Merger Companies	Market Model	CAPM	Fama-French Model	Fama-French 4 Factors
	78	6/1/1999	Crompton & Knowles Corp	1.646785	1.649887	1.741335	1.804984
			Witco Corp	1.712338	1.712426	1.876673	1.938392
	79	5/20/1999	Devon Energy Corp	1.809757	1.808155	1.845233	1.960641
			PennzEnergy Co	1.981758	1.980089	1.995313	1.987771
	80	2/24/1999	Dominion Resources Inc	1.749581	1.749784	1.85514	1.871186
			Remington Energy Ltd	2.322112	2.320666	2.348365	2.351051
2000							
	81	11/6/2000	Amerada Hess Corp	2.14109	2.14071	2.224555	2.202055
			Lasmo PLC	2.170629	2.170682	2.225304	2.223205
	82	3/16/2000	BP Amoco PLC	1.954329	1.954841	1.986025	1.987365
			Vastar Resources Inc	1.983102	1.982927	2.109882	2.110094
	83	10/16/2000	Chevron Corp	2.075265	2.075374	2.167971	2.144163
			Texaco Inc	2.086097	2.085956	2.16791	2.140596
	84	12/27/2000	Hunt Oil Co	2.36328	2.369041	2.360995	2.392741
			Berkley Petroleum Corp	1.833662	1.839695	1.912864	1.902672
	85	3/20/2000	North Coast Energy Inc	2.211821	2.211508	2.209461	2.200654
			Belden & Blake Corp	2.004946	2.004326	2.055161	2.056076
	86	10/20/2000	Stone Energy Corp	1.943784	1.944142	2.009372	1.998549
			Basin Exploration Inc	1.70052	1.700459	1.752388	1.75926
	87	12/22/2000	USX-Marathon Group	2.256884	2.256889	2.256481	2.256984
			Pennaco Energy Inc	2.201779	2.200319	2.241615	2.244694
2001							
	88	7/10/2001	Amerada Hess Corp	1.890533	1.890367	2.025917	2.031314
			Triton Energy Ltd	1.984551	1.985831	1.997725	1.982956
	89	2/12/2001	Anadarko Petroleum Corp	1.979035	1.977227	2.060159	2.009868
			Berkley Petroleum Corp	1.798311	1.799051	1.894886	1.930507
	90	6/25/2001	Anadarko Petroleum Corp	2.026246	2.02608	2.139756	2.133184
			Gulfstream Resources Canada Ltd	2.114327	2.110958	2.131467	2.139778
	91	2/8/2001	Calpine Corp	1.886039	1.885692	1.872955	1.872813
			Encal Energy Ltd	2.513361	2.513057	2.517409	2.517775
	92	5/29/2001	Conoco	2.090043	2.090997	2.087524	2.084467
			Gulf Canada Resources Ltd	2.086236	2.08575	2.105331	2.105579
	93	8/14/2001	Devon Energy Corp	1.855777	1.855783	1.860007	1.863425
			Mitchell Energy & Development Corp	1.854182	1.856596	1.91162	1.999769
	94	9/10/2001	Dominion Resources Inc	1.645183	1.646601	1.70541	1.755589
			Louis Dreyfus Natural Gas Corp	1.542511	1.542538	1.635382	1.653866
	95	5/23/2001	EOG Resources Inc	1.732323	1.731323	1.779735	1.790908
			Energy Search Inc	2.395233	2.395269	2.401612	2.392251
	96	5/14/2001	Kerr-McGee	2.049699	2.049146	2.020475	2.020533
			HS Resources Inc	1.800504	1.800589	1.871152	1.866292
	97	12/18/2001	Magnum Hunter Resources Inc	1.988136	1.994794	1.984191	1.968893

Year	No	Date	Merger Companies	Market Model	CAPM	Fama-French Model	Fama-French 4 Factors
			Prize Energy Corp	2.050384	2.053729	2.110878	2.087871
	98	11/18/2001	Phillips Petroleum Co	1.925523	1.925552	1.977432	1.965533
			Conoco Inc	1.915973	1.915945	1.989302	1.991707
	99	2/4/2001	Phillips Petroleum Co	2.086443	2.085696	2.100573	2.106077
			Tosco Corp	2.225721	2.225422	2.285913	2.277774
	100	3/1/2001	Plains All American Pipeline LP	2.068141	2.06704	2.04954	2.047102
			Murphy Oil Corp	2.065282	2.06401	2.040434	2.031607
	101	7/17/2001	Tesoro Petroleum Corp	2.218511	2.220888	2.283972	2.283336
			BP PLC	2.015544	2.015032	2.022612	2.024699
	102	3/20/2001	Valero Energy Corp	2.15233	2.150976	2.176227	2.176988
			Huntway Refining Co	2.469617	2.469559	2.477295	2.489274
	103	5/7/2001	Valero Energy Corp	2.093907	2.090792	2.079832	2.081437
			Ultramar Diamond Shamrock Corp	2.07242	2.068798	2.103912	2.119316
	104	5/7/2001	Williams Cos Inc	2.122217	2.121974	2.156727	2.152519
			Barrett Resources Corp	1.957837	1.957594	1.993676	1.997858
2002							
	106	2/20/2002	BJ Services Co	1.998838	2.003365	1.99455	1.978155
			Great Lakes Chemical Corp	2.133999	2.132692	2.182316	2.183514
	107	3/11/2002	Chesapeake Energy Corp	1.890619	1.891145	1.857213	1.873535
			Canaan Energy Corp	2.078648	2.078665	2.080764	2.093883
	108	5/28/2002	Conoco Inc	2.004273	2.007512	1.993814	1.978217
			Gulf Indonesia Resources Ltd	2.220808	2.21901	2.257791	2.245625
	109	2/12/2002	Giant Industries Inc	1.785422	1.786868	1.748322	1.753559
			BP PLC	1.962143	1.962096	1.953447	2.021613
	110	5/29/2002	Newfield Exploration Co	1.993544	1.993089	2.015052	2.039699
			EEX Corp	1.930513	1.950081	1.962091	1.958781
	111	3/25/2002	Royal Dutch Petroleum	1.998369	1.99961	2.091005	2.149514
			Pennzoil Quaker State Co	2.098986	2.098822	2.005256	2.003475
	112	3/18/2002	Santos Ltd	2.385575	2.386473	2.386183	2.387795
			Esenjay Exploration Inc	2.360562	2.36298	2.398883	2.391955
	113	2/5/2002	Tesoro Petroleum Corp	2.148328	2.148848	2.159687	2.171011
			Valero Energy Corp	1.942278	1.943734	1.981075	1.95994
	114	8/20/2002	Unocal Corp	2.132437	2.130455	2.10094	2.123491
			Pure Resources Inc	2.019779	2.019111	2.020068	2.028518
	115	4/11/2002	Williams Energy Partners	1.885947	1.885291	1.887981	1.869839
			Williams Cos Inc	1.902347	1.903221	1.933686	1.949205
2003							
	116	2/24/2003	Devon Energy Corp	2.039941	2.039763	2.113681	2.197475
			Ocean Energy Inc	2.076298	2.077191	2.133973	2.166027
	117	5/29/2003	Edge Petroleum Corp	2.170715	2.172856	2.248438	2.228941
			Miller Exploration Co	2.329396	2.327954	2.313648	2.313011

Year	No	Date	Merger Companies	Market Model	CAPM	Fama-French Model	Fama-French 4 Factors	
2003	118	3/31/2003	Evergreen Resources Inc	2.120476	2.120778	2.099146	2.136034	
			Carbon Energy Corp	2.065492	2.065162	2.090326	2.084068	
2003	119	7/1/2003	Unit Corp	2.266744	2.267061	2.182818	2.254281	
			PetroCorp Inc	2.057384	2.050544	2.058658	2.056257	
2004	120	4/15/2004	EnCana Corp	1.751206	1.753363	1.810146	1.844124	
			Tom Brown Inc	1.885891	1.883655	1.967003	1.973087	
	121	5/24/2004	Forest Oil Corp	2.054547	2.053778	2.086515	2.102684	
			Wiser Oil Co	1.728441	1.734541	1.718682	1.807358	
	122	4/7/2004	Kerr-McGee	1.92679	1.927675	1.963691	1.990891	
			Westport Resources Corp	1.989288	1.989424	1.989816	1.982955	
	123	12/16/2004	Noble Energy Inc	1.773866	1.773161	1.893675	1.911527	
			Patina Oil & Gas Corp	1.995117	1.994327	2.020605	2.019825	
	124	6/9/2004	Petro Canada	1.756309	1.756296	1.762766	1.756587	
			Prima Energy Corp	2.254246	2.252751	2.172842	2.206135	
	125	5/4/2004	Pioneer Natural Resources	1.891734	1.893521	1.967189	1.992069	
			Evergreen Resources Inc	1.956601	1.956702	1.947408	1.956701	
	126	2/12/2004	Plains Exploration & Production Co	2.154476	2.152008	2.100524	2.111366	
			Nuevo Energy Company	2.240378	2.2409	2.310744	2.305236	
	127	2/4/2004	Valero Energy Corp	1.985894	1.982229	1.943897	1.915888	
			El Paso Corp	1.853183	1.853309	1.86249	1.885332	
	128	11/1/2004	Valero LP	1.80776	1.810264	1.776223	1.784258	
			Kaneb Pipeline Partners LP	2.033249	2.03488	2.108466	2.109827	
	2005	129	4/4/2005	Chevron Corp	1.972487	1.971293	2.0319	2.030066
				Unocal	1.889953	1.905026	1.924321	1.949225
130		12/12/2005	ConocoPhillips	2.044301	2.044511	2.004165	2.000973	
			Burlington Resources Inc	2.169028	2.166679	2.20984	1.924066	
131		11/8/2005	Delta Petroleum Corp	2.174466	2.174358	2.245783	2.159697	
			Castle Energy Corp	1.966741	1.969118	1.942766	1.93219	
132		1/26/2005	Energy Transfer Partner LP	1.997659	2.012706	2.061051	2.058206	
			American Electric Power Co Inc	1.894208	1.894091	1.912466	1.902434	
133		9/19/2005	Norsk Hydro ASA	1.933466	1.934114	2.233278	2.237362	
			Spinnaker Exploration Co	1.98241	1.98445	1.928026	1.893976	
134		10/13/2005	Occidental Petroleum Corp	1.862691	1.863108	2.027391	1.998375	
			Vintage Petroleum Inc	1.981883	1.984567	2.120564	2.096205	
135		4/4/2005	Petrohawk Energy Corp	1.946954	1.941448	1.952854	1.962063	
			Mission Resources Corp	2.074145	2.066304	2.063556	2.068495	
136		7/11/2005	Pogo Producing Co	2.151482	2.151994	2.201102	2.212463	
			Unocal Corp	1.974372	1.97871	2.051785	2.0451	
137		4/25/2005	Valero Energy Corp	1.968736	1.969439	1.987709	1.970919	

Year	No	Date	Merger Companies	Market Model	CAPM	Fama-French Model	Fama-French 4 Factors
			Premcor Inc	1.836303	1.838271	1.900458	1.919254
2006							
	138	6/23/2006	Anadarko Petroleum Corp	2.027111	2.032224	1.995413	1.957443
			Kerr-McGee Corp	1.245675	1.246556	1.221247	1.205432
	139	5/30/2006	Kinder Morgan Inc Management	1.957323	1.963043	1.984035	1.998703
			Kinder Morgan Inc	2.052662	2.055203	2.12527	2.08017
	140	7/8/2006	MDU Resources Group Inc	1.91256	1.913053	1.961897	1.996876
			Cascade Natural Gas Corp	2.354551	2.352867	2.368362	2.405938
	141	4/21/2006	Petrohawk Energy Corp	1.701444	1.70189	1.935595	1.940957
			KCS Energy Inc	1.924301	1.922401	1.984776	1.965148
	142	6/12/2006	Plains All American Pipeline LP	1.803693	1.804425	1.821767	1.816685
			Pacific Energy Partner LP	1.786962	1.786234	1.807432	1.806186
2007							
	143	1/7/2007	Forest Oil Corp	1.882709	1.881531	1.962541	1.956482
			The Houston Exploration Co	1.808774	1.809161	1.812448	1.790909
	144	6/19/2007	General Electric Co	1.640403	1.640479	1.682281	1.703931
			Regency Energy Partners LP	1.939165	1.93971	1.953251	1.948785
	145	7/17/2007	Plains Exploration & Production Co	1.904199	1.904157	1.914766	1.892186
			Pogo Producing Co	1.942988	1.943124	2.035118	2.057596

**Appendix 7**  
**Market Model Result (GLS)**

Year	No	Date	Merger Companies	Market Model			
				$\alpha$	$\beta$	CAR	
1981	1	5/6/1981	Dome Petroleum Ltd Canada	-0.000601	0.0131551		
			Conoco Inc	-0.41	8.14	0.15337914	
	2	6/26/1981	Seagram Ltd	-0.0016191	0.0139601		
			Conoco Inc	-1.75	13.9	-0.27190425	
	3	7/7/1981	Du Pont	-0.0007517	0.0063549		
			Conoco Inc	-1.05	8.08	-0.35418123	
1982	4	2/11/1982	Allied Corp & Continental Group	-0.0012278	0.0140443		
			Supron Energy Corp	-1.18	12.36	0.65959252	
	5	8/16/1982	Occidental Petroleum Corp	-0.002027	0.0120725		
			Cities Service Co	-0.22	11.77	0.07094811	
	6	11/1/1982	Damson Oil Corp	-0.0004027	0.0133135		
			Juniper Petroleum Corp	-0.37	11.08	0.0961266	
	7	12/20/1982	Mesa Petroleum Co	-0.0003608	0.0125909		
			General American Oil Co of Texas	-0.37	10.94	-0.18276438	
	8	12/21/1982	Burlington Northern Inc	-0.0018336	0.0235911		
			El Paso Co	-0.51	5.53	-0.05910879	
	1983	10	1/3/1983	National Distillers & Chemical Corp	-0.0012381	0.0124837	
				Suburban Propane Gas Corp	-1.51	13.23	-0.01420563
		11	1/10/1983	Phillips Petroleum Co	-0.0012381	0.0124837	
				General American Oil Co of Texas	-1.51	13.23	-0.01420563
		12	2/9/1983	Goodyear Tire and Rubber Cor	-0.0022936	0.0133119	
Celeron Corp				-1.12	6.27	-0.18533045	
13		4/4/1983	Internorth Inc	-0.0027055	0.0116217		
			Belco Petroleum Corp	-1.31	5.99	-0.11420063	
14		4/22/1983	Northwest Industries Inc	-0.0024688	0.011454		
			Pogo Producing Co	-1.33	6.44	0.11981278	
15		5/23/1983	Diamond Shamrock Corp	-0.0009143	0.01619		
			Natomas Co	-0.94	17.35	-0.84669273	
				-1.74	8.3	-0.05270211	

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
	16	6/8/1983	CSX Corp	0.11 0.0009437	7.17 0.0132247	0.08563015
			Texas Gas Resources Corp	0.94 0.0001874	13.61 0.0065305	0.1582605
	17	8/26/1983	Burlington Northern Inc	0.1 0.0008666	3.68 0.0088863	-0.38195449
			El Paso Co	0.63 0.0015238	6.68 0.0072167	0.29716169
	18	9/12/1983	Williams Cos	0.96 -0.0006438	4.7 0.0115743	-0.24959019
			Northwest Energy Co	-0.48 -0.000145	9.05 0.0131202	0.00133147
	19	10/3/1983	Kaneb Services Inc	-0.06 0.0008933	5.99 0.0134357	-0.2167844
			Moran Energy Inc	0.54 -0.0006884	6.66 0.0097011	-0.08097721
	20	12/15/1983	Lear Petroleum Corp	-0.39 -0.0012107	4.56 0.0125612	-0.29025266
			Mcrae Consolidated Oil & Gas	-1.13 0.0008119	9.56 0.0137327	0.03231551
	21	12/28/1983	Pennzoil Co	0.7 -0.0038255	9.51 0.0094101	0.1140444
			Getty Oil Co	-2.38 -0.0028933	6.28 0.0093683	0.49094841
				-1.61 0.0333153	5.74 -0.0003868	0.16883988
1984	22	1/9/1984	Texaco Inc	191.46 0.0015065	-1.74 0.0131685	0.00197707
			Getty Oil Co	1.03 0.0006462	7.24 0.0064456	-0.07355615
	23	1/25/1984	Howell Corp	0.37 0.0002635	2.8 0.0085798	0.45052352
			Howell Petroleum Corp	0.16 -0.0001309	3.94 0.0106657	-0.16742076
	24	1/25/1984	Royal Dutch Shell Group Netherlands	-0.17 -0.0009347	10.42 0.0109913	-0.13992459
			Shell Oil Co	-0.82 0.0001332	7.27 0.0116338	-0.45799186
	25	1/26/1984	Damson Oil Corp	0.07 0.0016357	4.62 0.0090443	-0.120688
			Dorchester Gas Corp	0.81 -0.0001408	3.41 0.0120455	-0.14560352
	26	3/6/1984	Chevron Corp	-0.15 0.0016155	9.16 0.0116118	0.16008377
			Gulf Corp	1.49 -0.0000234	7.72 0.0130087	-0.42375982
	27	3/12/1984	Mobil Corp	-0.03 0.000128	10.83 0.0117852	0.05004411
			Superior Oil Co	0.09 -0.0000983	6.28 0.0038026	0.25919415
	28	11/6/1984	Houston Natural Gas Co	-0.06 -0.00286	1.73 -0.0013596	0.00207427
			Texas Eastern Corp	-0.99 0.0001191	-0.34 0.0038407	-0.09731308
	29	11/18/1984	Placer Development Ltd Canada	0.11 0.0012018	2.32 0.003195	-0.03520437
			Prairie Production Co			



Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
				0.68	1.26	-0.27086254
1985						
	30	2/26/1985	SunShine Mining Co	-0.0021686	0.0046148	
				-1.66	2.63	0.34933556
			Woods Petroleum Co	-0.000979	0.0057532	
				-0.81	3.64	0.04416438
	31	3/4/1985	Coastal Corp	-0.0009573	0.0052951	
				-0.81	3.25	0.11823977
			American Natural Resources Co	-0.0003743	0.0040659	
				-0.21	1.62	-0.30983769
	32	6/19/1985	Tenneco Inc	-0.0005148	0.0087947	
				-0.68	7.86	0.01693939
			Goodyear Tire & Rubber Co	-0.0007196	0.013485	
				-0.97	12.2	0.01806905
	33	7/19/1985	Diversified Energies Inc	-0.0013848	0.0037494	
				-0.49	0.88	-0.10744839
			Dyco Petroleum Corp	-0.0005217	0.0021552	
				-0.27	0.74	-0.45195945
	34	8/12/1985	Midcon Corp	0.0006161	0.0042614	
				0.76	3.28	0.19304291
			United Energy Resources Inc	0.0012855	0.0014819	
				1.36	0.98	-0.0494329
	35	9/10/1985	Pacific Gas & Electric Co	0.0004682	0.0082944	
				0.63	6.61	-0.0302013
			Pacific Gas Transmission Co	0.0006033	0.0073155	
				0.47	3.4	0.11626938
	36	10/22/1985	Burlington Northern Inc	0.0002352	0.0137641	
				0.3	10.5	-0.04454095
			Southland Royalty Co	-0.001247	0.0124823	
				-0.91	5.45	-0.36045259
	37	12/31/1985	Occidental Petroleum Corp	-0.0002183	0.0093159	
				-0.18	4.39	-0.06609122
			Midcon Corp	0.0006848	0.0084254	
				0.51	3.64	-0.29176341
1986						
	38	5/13/1986	Louisiana Land & Exploration Co	-0.0018843	0.0073324	
				-1.42	3.55	-0.11929238
			Inexco Oil Co	-0.0032682	0.007374	
				-0.98	1.44	-0.18649474
	39	6/12/1986	Triton Energy Corp	-0.000962	0.0031896	
				-0.52	1.13	0.09663708
			Worldwide Energy Corp	-0.0035599	0.0046846	
				-1.18	1.02	0.20211596
	40	12/18/1986	Questar Corp	0.0004892	0.0033503	
				0.52	2.87	-0.05720477
			Universal Resources	-0.0044856	0.0021469	
				-1.99	0.75	0.36805735
1987						
	41	10/5/1987	Arkla Inc	-0.0003988	0.006007	
				-0.56	7.02	0.24790687
			Entex Inc	-0.0009739	0.0019174	
				-0.66	1.06	-0.4500517
	42	3/27/1987	British Petroleum Co	0.0010404	0.0081175	
				1.1	7.14	-0.34711883
			Standard Oil Co	0.0004035	0.010204	
				0.39	8.31	-0.18442999
	43	6/23/1987	Conquest Exploration Co	-0.0002102	0.0079633	

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
			Cenergy Corp	-0.1 0.0009318	3.37 0.0050125	-0.13085477
	44	1/16/1987	Energy Development Partner Ltd	0.51 -0.00391	2.45 0.0006903	0.27536807
			May Energy Partnemrs Ltd	-1.37 -0.0062872	0.14 0.0057083	-0.56094534
	45	12/15/1987	Mesa Limited Partnership	-1.34 -0.002163	1.01 0.000925	-0.68344785
			KN Energy Inc	-1.38 -0.0018302	0.48 0.0038377	0.1268214
1988				-1.33	4.91	-0.0342619
	46	7/15/1988	Witco Corp	-0.0002957 -0.24	0.0074927 10.91	0.16700154
			Calumet Inds Inc	-0.0009628 -0.33	0.0072942 4.6	0.09837864
	47	2/24/1988	British Petroleum Co	0.0007534 0.67	0.0057289 9.22	0.01526804
			Lear Petroleum Corp	-0.0034629 -1.12	0.0087761 5.22	-0.01417088
	48	9/27/1988	Utilicorp Utd Inc	0.0004479 0.45	0.0040251 7.42	0.01791007
			Michigan Energy Resources Co	0.0015084 1.36	0.0041281 6.73	-0.0173759
1989						
	49	4/21/1989	Raytheon Company	-0.0005275 -1.12	0.0086958 12.45	0.04383945
			Standard Havens	-0.0022012 -0.29	0.0133705 1.19	0.01338815
	50	2/22/1989	Panhandle Eastern Corp	-0.0006882 -0.78	0.008281 6.93	0.26945933
			Texas Eastern Corp	0.0015911 0.8	0.01092 4.04	-0.10444947
1992						
	51	3/3/1992	Grace (W.R) & Co	0.0007421 0.71	0.0121977 8.62	0.02468815
			Grace Energy Corp	-0.0018048 -1.18	0.0043437 2.1	-0.51368006
1993						
	52	6/18/1993	Apache Corporation	0.0017024 1.29	0.0056277 2.24	-0.35803775
			Hadson Energy Resources Corp	0.0006144 0.42	-0.000835 -0.3	0.01643455
1994						
	53	12/13/1994	Williams Cos	0.0003757 0.32	0.0125261 6.07	0.18210176
			Transco Energy Co	-0.0005366 -0.61	0.0076688 4.98	-0.23837894
1995						
	54	5/4/1995	Barret Resources Corp	0.001827 1.3	0.0029996 1.06	0.40947395
			Plains Petroleum Co	0.0002016 0.25	0.0007159 0.43	0.15096254
	55	8/25/1995	Enron Crop	-0.0003658 -0.4	0.0071345 4.01	-0.05979816
			Coda Energy Inc	-0.0002961 -0.17	0.003841 1.16	-0.16995628

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
1996	56	7/22/1996	Seagull Energy Corp	0.0009421	0.0061542	
				0.68	2.7	0.61232162
			Global Natural Resources Inc	0.0016444	0.0051484	
				1.41	2.75	1.44948784
	57	9/23/1996	Ultramar Corp	0.0002736	0.0059794	
				0.28	4.19	-0.03740461
		Diamond Shamrock Inc	0.0001759	0.0052984		
			0.17	3.5	0.12490785	
1997	58	7/17/1997	Burlington Resources Inc	-0.0010622	0.0067589	
				-1.31	6.65	-0.09633391
			Louisiana Land & Exploration Co	-0.0013903	0.0077943	
				-1.25	5.44	0.12330671
	59	5/27/1997	Columbia Gas System Inc	0.0007106	0.0059574	
				0.99	6.5	0.06944818
			Alamco Inc	0.00065	0.0037725	
				0.53	2.44	-0.27407624
	60	6/20/1997	Forcenergy	0.0026474	0.0059602	
				1.53	2.72	0.49148476
			Edisto Resources Corp	0.0000881	0.0033895	
				0.06	1.99	0.11068947
	61	10/20/1997	Kinder Morgan Energy Partners LP	0.0011943	0.0008464	
				0.4	0.23	-0.28889074
			Santa Fe Pacific Pipeline Partner LP	0.0003013	0.0006996	
				0.48	0.9	-0.4146939
	62	6/24/1997	Louis Dreyfus Natural Gas Corp	0.0003435	0.0058226	
				0.31	4.1	0.13551911
			American Exploration Co	-0.0002846	0.0077984	
				-0.21	4.42	0.44649933
	63	7/7/1997	Meridian Resources Corp	0.0002204	0.0054392	
			0.15	2.91	-0.11494491	
		Cairn Energy USA Inc	-0.000743	0.0052079		
			-0.45	2.56	-0.28593343	
64	4/7/1997	Mesa Inc	0.0023447	0.0106268		
			0.8	2.52	-0.07352848	
		Parker & Parsley Petroleum Co	0.0005634	0.0056006		
			0.46	3.16	-0.13843844	
65	6/17/1997	Santa Fe Energy Resources Inc	0.0011949	0.0036541		
			0.92	2.2	0.03820553	
		McFarland Energy	0.0010553	0.0010553		
			0.78	0.61	-0.24721626	
66	11/24/1997	Williams Cos Inc	-0.0008755	0.0087597		
			-0.46	4.57	-0.1307059	
		Mapco Inc	-0.0003444	0.0038313		
			-0.52	5.89	-0.22489682	
1998	67	5/4/1998	Atlantic Richfield Co	-0.0033106	0.0067749	
				-1.14	2.35	-0.05509125
			Union Texas Petroleum Holding Inc	-0.0002864	0.0047319	
				-0.28	4.81	0.16310369
	68	8/11/1998	British Petroleum Co PLC	-0.0007587	0.0087117	
				-0.85	10.08	0.15681323
		Amoco Corp	-0.0036473	0.0049495		
			-1.27	1.76	0.20957796	
69	12/23/1998	Chevron Corp	0.0000384	0.0056491		
			0.03	6.53	-0.09621675	

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
			Rutherford-Moran Oil Corp	-0.0083831	0.0034973	
				-1.94	0.83	0.55974906
	70	12/1/1998	Exxon Corp	0.0001699	0.005093	
				0.18	6.72	0.04417343
			Mobil Corp	-0.0003641	0.0058529	
				-0.34	6.74	-0.09545332
	71	10/15/1998	Kerr-McGee	-0.0015084	0.0075232	
				-1.62	10.71	0.02454481
			Oryx Energy co	-0.0031803	0.0098652	
				-1.93	7.99	0.15699289
	72	6/18/1998	Lyondell Petrochemical Co	0.0000611	0.0074132	
				0.05	5.98	-0.09581154
			Atlantic Richfield Co	-0.003074	0.0068051	
				-1.07	2.42	0.0272734
	73	3/23/1998	Plains Resources Inc	-0.00014	0.0050391	
				-0.1	3.93	-0.01049721
			Goodyear Tire & Rubber Co	-0.0001883	0.0084324	
				-0.24	11.55	-0.14286998
	74	5/29/1998	Pogo Producing Co	-0.0026744	0.0093884	
				-2.02	7.13	0.04599861
			Arch Petroleum Inc	-0.0012306	0.0044217	
				-0.52	1.84	-0.08367125
	75	11/25/1998	Seagull Energy Corp	-0.0036243	0.0144683	
				-2.29	11.43	-0.21579831
			Ocean Energy Inc	-0.0082518	0.0177748	
				-2.03	5.43	0.26620728
	76	11/16/1998	Vulcan Materials Co	0.0007999	0.0059842	
				0.85	8.21	-0.13987346
			CalMat Co	-0.0006607	0.010584	
				-0.48	9.66	-0.27605296
1999						
	77	4/1/1999	BP Amoco PLC	0.0001136	0.0062516	
				0.1	7.47	0.02114875
			Atlantic Richfield Co	-0.0011581	0.0051811	
				-1.03	6.05	-0.19740876
	78	6/1/1999	Crompton & Knowles Corp	-0.0022504	0.007758	
				-1.29	6	-0.05356678
			Witco Corp	-0.0033661	0.0042298	
				-1.92	3.26	0.43644586
	79	5/20/1999	Devon Energy Corp	-0.0011279	0.0062731	
				-0.78	5.79	0.11551013
			PennzEnergy Co	-0.0067204	0.0071116	
				-2.18	3.13	-0.20057357
	80	2/24/1999	Dominion Resources Inc	0.0000588	0.0016654	
				0.09	3.29	0.1759722
			Remington Energy Ltd	-0.0034765	0.0041526	
				-1.23	1.89	1.0000181
2000						
	81	11/6/2000	Amerada Hess Corp	0.0003647	0.0004471	
				0.28	0.5	-0.08003462
			Lasmo PLC	-0.0003567	0.0025035	
				-0.17	1.77	0.02617074
	82	3/16/2000	BP Amoco PLC	-0.0023514	-0.0002335	
				-0.77	-0.09	0.05874736
			Vastar Resources Inc	0.0010695	0.0046551	
				0.71	3.57	-0.19211497
	83	10/16/2000	Chevron Corp	-0.0001976	0.0005335	

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
			Texaco Inc	-0.16	0.62	-0.11660912
				-0.0007313	0.0009051	
				-0.55	0.97	-0.30223278
	84	12/27/2000	Hunt Oil Co	-0.0031961	-0.0003259	
				-1.77	-0.28	1.14486252
			Berkley Petroleum Corp	0.002869	0.0023743	
				1.76	2.27	-0.86138066
	85	3/20/2000	North Coast Energy Inc	0.0058406	-0.0043402	
				0.68	-0.58	0.96076456
			Belden & Blake Corp	0.0010024	0.0029513	
				0.6	2.07	-0.15364941
	86	10/20/2000	Stone Energy Corp	0.0007781	0.001496	
				0.43	1.16	-0.16268068
			Basin Exploration Inc	-0.000444	0.0037354	
				-0.16	1.89	0.22971731
	87	12/22/2000	USX-Marathon Group	0.0007529	0.0041615	
				0.19	1.64	0.51074744
			Pennaco Energy Inc	0.0017934	0.0060979	
				0.8	4.22	-0.01731603
2001						
	88	7/10/2001	Amerada Hess Corp	0.0009883	0.000327	
				0.78	0.4	-0.13331547
			Triton Energy Ltd	-0.0004658	0.0049041	
				-0.18	2.94	0.22289336
	89	2/12/2001	Anadarko Petroleum Corp	0.0025188	0.0008769	
				1.19	0.67	-0.29960429
			Berkley Petroleum Corp	0.0031249	0.0034389	
				1.82	3.32	-0.13897558
	90	6/25/2001	Anadarko Petroleum Corp	0.0006582	0.0010701	
				0.33	0.83	0.06666545
			Gulfstream Resources Canada Ltd	0.0020614	0.0021315	
				1.01	1.62	0.02744102
	91	2/8/2001	Calpine Corp	-0.002662	0.0044063	
				-0.56	1.5	-0.02224837
			Encal Energy Ltd	0.0019403	-0.0002464	
				0.83	-0.17	-0.62746184
	92	5/29/2001	Conoco	0.0008275	-0.0008127	
				0.62	-0.93	0.23216731
			Gulf Canada Resources Ltd	0.0010862	0.0026855	
				0.61	2.56	0.24369809
	93	8/14/2001	Devon Energy Corp	0.0000266	-0.000747	
				0.02	-0.96	0.05565354
			Mitchell Energy & Development Corp	0.0014476	0.0012401	
				0.75	1.25	0.08539369
	94	9/10/2001	Dominion Resources Inc	0.0005645	-0.0009561	
				0.49	-1.28	-0.1560639
			Louis Dreyfus Natural Gas Corp	0.0000863	0.0020364	
				0.04	1.62	0.13159402
	95	5/23/2001	EOG Resources Inc	0.0018447	0.0004014	
				1	0.33	-0.23359421
			Energy Search Inc	0.0005045	-0.0011748	
				0.19	-0.69	-0.09256274
	96	5/14/2001	Kerr-McGee	0.0009999	0.0004984	
				0.79	0.64	0.09967551
			HS Resources Inc	0.0026748	0.0031684	
				1.49	2.77	-0.39858808
	97	12/18/2001	Magnum Hunter Resources Inc	0.0004897	0.00204	

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
			Prize Energy Corp	0.0002368	0.0015032	0.19478959
	98	11/18/2001	Phillips Petroleum Co	0.15	1.5	-0.05923249
			Conoco Inc	-0.000047	0.0017212	
				-0.04	2.41	0.32756197
	99	2/4/2001	Phillips Petroleum Co	0.0000708	0.0009142	
			Tosco Corp	0.06	1.16	0.31765727
				0.0013168	-0.000658	
				1.01	-0.83	0.0697471
	100	3/1/2001	Plains All American Pipeline LP	0.0010646	0.0003579	
			Murphy Oil Corp	0.77	0.42	0.08963766
				0.0013592	0.0003573	
				1.54	0.66	0.05516576
	101	7/17/2001	Tesoro Petroleum Corp	0.0010011	-0.0009059	
			BP PLC	0.69	-1.03	0.28718726
				0.0008492	0.0028854	
				0.52	2.65	0.14483412
	102	3/20/2001	Valero Energy Corp	-0.0006039	0.0009475	
			Huntway Refining Co	-0.56	1.42	-0.03439912
				0.0014024	0.0022489	
				0.8	2.13	0.25401644
	103	5/7/2001	Valero Energy Corp	0.001061	-0.000567	
			Ultramar Diamond Shamrock Corp	0.27	-0.23	0.42248568
				0.0021978	0.0023189	
				1.31	2.21	0.62718863
	104	5/7/2001	Williams Cos Inc	0.0024021	0.0014504	
			Barrett Resources Corp	1.79	1.79	0.46463706
				0.0008427	0.006092	
				0.49	5.66	0.34984754
				0.002784	0.0015577	
				1.23	1.1	-0.07532265
2002						
	106	2/20/2002	BJ Services Co	-0.003753	0.0054158	
			Great Lakes Chemical Corp	-1.02	2.04	-0.10667568
				-0.001138	0.0080442	
	107	3/11/2002	Chesapeake Energy Corp	-1.18	11.45	0.24668335
			Canaan Energy Corp	-0.0014138	0.0076948	
				-0.67	4.93	0.00823813
				-0.000254	0.0022167	
	108	5/28/2002	Conoco Inc	-0.1	1.32	0.60930859
			Gulf Indonesia Resources Ltd	-0.0003071	0.0044038	
				-0.27	4.84	-0.11244392
				0.0014446	0.0030526	
				0.77	2	-0.02267197
	109	2/12/2002	Giant Industries Inc	0.0011198	0.0063217	
			BP PLC	0.58	4.51	0.15401563
				-0.0000793	0.0045203	
				-0.08	6.27	0.01280997
	110	5/29/2002	Newfield Exploration Co	0.0003167	0.0038162	
			EEX Corp	0.22	3.27	-0.06523768
				-0.0032748	0.0152916	
				-1.03	5.82	0.23710621
	111	3/25/2002	Royal Dutch Petroleum	-0.0002775	0.0062771	
			Pennzoil Quaker State Co	-0.29	8.76	0.1574022
				0.000292	0.0098913	
				0.15	6.54	0.37295469
	112	3/18/2002	Santos Ltd	-0.0006165	0.0028887	

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
			Esenjay Exploration Inc	-0.51	3.24	-0.19863383
				-0.002275	0.0088635	
	113	2/5/2002	Tesoro Petroleum Corp	-0.8	4.26	-0.03774368
				0.0010066	0.0063248	
			Valero Energy Corp	0.56	4.69	-0.05943461
				0.0013799	0.0052165	
	114	8/20/2002	Unocal Corp	0.85	4.33	-0.22287092
				0.0003887	0.0057174	
			Pure Resources Inc	0.4	8.48	0.02843011
				-0.0004871	2.64E-07	
	115	4/11/2002	Williams Energy Partners	-0.44	0	0.28467501
				0.0011414	0.0003967	
			Williams Cos Inc	0.82	0.47	0.3476624
				-0.0024246	0.0084554	
				-1.13	5.12	0.4530111
2003						
	116	2/24/2003	Devon Energy Corp	0.0012251	0.0080078	
				1.04	10.81	0.00936141
			Ocean Energy Inc	0.0010333	0.0079376	
				0.88	10.74	0.03201234
	117	5/29/2003	Edge Petroleum Corp	-0.0006726	0.000052	
				-0.33	0.04	-0.33886063
			Miller Exploration Co	0.0111255	0.0138483	
				1.1	2.26	0.54817086
	118	3/31/2003	Evergreen Resources Inc	0.0007103	0.0056765	
				0.65	8.37	-0.21427977
			Carbon Energy Corp	0.000814	-0.000576	
				1.17	-1.35	-0.01175864
	119	7/1/2003	Unit Corp	0.0003064	0.0096243	
				0.2	10.12	-0.04634294
			PetroCorp Inc	0.0010394	0.0003549	
				1.33	0.73	0.28030503
2004						
	120	4/15/2004	EnCana Corp	0.0009668	0.00254	
				1.17	2.63	-0.07632683
			Tom Brown Inc	0.0009089	0.0061779	
				1.06	6.16	-0.24484585
	121	5/24/2004	Forest Oil Corp	-0.0002534	0.0072517	
				-0.24	5.77	0.16310743
			Wiser Oil Co	0.0026641	0.0020521	
				1.98	1.25	0.29220765
	122	4/7/2004	Kerr-McGee	-0.0010639	0.0077023	
				-1.06	12.78	0.03396832
			Westport Resources Corp	0.0006059	0.0057189	
				0.46	7.25	0.01705425
	123	12/16/2004	Noble Energy Inc	0.0008526	0.008864	
				1	7.88	0.05477087
			Patina Oil & Gas Corp	-0.0021654	0.0089092	
				-0.71	2.12	-0.00250202
	124	6/9/2004	Petro Canada	0.0001104	0.003646	
				0.11	2.96	0.1837946
			Prima Energy Corp	0.0010502	0.0130279	
				0.71	7.03	0.08658505
	125	5/4/2004	Pioneer Natural Resources	0.0007314	0.0068417	
				0.77	5.95	0.07018446
			Evergreen Resources Inc	-0.0005304	-0.0004644	
				-0.18	-0.13	0.04654193

Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
2004	126	2/12/2004	Plains Explorationa & Production Co	0.0006878	0.0088328	
				0.62	7.63	0.01297882
			Nuevo Energy Company	0.0027374	0.004414	
				2.04	3.23	-0.09098683
	127	2/4/2004	Valero Energy Corp	0.0013767	0.0026038	
				1.35	2.5	0.17817932
			El Paso Corp	-0.0023816	0.0186154	
				-0.89	6.92	0.4029291
	128	11/1/2004	Valero LP	0.0007197	0.0042875	
				1.03	4.53	-0.07478133
			Kaneb Pipeline Partners LP	0.0003524	0.0039825	
				0.46	3.9	0.11841593
2005	129	4/4/2005	Chevron Corp	-0.0017874	0.007118	
				-0.64	1.78	-0.00236325
			Unocal	0.0016422	0.0092648	
				1.65	6.59	-0.11514011
	130	12/12/2005	ConocoPhillips	-0.0019395	0.0148167	
				-0.65	3.3	-0.02935397
			Burlington Resources Inc	0.0014934	0.0169584	
				1.27	9.73	0.01397825
	131	11/8/2005	Delta Petroleum Corp	-0.0001172	0.0199332	
				-0.07	8.23	-0.26614703
			Castle Energy Corp	0.0009247	0.0123797	
				0.48	4.38	-0.2687234
	132	1/26/2005	Energy Transfer Partner LP	0.0015997	0.0049803	
				2.37	5.47	0.05220215
			American Electric Power Co Inc	0.0001721	0.006515	
				0.3	8.51	0.05945695
	133	9/19/2005	Norsk Hydro ASA	0.0014292	0.0097252	
				1.58	7.22	-0.25671695
			Spinnaker Exploration Co	0.0003175	0.0132256	
				0.25	6.89	-0.09236172
134	10/13/2005	Occidental Petroleum Corp	0.000646	0.0124159		
			0.68	8.68	-0.1190708	
		Vintage Petroleum Inc	0.0018295	0.0154514		
			1.25	7	0.15718762	
135	4/4/2005	Petrohawk Energy Corp	0.0043881	0.0031661		
			1.16	0.57	-0.27118308	
		Mission Resources Corp	0.0036415	0.0224443		
			1.4	6.02	0.01776757	
136	7/11/2005	Pogo Producing Co	0.0004748	0.0169226		
			0.24	5.75	0.01301297	
		Unocal Corp	0.0016989	0.0082666		
			1.64	5.34	-0.07960322	
137	4/25/2005	Valero Energy Corp	0.0003389	0.0142921		
			0.11	3.23	-0.52831441	
		Premcor Inc	0.0017669	0.0088199		
			1.5	5.33	-0.43133582	
2006	138	6/23/2006	Anadarko Petroleum Corp	-0.002922	0.025103	
				-1	5.85	0.08026134
			Kerr-McGee Corp	-0.0015098	-0.0010859	
				-0.52	-0.26	0.22720635
	139	5/30/2006	Kinder Morgan Inc Management	-0.0005848	0.0052034	
			-1.05	5.8	-0.0053784	
		Kinder Morgan Inc	-0.0001291	0.0116095		



Year	No	Date	Merger Companies	Market Model		
				$\alpha$	$\beta$	CAR
2006	140	7/8/2006	MDU Resources Group Inc	-0.21	11.64	0.09842601
			Cascade Natural Gas Corp	0.0004232	0.0115399	-0.01329283
	141	4/21/2006	Petrohawk Energy Corp	0.7	13.26	0.10348031
			KCS Energy Inc	-0.0004159	0.0101341	-0.15654358
	142	6/12/2006	Plains All American Pipeline LP	-0.62	10.51	-0.17656913
			Pacific Energy Partner LP	-0.0000548	0.0166004	0.02699007
2007	143	1/7/2007	Forest Oil Corp	-0.04	7.32	-0.11626248
			The Houston Exploration Co	0.0011367	0.0211429	0.02515886
	144	6/19/2007	General Electric Co	0.76	9.06	0.19366069
			Regency Energy Partners LP	0.0002493	0.0064392	-0.06000048
	145	7/17/2007	Plains Exploration & Production Co	0.38	6.23	0.07784751
			Pogo Producing Co	-0.0003071	0.0072785	-0.32713331
				-0.43	6.53	0.01246502
				-0.002134	0.0136402	
				-1.26	5.47	
				-0.0003472	0.0064174	
			-0.33	4.13		
			-0.0001818	0.006262		
			-0.43	10.31		
			0.0004764	0.0008368		
			0.69	0.85		
			-0.0001477	0.0095626		
			-0.15	6.53		
			-0.0002758	0.0093512		
			-0.26	5.99		

**Appendix 8**  
**CAPM Result (GLS)**

Year	No	Date	Merger Companies	CAPM				
				$\alpha_1$	$\alpha_2$	$\beta$	CAR	
1981	1	5/6/1981	Dome Petroleum Ltd Canada	-0.00564	0.1296832	0.0132704		
			Conoco Inc	-0.99	1.02	8.21	0.1447048	
	2	6/26/1981	Seagram Ltd	0.0003398	-0.031355	0.0139201		
			Conoco Inc	0.1	-0.39	13.83	-0.269199	
	3	7/7/1981	Du Pont	-0.000067	-0.008321	0.0063403		
			Conoco Inc	-0.02	-0.14	8.05	-0.35537	
			Conoco Inc	-0.004286	0.0796269	0.0140785		
	1982	4	2/11/1982	Allied Corp & Continental Group	-1.02	0.91	12.37	0.6601753
				Supron Energy Corp	-0.00501	0.1134262	0.0121877	
5		8/16/1982	Occidental Petroleum Corp	-1.31	1.45	11.91	0.0735241	
			Cities Service Co	-0.00614	0.134339	0.0134014		
6		11/1/1982	Damson Oil Corp	-1.36	1.45	11.16	0.0970302	
			Juniper Petroleum Corp	0.0017637	-0.027046	0.0126268		
7		12/20/1982	Mesa Petroleum Co	0.24	-0.2	11.01	-0.182459	
			General American Oil Co of Texas	0.0297851	-0.562367	0.0239998		
8		12/21/1982	Burlington Northern Inc	1.09	-1.11	5.67	-0.061835	
	El Paso Co		-0.00461	-0.001696	0.012539			
1983	10	1/3/1983	National Distillers & Chemical Corp	-0.08	-0.02	13.34	-0.016405	
			Suburban Propane Gas Corp	-0.006568	0.1099935	0.0135572		
	11	1/10/1983	Phillips Petroleum Co	-0.7	0.51	6.35	-0.05028	
			General American Oil Co of Texas	-0.006568	0.1099935	0.0135572		
	12	2/9/1983	Goodyear Tire and Rubber Cor	-0.7	0.51	6.35	-0.19271	
			Celeron Corp	-0.008449	0.157463	0.0117841		
	13	4/4/1983	Internorth Inc	-0.97	0.75	6.06	-0.118747	
			Belco Petroleum Corp	-0.005046	0.0934834	0.0109253		
	14	4/22/1983	Northwest Industries Inc	-0.62	0.47	5.91	0.1287841	
Pogo Producing Co			0.002619	-0.075934	0.0161253			

Year	No	Date	Merger Companies	CAPM			
				$\alpha_1$	$\alpha_2$	$\beta$	CAR
				-0.16	-0.12	7.54	-0.124799
15	5/23/1983		Diamond Shamrock Corp	-0.000105	0.0124742	0.0111559	
			Natomas Co	-0.02	0.09	12.7	-0.336721
				-0.003658	0.1233527	0.0086813	
				-0.57	0.66	7.17	0.0857169
16	6/8/1983		CSX Corp	-0.004472	0.1878337	0.013256	
			Texas Gas Resources Corp	-0.51	0.67	13.64	0.1578724
				0.0122311	-0.381582	0.0064257	
				0.77	-0.75	3.62	-0.381501
17	8/26/1983		Burlington Northern Inc	-0.003601	0.1522697	0.0088826	
			El Paso Co	-0.29	0.39	6.66	0.2930323
				-0.024933	0.8557479	0.0073277	
				-1.77	1.91	4.8	-0.274178
18	9/12/1983		Williams Cos	-0.004843	0.1431892	0.0115942	
			Northwest Energy Co	-0.36	0.34	9.04	0.0016097
				0.0232426	-0.720197	0.0130715	
				1.01	-1.01	5.96	-0.216063
19	10/3/1983		Kaneb Services Inc	-0.005268	0.1997665	0.0134902	
			Moran Energy Inc	-0.28	0.35	6.67	-0.081715
				-0.01519	0.4483297	0.0097797	
				-0.75	0.74	4.6	-0.292411
20	12/15/1983		Lear Petroleum Corp	0.0076136	-0.253039	0.0124962	
			Mcrae Consolidated Oil & Gas	0.62	-0.68	9.48	0.0336838
				-0.011867	0.395371	0.0138174	
				-0.87	0.97	9.55	0.1131667
21	12/28/1983		Pennzoil Co	-0.005507	0.0566594	0.0094455	
			Getty Oil Co	-0.89	0.34	6.25	0.489973
				0.002533	-0.142917	0.0091984	
				0.37	-0.77	5.6	0.1722354
1984							
22	1/9/1984		Texaco Inc	0.0333437	0.016577	-0.000501	
			Getty Oil Co	193.95	1.12	-1.97	-0.000225
				-0.014214	0.4857314	0.0136277	
				-0.85	0.97	7.53	-0.072689
23	1/25/1984		Howell Corp	0.0205268	-0.58605	0.0059051	
			Howell Petroleum Corp	1	-0.96	2.59	0.4479721
				-0.014417	0.446746	0.0088795	
				-0.75	0.78	4.13	-0.165763
24	1/25/1984		Royal Dutch Shell Group Netherlands	0.0144747	-0.421974	0.0106176	
			Shell Oil Co	1.6	-1.56	10.54	-0.14106
				0.0079171	-0.249786	0.0109928	
				0.59	-0.62	7.31	-0.458334
25	1/26/1984		Damson Oil Corp	-0.003987	0.1361739	0.0115592	
			Dorchester Gas Corp	-0.18	0.2	4.64	-0.118867
				0.006005	-0.124341	0.0088271	
				0.25	-0.18	3.38	-0.145714
26	3/6/1984		Chevron Corp	0.0043137	-0.122213	0.0120591	
			Gulf Corp	0.38	-0.36	9.22	0.1575353
				-0.022016	0.7148448	0.0118342	
				-1.76	1.93	8.01	-0.404582
27	3/12/1984		Mobil Corp	-0.000803	0.0366375	0.0128569	
			Superior Oil Co	-0.07	0.11	10.66	0.0519325
				-0.007557	0.2440947	0.0120687	

Year	No	Date	Merger Companies	CAPM			
				$\alpha_1$	$\alpha_2$	$\beta$	CAR
				-0.42	0.46	6.18	0.2557992
	28	11/6/1984	Houston Natural Gas Co	0.0102501	-0.282638	0.0039452	
				0.65	-0.67	1.81	-0.016544
			Texas Eastern Corp	-0.01893	0.4278821	-0.00104	
				-0.66	0.55	-0.26	-0.062516
	29	11/18/1984	Placer Development Ltd Canada	0.0096979	-0.245746	0.0053227	
				0.84	-0.8	3.39	
			Prairie Production Co	0.0174343	-0.432409	0.0030009	0.1491689
				1	-0.93	1.26	
1985							
	30	2/26/1985	SunShine Mining Co	0.0061916	-0.224312	0.0044762	
				0.64	-0.84	2.54	0.3486498
			Woods Petroleum Co	0.0112264	-0.327342	0.0055381	
				1.28	-1.37	3.45	0.0410743
	31	3/4/1985	Coastal Corp	0.020306	-0.570223	0.0031748	
				2.18	-2.24	1.86	0.0936869
			American Natural Resources Co	0.0045149	-0.128322	0.0039616	
				0.33	-0.34	1.6	-0.313279
	32	6/19/1985	Tenneco Inc	0.0055911	-0.166796	0.0086134	
				1.2	-1.25	7.73	0.0186451
			Goodyear Tire & Rubber Co	-0.000592	0.0106841	0.0134584	
				-0.13	0.08	12.2	0.0183468
	33	7/19/1985	Diversified Energies Inc	-0.015596	0.4191731	0.004392	
				-0.93	0.85	1.04	-0.103084
			Dyco Petroleum Corp	0.0109769	-0.335191	0.0019134	
				0.96	-1	0.66	-0.454555
	34	8/12/1985	Midcon Corp	0.000765	0.0045147	0.0041796	
				0.16	0.03	3.16	0.1933885
			United Energy Resources Inc	0.0075007	-0.186274	0.0013014	
				1.42	-1.18	0.86	-0.048505
	35	9/10/1985	Pacific Gas & Electric Co	-0.001957	0.0857495	0.0080464	
				-0.49	0.7	6.53	-0.032045
			Pacific Gas Transmission Co	0.0007167	0.0043354	0.0070184	
				0.11	0.02	3.29	0.1142078
	36	10/22/1985	Burlington Northern Inc	0.0119231	-0.368275	0.0135352	
				2.05	-1.94	10.57	-0.043922
			Southland Royalty Co	0.0301292	-1.003832	0.00999	
				2.85	-2.91	4.27	-0.362515
	37	12/31/1985	Occidental Petroleum Corp	0.009378	-0.313679	0.0091806	
				0.64	-0.63	4.31	-0.09462
			Midcon Corp	0.0090318	-0.279514	0.0085004	
				0.57	-0.52	3.67	-0.316658
1986							
	38	5/13/1986	Louisiana Land & Exploration Co	0.0284533	-1.080127	0.007607	
				2.05	-2.17	3.72	-0.123576
			Inexo Oil Co	0.0390668	-1.508153	0.0077997	
				1.12	-1.21	1.53	-0.192382
	39	6/12/1986	Triton Energy Corp	0.0195379	-0.726194	0.0015434	
				1.04	-1.06	0.54	0.1074315
			Worldwide Energy Corp	0.0164139	-0.7195	0.0043213	
				0.55	-0.66	0.96	0.2013447
	40	12/18/1986	Questar Corp	0.004363	-0.157316	0.0033989	
				0.64	-0.56	2.91	-0.057409

Year	No	Date	Merger Companies	CAPM			
				$\alpha_1$	$\alpha_2$	$\beta$	CAR
			Universal Resources	-0.00733	0.1218878	0.0020475	
				-0.45	0.18	0.72	0.3683426
1987							
	41	10/5/1987	Arkla Inc	0.0085036	-0.410672	0.00593	
				0.7	-0.71	6.92	0.277383
			Entex Inc	0.0533397	-2.548454	0.0012375	
				1.86	-1.87	0.62	-0.26806
	42	3/27/1987	British Petroleum Co	0.0122613	-0.474758	0.0068686	
				1.05	-0.91	5.59	-0.343724
			Standard Oil Co	0.0227301	-0.986105	0.0096675	
				1.97	-1.91	7.98	-0.182799
	43	6/23/1987	Conquest Exploration Co	0.0196657	-0.924326	0.0077229	
				0.72	-0.72	3.29	-0.133384
			Cenergy Corp	0.0224821	-1.001125	0.0052555	
				0.94	-0.9	2.58	0.2775809
	44	1/16/1987	Energy Development Partner Ltd	-0.025797	0.7572228	0.0009382	
				-0.81	0.69	0.19	-0.581604
			May Energy Partnemrs Ltd	0.0377686	-1.864527	0.005551	
				1.03	-1.21	0.99	-0.710916
	45	12/15/1987	Mesa Limited Partnership	-0.019588	0.7320656	0.0005215	
				-1.71	1.55	0.27	0.1272219
			KN Energy Inc	0.0013871	-0.150408	0.0039183	
				0.11	-0.26	5.01	-0.032997
1988							
	46	7/15/1988	Witco Corp	0.0032328	-0.157628	0.0074912	
				0.41	-0.43	10.86	0.1670766
			Calumet Inds Inc	0.0135013	-0.675285	0.0071823	
				0.75	-0.8	4.53	0.1016549
	47	2/24/1988	British Petroleum Co	0.0115575	-0.500865	0.0053713	
				1.45	-1.3	8.11	-0.00273
			Lear Petroleum Corp	0.0059223	-0.441229	0.0086123	
				0.29	-0.45	5.11	-0.031215
	48	9/27/1988	Utilicorp Utd Inc	0.0080811	-0.342143	0.0039682	
				1.53	-1.45	7.34	
			Michigan Energy Resources Co	0.0015084	0.0041999	0.0041214	-0.073237
				0.25	0.02	6.71	
1989							
	49	4/21/1989	Raytheon Company	0.0060016	-0.228793	0.0086688	
				1.5	-1.56	12.45	0.0436848
			Standard Havens	-0.007345	0.2075508	0.0134504	
				-0.11	0.09	1.2	0.014568
	50	2/22/1989	Panhandle Eastern Corp	0.0038585	-0.150415	0.006862	
				0.52	-0.52	5.25	0.258279
			Texas Eastern Corp	0.0021584	-0.004847	0.0104827	
				0.14	-0.01	3.93	-0.107678
1992							
	51	3/3/1992	Grace (W.R) & Co	0.0025642	-0.076335	0.0122251	
				0.34	-0.21	8.65	0.0249717
			Grace Energy Corp	-0.0059	0.2166474	0.0044674	
				-0.54	0.4	2.16	-0.511476
1993							
	52	6/18/1993	Apache Corporation	-0.01552	1.538192	0.005676	
				-0.79	0.88	2.27	-0.375142

Year	No	Date	Merger Companies	CAPM			CAR
				$\alpha_1$	$\alpha_2$	$\beta$	
1994			Hadson Energy Resources Corp	0.0136459	-1.143807	-0.0006	
				0.62	-0.59	-0.22	0.0306186
	53	12/13/1994	Williams Cos	0.0035351	-0.201321	0.0125962	
1995			Transco Energy Co	0.0075699	-0.540307	0.0078624	
				1.56	-1.64	5.07	-0.238065
	54	5/4/1995	Barret Resources Corp	0.0032495	-0.072503	0.0031088	
1996			Plains Petroleum Co	0.004059	-0.204978	0.0010125	
				0.75	-0.69	0.61	0.1533363
	55	8/25/1995	Enron Crop	-0.011915	0.6050754	0.0038235	
1997			Coda Energy Inc	-0.000224	0.014793	-0.010964	
				-0.13	1.03	-0.79	-0.169895
	56	7/22/1996	Seagull Energy Corp	-0.013882	0.7340952	0.0062074	
1998			Global Natural Resources Inc	0.009689	-0.381666	0.0053147	
				0.61	-0.49	2.83	39.54442
	57	9/23/1996	Ultramar Corp	-0.005361	0.3068594	0.0043385	
1999			Diamond Shamrock Inc	-0.00583	0.3071389	0.0047625	
				-0.4	0.43	3.18	0.1248448
	58	7/17/1997	Burlington Resources Inc	-0.001306	0.0222744	0.0067565	
2000			Louisiana Land & Exploration Co	0.0272973	-1.406458	0.0079631	
				1.95	-2.03	5.59	0.123655
	59	5/27/1997	Columbia Gas System Inc	0.0164305	-0.7451	0.0045597	
2001			Alamco Inc	0.0012006	-0.017365	0.0033137	
				0.06	-0.02	2.16	-0.276671
	60	6/20/1997	Forcenergy	-0.019698	1.108562	0.0059279	
2002			Edisto Resources Corp	0.0188633	-0.921955	0.0034323	
				1.07	-1.06	2.02	0.1109898
	61	10/20/1997	Kinder Morgan Energy Partners LP	-0.03935	1.998414	0.0010477	
2003			Santa Fe Pacific Pipeline Partner LP	-0.005327	0.2854666	0.000543	
				-0.62	0.68	0.7	-0.419552
	62	6/24/1997	Louis Dreyfus Natural Gas Corp	0.0062092	-0.275519	0.0058853	
2004			American Exploration Co	0.0046181	-0.232938	0.0076966	
				0.25	-0.25	4.37	0.4498834
	63	7/7/1997	Meridian Resources Corp	0.0006932	-0.016501	0.0054971	
2005			Caim Energy USA Inc	0.0166861	-0.85635	0.0049809	
				0.81	-0.84	2.45	-0.271606
	64	4/7/1997	Mesa Inc	0.0012584	0.0664264	0.0107625	
2006			Parker & Parsley Petroleum Co	0.0232309	-1.098098	0.0048264	
				0.03	0.03	2.58	-0.073844

Year	No	Date	Merger Companies	CAPM			
				$\alpha_1$	$\alpha_2$	$\beta$	CAR
				1.21	-1.16	2.64	-0.140968
	65	6/17/1997	Santa Fe Energy Resources Inc	-0.0122	0.6696237	0.0037087	
			McFarland Energy	-0.68	0.76	2.23	0.0370586
				-0.002554	0.1759023	0.0009824	
				-0.14	0.19	0.57	-0.247411
	66	11/24/1997	Williams Cos Inc	0.0396358	-2.000162	0.0089409	
			Mapco Inc	1.54	-1.57	4.7	-0.094572
				-0.008482	0.4089963	0.0037842	
				-0.97	0.94	5.85	-0.232215
1998							
	67	5/4/1998	Atlantic Richfield Co	-0.063497	3.028171	0.0066405	
			Union Texas Petroleum Holding Inc	-1.82	1.73	2.31	-0.05529
				0.0192798	-0.968591	0.0047717	
				1.6	-1.61	4.81	0.162992
	68	8/11/1998	British Petroleum Co PLC	-0.010692	0.5383853	0.0079873	
			Amoco Corp	-0.73	0.73	8.53	0.1709605
				0.0161526	-0.996505	0.0049673	
				0.37	-0.45	1.78	0.2093506
	69	12/23/1998	Chevron Corp	-0.012845	0.6892377	0.0057336	
			Rutherford-Moran Oil Corp	-1.4	1.43	6.66	-0.096341
				0.0255418	-1.709378	0.0035516	
				0.39	-0.52	0.85	0.5436956
	70	12/1/1998	Exxon Corp	-0.000298	0.020328	0.0052645	
			Mobil Corp	-0.04	0.05	6.9	0.044584
				-0.011747	0.6028347	0.0058626	
				-1.27	1.26	6.76	-0.11093
	71	10/15/1998	Kerr-McGee	-0.008833	0.3862201	0.0075823	
			Oryx Energy co	-0.77	0.67	10.66	0.0233611
				-0.010359	0.3744532	0.0097661	
				-0.52	0.37	7.89	0.1554071
	72	6/18/1998	Lyondell Petrochemical Co	0.0031919	-0.148469	0.0074094	
			Atlantic Richfield Co	0.17	-0.16	6.03	-0.095613
				-0.048556	2.312482	0.0066025	
				-1.16	1.09	2.35	0.0304586
	73	3/23/1998	Plains Resources Inc	0.0126176	-0.629576	0.0051142	
			Goodyear Tire & Rubber Co	0.75	-0.75	4	-0.008695
				0.0030385	-0.130453	0.0079813	
				0.29	-0.25	9.95	-0.147431
	74	5/29/1998	Pogo Producing Co	0.0121359	-0.731593	0.0092977	
			Arch Petroleum Inc	0.65	-0.78	6.97	0.0364401
				0.0072105	-0.425101	0.0043762	
				0.22	-0.25	1.83	-0.089367
	75	11/25/1998	Seagull Energy Corp	-0.01432	0.5726361	0.0144996	
			Ocean Energy Inc	-1.02	0.8	11.47	-0.233544
				-0.074783	3.465413	0.0178606	
				-2.07	1.86	5.49	0.171818
	76	11/16/1998	Vulcan Materials Co	0.0170768	-0.836758	0.0058906	
			CalMat Co	2.11	-2.02	8.17	-0.136195
				0.0251697	-1.319305	0.0103766	
				2.06	-2.11	9.54	-0.268894
1999							
	77	4/1/1999	BP Amoco PLC	-0.014528	0.806302	0.0063641	
				-1.46	1.5	7.62	0.0329938



Year	No	Date	Merger Companies	CAPM			
				$\alpha_1$	$\alpha_2$	$\beta$	CAR
			Atlantic Richfield Co	-0.017804	0.9190628	0.0053285	
	78	6/1/1999	Crompton & Knowles Corp	-1.74	1.67	6.21	-0.184888
			Witco Corp	0.0333132	-1.934131	0.0070381	
				1.97	-2.08	5.34	-0.010007
	79	5/20/1999	Devon Energy Corp	-0.003849	0.0378008	0.004169	
				-0.23	0.04	3.22	0.437595
			PennzEnergy Co	-0.018724	0.9789451	0.006394	
				-1.38	1.32	5.91	0.1155076
	80	2/24/1999	Dominion Resources Inc	-0.015255	0.4804812	0.0070754	
				-0.53	0.31	3.11	-0.200209
			Remington Energy Ltd	0.0026285	-0.147367	0.0016707	
				0.44	-0.46	3.21	0.1778505
				-0.021697	1.000416	0.0042564	
				-0.87	0.74	1.94	0.9868215
2000							
	81	11/6/2000	Amerada Hess Corp	0.0074168	-0.323854	0.0003959	
				0.69	-0.65	0.44	-0.0841
			Lasmo PLC	0.0148039	-0.694869	0.0024031	
				0.87	-0.88	1.68	0.0164239
	82	3/16/2000	BP Amoco PLC	0.0210859	-1.232263	-0.000719	
				0.44	-0.48	-0.27	0.0658679
			Vastar Resources Inc	0.0075935	-0.338541	0.0045559	
				0.33	-0.27	3.51	-0.190881
	83	10/16/2000	Chevron Corp	0.0007079	-0.041274	0.0005052	
				0.07	-0.09	0.58	-0.115818
			Texaco Inc	-0.004563	0.1823463	0.0009266	
				-0.41	0.35	0.99	-0.303713
	84	12/27/2000	Hunt Oil Co	0.0354206	-1.73179	-0.000572	
				2	-2.21	-0.49	1.2084554
			Berkley Petroleum Corp	-0.035461	1.717996	0.0025964	
				-2.25	2.46	2.5	-0.870298
	85	3/20/2000	North Coast Energy Inc	0.0315395	-1.371079	-0.00426	
				0.25	-0.2	-0.57	0.9598747
			Belden & Blake Corp	0.0220481	-1.123611	0.0029929	
				0.88	-0.84	2.11	-0.150946
	86	10/20/2000	Stone Energy Corp	-0.015747	0.7779759	0.0017182	
				-1.02	1.08	1.33	-0.151965
			Basin Exploration Inc	-0.002943	0.1211518	0.0037814	
				-0.13	0.11	1.9	0.2315344
	87	12/22/2000	USX-Marathon Group	0.0010045	-0.006399	0.0042852	
				0.03	0	1.69	0.5118985
			Pennaco Energy Inc	0.0382894	-1.613664	0.0056717	
				1.79	-1.69	3.89	-0.001376
2001							
	88	7/10/2001	Amerada Hess Corp	0.0019777	-0.045763	0.0003314	
				0.3	-0.15	0.4	-0.13315
			Triton Energy Ltd	0.0226589	-1.072124	0.0050414	
				1.69	-1.75	3.03	0.2361822
	89	2/12/2001	Anadarko Petroleum Corp	0.023656	-0.916822	0.0008135	
				1.16	-1.04	0.62	-0.302842
			Berkley Petroleum Corp	0.0037237	-0.022568	0.0034326	
				0.23	-0.03	3.31	-0.139109
	90	6/25/2001	Anadarko Petroleum Corp	0.0031082	-0.111889	0.001076	

Year	No	Date	Merger Companies	CAPM			
				$\alpha_1$	$\alpha_2$	$\beta$	CAR
				0.28	-0.22	0.84	0.0681658
			Gulfstream Resources Canada Ltd	0.0143904	-0.566675	0.0020774	
				1.25	-1.08	1.58	0.0339727
91	2/8/2001		Calpine Corp	-0.032905	1.31687	0.0044525	
				-0.71	0.66	1.51	-0.022395
			Encal Energy Ltd	0.0136374	-0.507893	-0.000275	
				0.61	-0.53	-0.19	-0.630931
92	5/29/2001		Conoco	-0.004937	0.2716201	-0.000716	
				-0.46	0.54	-0.82	0.2292616
			Gulf Canada Resources Ltd	0.0113862	-0.463054	0.0026276	
				0.99	-0.9	2.5	0.2355364
93	8/14/2001		Devon Energy Corp	-0.003023	0.1354867	-0.000688	
				-0.23	0.23	-0.87	0.0547426
			Mitchell Energy & Development Corp	-0.004494	0.2911332	0.0012306	
				-0.62	0.85	1.25	0.0827136
94	9/10/2001		Dominion Resources Inc	-0.004388	0.2486965	-0.000965	
				-0.95	1.1	-1.3	-0.163752
			Louis Dreyfus Natural Gas Corp	-0.001767	0.0953738	0.0020233	
				-0.22	0.25	1.61	0.1279215
95	5/23/2001		EOG Resources Inc	0.0079781	-0.275743	0.0003793	
				0.59	-0.46	0.31	-0.234656
			Energy Search Inc	-0.008402	0.3998418	-0.001145	
				-0.44	0.47	-0.67	-0.090422
96	5/14/2001		Kerr-McGee	0.0039441	-0.13077	0.0004733	
				0.4	-0.3	0.6	0.0997413
			HS Resources Inc	-0.004105	0.3052698	0.0031577	
				-0.29	0.48	2.76	-0.394855
97	12/18/2001		Magnum Hunter Resources Inc	-0.014245	0.9084628	0.0022154	
				-2.41	2.65	1.71	0.2043085
			Prize Energy Corp	-0.007008	0.4471495	0.0015779	
				-1.52	1.67	1.58	-0.053908
98	11/18/2001		Phillips Petroleum Co	-0.000107	0.0052849	0.0017428	
				-0.03	0.03	2.44	0.3276604
			Conoco Inc	-0.00078	0.0493945	0.0009304	
				-0.19	0.22	1.18	0.3170646
99	2/4/2001		Phillips Petroleum Co	0.0039363	-0.114732	-0.000738	
				0.31	-0.21	-0.93	0.060943
			Tosco Corp	0.0058103	-0.206164	0.0003253	
				0.43	-0.36	0.38	0.0743887
100	3/1/2001		Plains All American Pipeline LP	0.0034266	-0.089588	0.0003531	
				0.42	-0.25	0.66	0.0551225
			Murphy Oil Corp	0.014809	-0.601661	-0.000939	
				1.11	-1.05	-1.07	0.2869853
101	7/17/2001		Tesoro Petroleum Corp	-0.006658	0.3560746	0.0029019	
				-0.8	0.93	2.67	0.1416386
			BP PLC	-0.005437	0.2282843	0.0009461	
				-1.04	0.94	1.42	-0.035775
102	3/20/2001		Valero Energy Corp	0.0177004	-0.707029	0.0022649	
				1.11	-1.03	2.15	0.2583939
			Huntway Refining Co	-0.011114	0.5292658	-0.000583	
				-0.3	0.33	-0.24	0.4197556
103	5/7/2001		Valero Energy Corp	0.019647	-0.770334	0.0023141	
				1.39	-1.24	2.21	0.6234512

Year	No	Date	Merger Companies	CAPM			
				$\alpha_1$	$\alpha_2$	$\beta$	CAR
			Ultramar Diamond Shamrock Corp	0.0117779	-0.413764	0.001432	
	104	5/7/2001	Williams Cos Inc	1.07	-0.85	1.76	0.4620561
			Barrett Resources Corp	0.0037848	-0.124219	0.0060811	
				0.26	-0.19	5.64	0.3483845
				-0.007282	0.4472346	0.0015521	
				-0.38	0.54	1.1	-0.065477
2002							
	106	2/20/2002	BJ Services Co	0.0018481	-0.417952	0.0052395	
				0.17	-0.55	1.97	-0.105811
			Great Lakes Chemical Corp	-0.00073	-0.022759	0.0080421	
				-0.26	-0.11	11.39	0.2467718
	107	3/11/2002	Chesapeake Energy Corp	-0.001371	0.0042405	0.0076761	
				-0.23	0.01	4.9	0.0080392
			Canaan Energy Corp	-0.001236	0.0455941	0.0021769	
				-0.06	0.05	1.3	0.6092749
	108	5/28/2002	Conoco Inc	0.0036265	-0.39152	0.0043101	
				1.15	-1.32	4.71	-0.112224
			Gulf Indonesia Resources Ltd	0.0033714	-0.191054	0.0029588	
				0.65	-0.39	1.93	-0.023241
	109	2/12/2002	Giant Industries Inc	-0.003004	0.3121414	0.0064461	
				-0.52	0.78	4.58	0.1514645
			BP PLC	-0.002548	0.1874422	0.0045704	
				-0.86	0.9	6.32	0.0125362
	110	5/29/2002	Newfield Exploration Co	0.0040266	-0.371205	0.0037061	
				1.02	-1	3.15	-0.064975
			EEX Corp	0.0137018	-1.701211	0.0147085	
				1.56	-2.05	5.58	0.2435928
	111	3/25/2002	Royal Dutch Petroleum	0.0011467	-0.112221	0.0062433	
				0.43	-0.54	8.69	0.1581315
			Pennzoil Quaker State Co	0.003089	-0.222821	0.0098329	
				0.55	-0.51	6.49	0.3754281
	112	3/18/2002	Santos Ltd	0.0009873	-0.127573	0.0028504	
				0.29	-0.49	3.18	-0.198876
			Esenjay Exploration Inc	0.0004048	-0.209136	0.0087946	
				0.05	-0.34	4.21	-0.040432
	113	2/5/2002	Tesoro Petroleum Corp	-0.000168	0.0909971	0.0063553	
				-0.03	0.25	4.69	-0.060382
			Valero Energy Corp	0.0007028	0.0540002	0.0052303	
				0.15	0.17	4.32	-0.222891
	114	8/20/2002	Unocal Corp	0.0014732	-0.126505	0.0057089	
				0.57	-0.43	8.44	0.0281731
			Pure Resources Inc	-0.000998	0.042922	4.64E-06	
				-0.33	0.18	0.01	0.2840859
	115	4/11/2002	Williams Energy Partners	0.0091387	-0.347582	0.000367	
				0.71	-0.62	0.44	0.3483808
			Williams Cos Inc	-0.000702	-0.143173	0.0084509	
				-0.12	-0.3	5.12	0.4529299
2003							
	116	2/24/2003	Devon Energy Corp	-5.47E-05	0.2185613	0.0080202	
				-0.01	0.13	10.83	0.0095748
			Ocean Energy Inc	-0.005312	1.051388	0.0079693	
				-0.52	0.63	10.8	0.0328244
	117	5/29/2003	Edge Petroleum Corp	0.0248194	-4.517809	-9.94E-05	

Year	No	Date	Merger Companies	CAPM			
				$\alpha_1$	$\alpha_2$	$\beta$	CAR
				1.79	-1.86	-0.08	-0.284955
			Miller Exploration Co	0.0560506	-7.948908	0.013478	
				0.81	-0.66	2.19	0.7215892
	118	3/31/2003	Evergreen Resources Inc	-0.001654	0.4030209	0.0056813	
				-0.19	0.28	8.36	-0.214325
			Carbon Energy Corp	0.0015985	-0.132398	-0.000576	
				0.29	-0.14	-1.35	-0.011711
	119	7/1/2003	Unit Corp	-0.003737	0.7413481	0.0096631	
				-0.38	0.42	10.14	-0.023359
			PetroCorp Inc	0.0128793	-2.142561	0.0002507	
				2.59	-2.41	0.52	0.2176056
2004							
	120	4/15/2004	EnCana Corp	-0.004274	1.381227	0.0025543	
				-0.93	1.17	2.65	-0.076528
			Tom Brown Inc	0.004329	-0.896159	0.0062431	
				0.91	-0.73	6.24	-0.245311
	121	5/24/2004	Forest Oil Corp	-0.008797	2.313784	0.0072558	
				-1.44	1.43	5.8	0.1512038
			Wiser Oil Co	-0.005871	2.306102	0.0020673	
				-0.74	1.09	1.27	0.2781274
	122	4/7/2004	Kerr-McGee	0.0030161	-0.681415	0.0076758	
				0.39	-0.52	12.7	0.0343829
			Westport Resources Corp	-0.004694	0.9009419	0.0057528	
				-0.46	0.53	7.28	0.0169208
	123	12/16/2004	Noble Energy Inc	0.0013327	-0.098101	0.0089014	
				0.39	-0.13	7.91	0.0547861
			Patina Oil & Gas Corp	-0.004051	0.4275551	0.00887	
				-0.32	0.16	2.11	-0.002756
	124	6/9/2004	Petro Canada	-0.000515	0.1750513	0.0036425	
				-0.09	0.11	2.94	0.1837884
			Prima Energy Corp	0.0107885	-2.650774	0.0128779	
				1.22	-1.11	6.95	0.085489
	125	5/4/2004	Pioneer Natural Resources	-0.003201	1.054247	0.0069013	
				-0.55	0.69	6	0.0850654
			Evergreen Resources Inc	0.007632	-2.178387	-0.000461	
				0.41	-0.44	-0.12	0.015678
	126	2/12/2004	Plains Explorationa & Production Co	0.0092478	-2.112926	0.0088579	
				1.6	-1.51	7.7	0.0136054
			Nuevo Energy Company	0.0011965	0.3857532	0.0044272	
				0.17	0.23	3.24	-0.090642
	127	2/4/2004	Valero Energy Corp	0.006554	-1.26688	0.002545	
				1.24	-1	2.45	0.1632022
			El Paso Corp	-0.00265	0.0854653	0.0185884	
				-0.19	0.03	6.91	0.4042133
	128	11/1/2004	Valero LP	-0.003305	0.9748796	0.0043533	
				-0.79	0.98	4.6	-0.102721
			Kaneb Pipeline Partners LP	-0.005115	1.322769	0.0040577	
				-1.13	1.23	3.97	0.0803766
2005							
	129	4/4/2005	Chevron Corp	-0.003738	0.3415163	0.0071143	
				-0.42	0.24	1.78	-0.002527
			Unocal	-0.003224	0.8430584	0.0093782	
				-1.03	1.66	6.7	-0.114893

Year	No	Date	Merger Companies	CAPM			
				$\alpha_1$	$\alpha_2$	$\beta$	CAR
130	12/12/2005	ConocoPhillips	0.0006016	-0.215116	0.0148192		
			0.04	-0.17	3.3	-0.028145	
		Burlington Resources Inc	0.0037127	-0.183854	0.0169602		
			0.68	-0.38	9.73	0.014828	
131	11/8/2005	Delta Petroleum Corp	-0.006631	0.6512915	0.0199629		
			-0.88	0.92	8.25	-0.266396	
		Castle Energy Corp	-0.009984	1.069607	0.0124487		
			-1.15	1.3	4.42	-0.267915	
132	1/26/2005	Energy Transfer Partner LP	-0.001833	0.7094348	0.0048858		
			-0.76	1.5	5.39	0.0537692	
		American Electric Power Co Inc	0.0009321	-0.149207	0.0064843		
			0.46	-0.37	8.47	0.0599074	
133	9/19/2005	Norsk Hydro ASA	0.0000791	0.1578374	0.0096887		
			0.02	0.44	7.19	-0.256381	
		Spinnaker Exploration Co	-0.006543	0.7655524	0.0130982		
			-1.36	1.51	6.86	-0.091672	
134	10/13/2005	Occidental Petroleum Corp	0.0001855	0.0594443	0.0124508		
			0.05	0.16	8.68	-0.118991	
		Vintage Petroleum Inc	-0.00158	0.3642806	0.0155551		
			-0.27	0.63	7.04	0.1574091	
135	4/4/2005	Petrohawk Energy Corp	0.01725	-2.200858	0.0028987		
			1.44	-1.13	0.53	-0.269776	
		Mission Resources Corp	0.0129645	-1.575015	0.0222243		
			1.57	-1.17	5.96	0.020171	
136	7/11/2005	Pogo Producing Co	-0.003616	0.5537809	0.0169696		
			-0.5	0.61	5.77	0.0141202	
		Unocal Corp	-0.000812	0.3377308	0.0083011		
			-0.22	0.72	5.37	-0.078564	
137	4/25/2005	Valero Energy Corp	-0.005292	0.9233111	0.0145064		
			-0.54	0.62	3.28	-0.536827	
		Premcor Inc	-1.28E-05	0.2961472	0.0088766		
			0	0.53	5.37	-0.433625	
2006							
138	6/23/2006	Anadarko Petroleum Corp	0.0258072	-1.828231	0.0249473		
			1.51	-1.68	5.84	0.0868572	
		Kerr-McGee Corp	0.013291	-0.955805	-0.00125		
			0.78	-0.88	-0.3	0.2279163	
139	5/30/2006	Kinder Morgan Inc Management	0.0046661	-0.347333	0.0051336		
			1.57	-1.77	5.75	-0.014835	
		Kinder Morgan Inc	0.0068308	-0.455672	0.0115185		
			2.06	-2.09	11.63	0.0851018	
140	7/8/2006	MDU Resources Group Inc	-0.000833	0.090901	0.0115703		
			-0.21	0.37	13.28	-0.013665	
		Cascade Natural Gas Corp	-0.005814	0.3514922	0.010169		
			-1.34	1.29	10.56	0.0999936	
141	4/21/2006	Petrohawk Energy Corp	0.0037276	-0.254421	0.0165995		
			0.46	-0.45	7.32	-0.15527	
		KCS Energy Inc	0.0111497	-0.696069	0.0210811		
			1.37	-1.21	9.06	-0.173749	
142	6/12/2006	Plains All American Pipeline LP	-0.002896	0.2131538	0.0064609		
			-0.8	0.91	6.26	0.0271203	
		Pacific Energy Partner LP	-0.002225	0.1333523	0.0072795		
			-0.57	0.53	6.53	-0.116678	

Year	No	Date	Merger Companies	CAPM			
				$\alpha_1$	$\alpha_2$	$\beta$	CAR
2007							
	143	1/7/2007	Forest Oil Corp	-0.015845	0.7469474	0.0136579	
				-0.67	0.6	5.48	0.0130982
			The Houston Exploration Co	0.0111345	-0.607563	0.0063574	
				0.76	-0.78	4.09	0.2036485
	144	6/19/2007	General Electric Co	0.0002273	-0.014395	0.0062671	
				0.03	-0.04	10.32	-0.059948
			Regency Energy Partners LP	-0.010484	0.5537855	0.0008558	
				-0.93	0.97	0.87	0.0779769
	145	7/17/2007	Plains Exploration & Production Co	-0.007332	0.3713962	0.0095547	
				-0.43	0.44	6.52	-0.327327
			Pogo Producing Co	0.0060244	-0.307989	0.009364	
				0.33	-0.34	5.99	0.0127523

## **Appendix 9**

### **Fama-French Three Factors Model Result (GLS)**

Year	No	Date	Merger Companies	Fama-French Model					
				$\alpha$	$\beta$	s	h	CAR	
1981	1	5/6/1981	Dome Petroleum Ltd Canada	0.0003462	0.0157816	-0.0032839	0.0082099	0.117516404	
			Conoco Inc	0.23	5.66	-0.8	1.83		
	2	6/26/1981	Seagram Ltd	-0.0001166	0.0077486	-0.0098694	-0.0097316	-0.190277541	
			Conoco Inc	-0.13	4.62	-4	-3.61		
	3	7/7/1981	Du Pont	-0.000697	0.0090716	0.0029586	0.0048793	0.625229132	
			Conoco Inc	-0.96	6.83	1.54	2.33		
			Conoco Inc	0.0001214	0.0078352	-0.0082972	-0.0102057		
	1982	4	2/11/1982	Allied Corp & Continental Group	0.0008023	0.0137805	-0.0048948	0.0063107	0.075144904
				Supron Energy Corp	0.87	7.98	-1.99	2.33	
5		8/16/1982	Occidental Petroleum Corp	0.0009987	0.0067838	-0.0095913	-0.010199	0.10369277	
			Cities Service Co	0.93	3.42	-3.39	-3.28		
6		11/1/1982	Damson Oil Corp	0.0003139	0.0109591	-0.0074073	-0.0000897	-0.171405515	
			Juniper Petroleum Corp	0.33	5.25	-2.95	-0.03		
7		12/20/1982	Mesa Petroleum Co	0.0014416	0.0024258	-0.0046921	-0.0399551	-0.303731691	
			General American Oil Co of Texas	0.41	0.32	-0.51	-3.52		
1983		10	1/3/1983	National Distillers & Chemical Corp	-0.0004848	0.0106107	-0.0005472	-0.0030606	0.011890754
	Suburban Propane Gas Corp			-0.59	5.49	-0.25	-1.2		
	11	1/10/1983	Phillips Petroleum Co	-0.0012491	0.0137012	0.0140943	-0.0111792	-0.098513545	
			General American Oil Co of Texas	-0.62	3.27	2.45	-2.02		
	12	2/9/1983	Goodyear Tire and Rubber Cor	-0.0004848	0.0106107	-0.0005472	-0.0030606	-0.146107619	
			Celeron Corp	-0.59	5.49	-0.25	-1.2		
	13	4/4/1983	Internorth Inc	-0.0011191	0.0038109	-0.0054359	-0.0170757	-0.029160769	
			Belco Petroleum Corp	-0.55	0.99	-1.06	-3.05		
	14	4/22/1983	Northwest Industries Inc	0.0001906	-0.0009321	-0.0060849	-0.0262385	0.122725962	
Pogo Producing Co			0.1	-0.26	-1.29	-5.09			
15	5/23/1983	Diamond Shamrock Corp	0.0000621	0.0123085	-0.0047592	-0.0057898	-0.821338432		
		Natomas Co	0.06	6.59	-1.9	-2.12			
16	6/8/1983	CSX Corp	-0.0019376	0.0109226	0.0077681	-0.0060375	-0.087528817		
		Texas Gas Resources Corp	-1.51	4.49	2.39	-1.7			
17	8/26/1983	Burlington Northern Inc	-0.0019376	0.0109226	0.0077681	-0.0060375	-0.381751874		
		El Paso Co	-1.51	4.49	2.39	-1.7			
18	9/12/1983	Williams Cos	-0.000356	0.0083401	-0.0007717	0.0058135	0.227851436		
		Northwest Energy Co	-0.44	5.61	-0.39	2.67			
19	10/3/1983	Kaneb Services Inc	0.0023357	0.0030212	0.0002437	-0.0111138	0.099396231		
		Williams Cos	1.7	1.18	0.07	-2.97			



Year	No	Date	Merger Companies	Fama-French Model				
				$\alpha$	$\beta$	s	h	CAR
1984	20	12/15/1983	Moran Energy Inc	-0.0009613	1.26E-02	0.0052656	0.0040295	
			Lear Petroleum Corp	-0.52	3.47	1.06	0.66	-0.274439987
	21	12/28/1983	Mcrae Consolidated Oil & Gas	-0.0009764	1.31E-02	-0.0048519	0.0055363	
			Pennzoil Co	-0.87	5.94	-1.6	1.48	0.060261671
	22	1/9/1984	Getty Oil Co	0.001329	1.29E-02	-0.0096655	0.0057394	
			Texaco Inc	1.11	5.39	-2.94	1.41	0.14197424
	23	1/25/1984	Howell Corp	-0.0021842	2.31E-03	-0.0077514	-0.0141936	
			Howell Petroleum Corp	-1.32	0.8	-1.98	-2.66	0.545250723
	24	1/25/1984	Royal Dutch Shell Group Netherlands	-0.002061	5.41E-03	0.0005971	-0.0142714	
			Shell Oil Co	-1.11	1.7	0.14	-2.45	0.184092503
	25	1/26/1984	Damson Oil Corp	0.0333379	-3.98E-04	-0.0011617	0.0008824	
			Dorchester Gas Corp	184.93	-1.1	-2.3	1.44	-0.003108717
	26	3/6/1984	Chevron Corp	0.0012888	1.61E-02	-0.0075781	0.0143239	
			Gulf Corp	0.87	5.52	-1.86	2.9	-0.128990443
	27	3/12/1984	Mobil Corp	0.0002817	9.99E-03	0.0087967	0.0024033	
			Superior Oil Co	0.15	2.63	1.68	0.38	0.512920714
	28	11/6/1984	Houston Natural Gas Co	0.0003027	1.05E-02	0.003678	0.0005944	
			Texas Eastern Corp	0.17	2.95	0.75	0.1	-0.142039526
	29	11/18/1984	Placer Development Ltd Canada	-0.0004679	1.45E-02	0.0019443	0.008729	
			Prairie Production Co	-0.59	8.82	0.86	3.2	-0.136728626
30	2/26/1985	SunShine Mining Co	-0.0010961	1.35E-02	-0.0042888	0.0102383		
		Woods Petroleum Co	-0.93	5.53	-1.27	2.53	-0.502016752	
31	3/4/1985	Coastal Corp	-0.0007013	1.79E-02	0.0124785	0.0084912		
		American Natural Resources Co	-0.35	4.36	2.21	1.25	-0.042101786	
32	6/19/1985	Tenneco Inc	0.0008809	1.34E-02	0.0078281	0.0075486		
		Goodyear Tire & Rubber Co	0.42	3.1	1.31	1.05	-0.086375049	
33	7/19/1985	Diversified Energies Inc	-0.0013417	1.67E-02	-0.0046193	0.0158919		
		Dyco Petroleum Corp	-1.43	8.32	-1.77	5.02	0.23663971	
34	8/12/1985	Midcon Corp	0.0010239	1.36E-02	-0.0059252	0.0105616		
		United Energy Resources Inc	0.92	5.75	-1.91	2.82	-0.372547933	
35	9/10/1985	Pacific Gas & Electric Co	-0.0010564	1.77E-02	-0.0050067	0.0159029		
		Pacific Gas Transmission Co	-1.22	9.64	-2.12	5.53	0.056334305	
36	10/22/1985	Burlington Northern Inc	2.55E-05	1.21E-02	-0.0093552	0.0077471		
		Southland Royalty Co	0.02	3.79	-2.28	1.55	0.246460529	
37	10/22/1985	Burlington Northern Inc	-5.93E-04	1.05E-02	0.0056987	0.0097379		
		Southland Royalty Co	-0.38	2.53	1.14	1.88	0.035135877	
38	10/22/1985	Burlington Northern Inc	-3.63E-03	2.79E-03	-0.0022234	0.0100464		
		Southland Royalty Co	-1.26	0.37	-0.24	1.05	-0.028141268	
39	10/22/1985	Burlington Northern Inc	5.87E-04	1.36E-02	0.0143871	0.0062329		
		Southland Royalty Co	0.52	4.73	4.04	1.7	-0.064979204	
40	10/22/1985	Burlington Northern Inc	1.19E-03	4.37E-03	0.00086	0.0025356		
		Southland Royalty Co	0.67	0.97	0.15	0.44	-0.272684383	

Year	No	Date	Merger Companies	Fama-French Model				
				$\alpha$	$\beta$	s	h	CAR
	37	12/31/1985	Occidental Petroleum Corp	-3.58E-04	1.41E-02	0.0012349	0.0122108	
			Midcon Corp	-0.29	4.05	0.26	2.56	-0.112421547
1986	38	5/13/1986	Louusiana Land & Exploration Co	6.70E-04	1.14E-02	0.0006002	0.0076389	
			Inexco Oil Co	0.49	2.99	0.11	1.46	-0.316342771
	39	6/12/1986	Triton Energy Corp	-1.47E-03	7.79E-03	-0.0048717	0.012392	
			Worldwide Energy Corp	-1.13	2.6	-1.08	2.48	-0.099599161
	40	12/18/1986	Questar Corp	-4.48E-03	3.00E-02	0.0369181	0.0337423	
			Universal Resources	-1.39	4.03	3.3	2.72	0.122699845
	41	10/5/1987	Arkla Inc	-1.20E-03	9.56E-03	0.0076942	0.0169793	
			Entex Inc	-0.66	2.3	1.24	2.42	0.050203708
	42	3/27/1987	British Petroleum Co	-4.46E-03	1.70E-02	0.0224657	0.0122295	
			Standard Oil Co	-1.49	2.52	2.23	1.07	0.162302998
	43	6/23/1987	Conquest Exploration Co	5.37E-04	6.67E-03	0.0063893	0.0034797	
			Cenergy Corp	0.58	3.61	2.31	1	-0.070381684
	44	1/16/1987	Energy Development Partner Ltd	-4.38E-03	7.47E-03	0.0111753	0.0035699	
			May Energy Partnemrs Ltd	-1.92	1.65	1.65	0.42	0.328977535
	45	12/15/1987	Mesa Limited Partnership	-2.30E-04	1.15E-02	0.0086826	0.0076311	
			KN Energy Inc	-0.34	8.72	4.61	3.06	0.313980727
	46	7/15/1988	Witco Corp	-4.35E-04	1.39E-02	0.0211254	0.0141649	
			Calumet Inds Inc	-0.28	4.46	4.75	2.41	-0.296728874
	47	2/24/1988	British Petroleum Co	1.01E-03	1.07E-02	0.0012196	0.008435	
			Lear Petroleum Corp	1.09	5.64	0.42	2.48	-0.323463639
	48	9/27/1988	Utilicorp Utd Inc	2.04E-04	1.53E-02	0.0005576	0.0191799	
			Michigan Energy Resources Co	0.21	7.78	0.19	5.44	-0.124195779
	49	4/21/1989	Raytheon Company	-7.44E-05	1.31E-02	0.0083717	0.0092279	
			Standard Havens	-0.04	3.46	1.49	1.28	-0.19223873
	50	2/22/1989	Panhandle Eastern Corp	6.91E-04	1.22E-02	0.0051811	0.0211299	
			Texas Eastern Corp	0.38	3.77	1.08	3.44	0.176903569
	51	3/3/1992	Grace (W.R) & Co	-4.25E-03	5.21E-03	0.0032073	0.0109143	
			Grace Energy Corp	-1.5	0.7	0.29	1.02	-0.518523114
	52	6/18/1993	Apache Corporation	-7.41E-03	9.60E-03	-0.006558	0.0315617	
			Hadson Energy Resources Corp	-1.59	1.07	-0.48	1.81	-0.64044023
	53	12/13/1994	Williams Cos	-2.56E-03	1.02E-03	-0.00365	0.0075217	
				-1.63	0.33	-0.79	1.29	0.148854708
				-1.35E-03	8.91E-03	0.0075852	0.0131504	
				-1.03	7.35	4.87	3.45	-0.124396863
				1.95E-06	1.22E-02	0.0129573	0.0039049	
				0	12.61	10.74	1.26	0.151858336
				-3.14E-04	7.21E-03	0.0071355	-0.0126266	
				-0.11	2.67	2.12	-1.46	0.104142374
				9.08E-04	6.06E-03	0.0008127	0.0004157	
				0.8	5.88	0.62	0.13	0.014639648
				-2.86E-03	2.01E-02	0.0205233	0.0284797	
				-1	7.78	6.19	3.54	-0.0061
				6.28E-04	6.59E-03	0.007016	0.0020347	
				0.68	7.44	6.41	0.71	0.0125
				1.63E-03	6.98E-03	0.0072334	0.0034436	
				1.56	6.85	5.75	1.04	-0.0236
				-3.34E-04	9.76E-03	0.0015846	0.0009172	
				-0.69	6.56	0.87	0.32	0.039648233
				-2.60E-03	4.29E-02	0.0491957	0.0123038	
				-0.34	1.8	1.68	0.27	-0.149584408
				-0.0004719	6.38E-03	-0.0043572	0.0025088	
				-0.52	2.66	-1.45	0.52	0.257690282
				0.0010561	1.74E-02	0.0062159	0.017241	
				0.52	3.21	0.92	1.59	-0.124794816
				0.0003299	1.52E-02	0.0073032	0.006916	
				0.32	9.23	2.86	2.41	0.03711989
				-0.0025041	8.09E-03	0.0081921	0.009748	
				-1.64	3.34	2.19	2.31	-0.505700547
				0.0005653	1.11E-02	0.0070258	0.0105477	
				0.42	3.55	1.81	2.88	-0.337852478
				0.0000193	1.75E-03	0.0025671	0.0056398	
				0.01	0.5	0.59	1.38	0.031880844
				0.000612	1.43E-02	0.0034763	0.0067187	

Year	No	Date	Merger Companies	Fama-French Model				
				$\alpha$	$\beta$	s	h	CAR
1995			Transco Energy Co	0.52	5.91	0.96	1.32	0.167827367
				-0.0003586	9.81E-03	0.0052062	0.0067826	
	54	5/4/1995	Barret Resources Corp	-0.41	5.46	1.95	1.8	-0.263754607
				0.0019005	2.61E-03	0.0031856	-0.0069405	
			Plains Petroleum Co	1.36	0.75	0.65	-1.24	0.415526064
				0.0003471	3.45E-03	0.0071417	0.0037984	
55	8/25/1995	Enron Crop	0.43	1.71	2.53	1.18	0.145485333	
			-0.00013	6.64E-03	-0.0031918	0.0022664		
		Coda Energy Inc	-0.14	2.86	-1.06	0.64	-0.074245663	
			-0.0004248	6.86E-03	0.0099292	0.0002849		
1996	56	7/22/1996	Seagull Energy Corp	-0.25	1.58	1.75	0.04	-0.156625915
				0.0005734	1.67E-02	0.0150608	0.0187022	
			Global Natural Resources Inc	0.42	5.01	3.99	3.66	0.546501881
				0.0017122	6.63E-03	0.0049345	0.0010105	
	57	9/23/1996	Ultramar Corp	1.48	2.34	1.54	0.23	1.670694864
				0.0003859	8.66E-03	0.0075894	0.0033575	
		Diamond Shamrock Inc	0.4	3.63	2.98	0.94	-0.063513803	
			0.0002547	7.55E-03	0.0050577	0.0030407		
			0.24	2.94	1.84	0.79	0.104119854	
1997	58	7/17/1997	Burlington Resources Inc	-0.0011436	0.0097464	0.0038744	0.0035667	
				-1.38	4.42	1.76	1.18	-0.08315115
			Louisiana Land & Exploration Co	-0.0017265	1.29E-02	0.0045496	0.0079296	
				-1.52	4.16	1.47	1.87	0.129278072
	59	5/27/1997	Columbia Gas System Inc	0.0003794	1.10E-02	0.0026898	0.0089381	
				0.53	5.95	1.46	3.38	0.0126
			Alamco Inc	0.0008405	4.85E-03	0.0028466	0.0005211	
				0.67	1.52	0.9	0.11	-0.270411609
	60	6/20/1997	Forcenergy	0.0027647	5.97E-03	-0.0001066	-0.0001005	
				1.56	1.32	-0.02	-0.02	0.492510745
			Edisto Resources Corp	0.0001355	8.20E-03	0.0088658	0.0051123	
				0.1	2.37	2.57	1.05	0.080999064
	61	10/20/1997	Kinder Morgan Energy Partners LP	0.0024362	-5.93E-03	-0.0005775	-0.018384	
				0.77	-0.72	-0.07	-1.65	-0.320863974
			Santa Fe Pacific Pipeline Partner LP	-0.0005099	6.73E-03	0.0079331	0.0054032	
				-0.79	4.01	4.52	2.36	-0.313767884
	62	6/24/1997	Louis Dreyfus Natural Gas Corp	-0.0000333	1.24E-02	0.0065045	0.0093109	
				-0.03	4.26	2.23	2.27	0.11674977
			American Exploration Co	1.89E-06	9.02E-03	0.0038675	-1.80E-06	
				0	2.47	1.06	0	0.445483732
	63	7/7/1997	Meridian Resources Corp	-0.0004458	1.61E-02	0.0119791	0.0145944	
				-0.3	4.04	2.96	2.64	-0.080601608
			Cairn Energy USA Inc	-0.0008479	1.07E-02	0.0087308	0.0057378	
				-0.5	2.44	1.95	0.94	-0.281512742
64	4/7/1997	Mesa Inc	0.0022134	1.31E-02	-0.0006647	0.0064699		
			0.74	1.67	-0.08	0.57	-0.064857356	
		Parker & Parsley Petroleum Co	0.0001925	1.35E-02	0.0093094	0.0121088		
			0.16	4.17	2.76	2.59	-0.145601063	
65	6/17/1997	Santa Fe Energy Resources Inc	0.0007964	8.41E-03	0.0030631	0.0080717		
			0.6	2.46	0.91	1.67	0.068433281	
		McFarland Energy	0.0006777	6.42E-03	0.0051633	0.0083306		
			0.49	1.8	1.46	1.65	-0.230739272	
66	11/24/1997	Williams Cos Inc	-0.0006438	7.71E-03	-0.0095781	0.0067424		
			-0.34	1.99	-2.16	1.05	-0.166746586	
		Mapco Inc	-0.0005514	6.12E-03	0.002361	0.0038463		
			-0.83	4.63	1.56	1.75	-0.232196446	
1998	67	5/4/1998	Atlantic Richfield Co	-0.0038911	1.14E-02	0.0028325	0.0099409	
				-1.3	1.99	0.41	1.02	-0.091107525
			Union Texas Petroleum Holding Inc	-0.0004201	6.37E-03	0.0059866	-0.00052	
				-0.41	3.32	2.57	-0.16	0.166867883
	68	8/11/1998	British Petroleum Co PLC	-0.0009242	1.18E-02	0.0008355	0.0073612	
				-1.03	7.66	0.43	2.65	0.134943311
			Amoco Corp	-0.0037971	3.12E-03	-0.0063414	-0.0009216	
				-1.31	0.62	-0.99	-0.1	0.179913198
	69	12/23/1998	Chevron Corp	-0.0002485	6.28E-03	-0.0046715	0.0032314	
				-0.23	4.02	-2.62	1.04	-0.042710865
			Rutherford-Moran Oil Corp	-0.0089694	1.30E-02	0.016111	0.0135362	
				-2.05	1.68	1.67	1	0.684429362
70	12/1/1998	Exxon Corp	-0.0002613	4.79E-03	-0.0050939	0.0007814		

Year	No	Date	Merger Companies	Fama-French Model				
				$\alpha$	$\beta$	s	h	CAR
			Mobil Corp	-0.28	3.59	-3.27	0.3	0.046896855
				-0.0008542	5.58E-03	-0.0057586	0.0009796	
	71	10/15/1998	Kerr-McGee	-0.79	3.67	-3.23	0.33	-0.088996918
				-0.0014429	8.28E-03	0.00007	0.0020437	
			Oryx Energy co	-1.51	6.11	0.04	0.75	0.019824077
				-0.0025767	1.19E-02	0.0040482	0.0039239	
	72	6/18/1998	Lyondell Petrochemical Co	-1.52	5.04	1.37	0.82	0.014695017
				-0.0002565	1.09E-02	0.0039521	0.0067937	
			Atlantic Richfield Co	-0.2	4.71	1.39	1.66	-0.120344442
				-0.0039598	1.31E-02	0.0037421	0.0145703	
	73	3/23/1998	Plains Resources Inc	-1.34	2.48	0.58	1.57	0.00041267
				-0.0006595	1.06E-02	0.0100349	0.0060352	
			Goodyear Tire & Rubber Co	-0.49	4.11	3.31	1.38	-0.007741006
				-0.0008107	1.46E-02	0.0059674	0.0111174	
	74	5/29/1998	Pogo Producing Co	-1.06	10.18	3.53	4.57	-0.064704481
				-0.0030883	1.46E-02	0.0099671	0.0066262	
			Arch Petroleum Inc	-2.31	5.84	3.22	1.51	0.049681615
				-0.0004394	1.39E-03	0.003629	-0.0104926	
			Seagull Energy Corp	-0.18	0.31	0.64	-1.31	-0.103341302
	75	11/25/1998		-0.0025242	2.07E-02	0.011477	0.0132135	
				-1.64	9.46	4.47	3.04	-0.293123463
			Ocean Energy Inc	-0.0066664	2.47E-02	0.0156166	0.0131236	
				-1.63	4.26	2.29	1.14	0.152958939
	76	11/16/1998	Vulcan Materials Co	0.0012308	1.13E-02	0.0062303	0.011585	
				1.34	8.94	4.24	4.66	-0.109094005
			CalMat Co	0.0003059	1.60E-02	0.0101987	0.0107531	
				0.23	8.33	4.55	2.83	-0.22355299
1999								
	77	4/1/1999	BP Amoco PLC	0.0004105	8.85E-03	-0.0002184	0.0065904	
				0.37	5.74	-0.12	2.23	-0.006935423
			Atlantic Richfield Co	-0.0006683	8.59E-03	0.0012167	0.0080852	
				-0.59	5.48	0.67	2.69	-0.218901319
	78	6/1/1999	Crompton & Knowles Corp	-0.0009631	1.72E-02	0.0089527	0.0178609	
				-0.58	8.17	3.57	5.11	-0.054406058
			Witco Corp	-0.002628	1.06E-02	0.0040138	0.012932	
				-1.52	4.89	1.54	3.58	0.455784041
	79	5/20/1999	Devon Energy Corp	0.0000934	1.27E-02	0.0090153	0.0117843	
				0.07	7.1	4.2	3.95	0.140575359
			PennzEnergy Co	-0.0064823	9.80E-03	-0.0008887	0.0067303	
				-2.08	2.51	-0.19	1.04	-0.207136726
	80	2/24/1999	Dominion Resources Inc	-0.0000382	4.07E-03	-0.0028655	0.0068768	
				-0.06	4.72	-2.87	4.13	0.202513244
			Remington Energy Ltd	-0.0023013	1.13E-02	0.0084684	0.0152949	
				-0.81	2.85	1.84	1.99	1.01181021
2000								
	81	11/6/2000	Amerada Hess Corp	-0.000146	9.16E-03	0.0044062	0.015411	
				-0.12	5.78	2.69	6.27	-0.113596348
			Lasmo PLC	-0.0008152	1.08E-02	0.0046726	0.0144074	
				-0.41	4.07	1.71	3.52	0.008936533
	82	3/16/2000	BP Amoco PLC	-0.0029168	5.26E-03	0.0073048	0.0077397	
				-0.93	1.04	1.37	1.16	0.008933867
			Vastar Resources Inc	0.0011832	1.61E-02	0.0095508	0.0174268	
				0.8	6.84	3.86	5.59	-0.251875917
	83	10/16/2000	Chevron Corp	-0.0004477	6.95E-03	0.0003304	0.011078	
				-0.39	4.65	0.22	4.72	-0.018464059
			Texaco Inc	-0.0010494	8.77E-03	0.0008455	0.0136909	
				-0.87	5.55	0.52	5.51	-0.182839769
	84	12/27/2000	Hunt Oil Co	-0.003501	1.46E-03	0.0022517	0.0030838	
				-1.9	0.62	0.93	0.86	1.191236476
			Berkley Petroleum Corp	0.0018678	9.02E-03	0.0008567	0.0107803	
				1.17	4.45	0.41	3.52	-0.653168634
	85	3/20/2000	North Coast Energy Inc	0.0037235	9.60E-03	0.0203415	0.0184091	
				0.42	0.67	1.34	0.97	0.531956741
			Belden & Blake Corp	0.0010389	1.25E-02	0.007866	0.0146807	
				0.62	4.72	2.81	4.16	-0.208162445
	86	10/20/2000	Stone Energy Corp	0.0000405	1.03E-02	0.00953	0.0169105	
				0.02	4.45	4.02	4.67	-0.406847526
			Basin Exploration Inc	-0.001256	1.62E-02	0.0083364	0.0227176	
				-0.46	4.54	2.27	4.05	-0.059294389
	87	12/22/2000	USX-Marathon Group	0.0004806	6.20E-03	0.0033991	0.0039745	
				0.12	1.2	0.64	0.51	0.52570621
			Pennaco Energy Inc	0.0010685	1.15E-02	0.0044037	0.0094642	

Year	No	Date	Merger Companies	Fama-French Model				
				$\alpha$	$\beta$	s	h	CAR
				0.47	3.91	1.46	2.12	0.050850992
2001	88	7/10/2001	Amerada Hess Corp	-0.0008444	0.0101662	0.0057352	0.0139033	
				-0.68	5.54	2.42	5.76	-0.152778731
			Triton Energy Ltd	-0.0043544	0.0245225	0.0206254	0.0285898	
				-1.69	6.59	4.29	5.84	-0.005322126
	89	2/12/2001	Anadarko Petroleum Corp	0.0001401	0.0136041	0.0110755	0.0214073	
				0.07	5.27	4.11	5.74	-0.182078461
			Berkley Petroleum Corp	0.0021504	0.0092771	-0.0022572	0.0083385	
				1.28	4.47	-1.04	2.78	-0.100174508
	90	6/25/2001	Anadarko Petroleum Corp	-0.0023839	0.0166797	0.0127969	0.0222992	
				-1.22	5.89	3.39	5.94	-0.048695327
			Gulfstream Resources Canada Ltd	0.0005251	0.0092546	0.0104677	0.0105666	
				0.25	3.05	2.58	2.62	-0.022198404
	91	2/8/2001	Calpine Corp	-0.0034513	1.03E-02	-0.0005836	0.0083738	
				-0.71	1.67	-0.09	0.94	0.078249532
			Encal Energy Ltd	0.001704	9.14E-04	0.0020975	0.0022702	
				0.72	0.31	0.68	0.53	-0.612103165
	92	5/29/2001	Conoco	0.0006537	1.13E-03	0.0023884	0.0036641	
				0.49	0.69	1.42	1.42	0.275869485
			Gulf Canada Resources Ltd	0.0000515	7.38E-03	0.0074991	0.0069156	
				0.03	2.96	2.34	2.1	0.215965475
	93	8/14/2001	Devon Energy Corp	-0.0000139	-7.81E-04	-0.0004639	0.0001472	
				-0.01	-0.47	-0.27	0.06	0.062225212
			Mitchell Energy & Development Corp	0.000682	5.81E-03	0.0019392	0.0069227	
				0.36	2.48	0.65	2.2	0.100763337
	94	9/10/2001	Dominion Resources Inc	-0.0010461	0.0097847	-0.0001403	0.0155905	
				-1.02	6.5	-0.07	7.67	0.26825652
			Louis Dreyfus Natural Gas Corp	-0.0028522	1.86E-02	1.72E-02	0.0247559	
				-1.48	6.95	4.97	6.84	0.955162186
	95	5/23/2001	EOG Resources Inc	-0.0005168	1.36E-02	6.48E-03	0.0190305	
				-0.29	5.11	1.87	5.39	-0.238897939
			Energy Search Inc	-0.0004029	4.09E-03	2.87E-03	0.0071546	
				-0.15	1.03	0.56	1.36	-0.087116797
	96	5/14/2001	Kerr-McGee	-0.0009741	1.14E-02	8.61E-03	0.0162726	
				-0.81	6.96	3.98	7.39	0.13449938
			HS Resources Inc	0.0001814	1.77E-02	8.97E-03	0.0213429	
				0.1	7.3	2.81	6.56	-0.363251273
	97	12/18/2001	Magnum Hunter Resources Inc	-0.0009932	1.00E-02	1.10E-02	0.0153059	
				-0.52	5.06	3.29	5.05	0.146446275
			Prize Energy Corp	-0.0003291	5.50E-03	2.53E-03	0.0078854	
				-0.21	3.53	0.97	3.32	-0.084035285
	98	11/18/2001	Phillips Petroleum Co	-0.0006347	5.39E-03	5.52E-03	0.0066676	
				-0.56	4.67	2.99	3.97	0.363997815
			Conoco Inc	-0.000539	5.12E-03	4.02E-03	0.0074583	
				-0.44	3.98	1.95	3.98	0.359397877
	99	2/4/2001	Phillips Petroleum Co	0.0003336	5.71E-03	1.19E-04	0.0091893	
				0.26	3.66	0.07	4.05	0.045412868
			Tosco Corp	-0.0001451	8.03E-03	2.22E-03	0.0115831	
				-0.11	4.78	1.27	4.76	0.057678648
	100	3/1/2001	Plains All American Pipeline LP	0.000819	2.68E-03	-2.76E-05	0.0033549	
				0.91	2.4	-0.02	2.1	0.034915346
			Murphy Oil Corp	-0.0011428	8.38E-03	6.46E-03	0.0150334	
				-0.81	4.84	3.58	6.06	0.189604561
	101	7/17/2001	Tesoro Petroleum Corp	-0.001018	1.18E-02	1.43E-02	0.0138693	
				-0.62	4.9	4.71	4.33	0.223094196
			BP PLC	-0.001413	5.26E-03	2.21E-03	0.0063867	
				-1.3	3.41	1.14	3.13	0.050402272
	102	3/20/2001	Valero Energy Corp	-0.0008271	1.24E-02	4.99E-03	0.0153665	
				-0.47	5.75	2.19	5.02	0.080861035
			Huntway Refining Co	0.0005313	2.05E-03	5.50E-03	0.0050796	
				0.13	0.4	1.01	0.69	0.405207821
	103	5/7/2001	Valero Energy Corp	0.000515	1.21E-02	5.57E-03	0.0144613	
				0.31	5.29	1.85	4.7	0.471816718
			Ultramar Diamond Shamrock Corp	0.0007743	1.08E-02	2.90E-03	0.0138813	
				0.61	6.26	1.28	5.98	0.304669478
	104	5/7/2001	Williams Cos Inc	-0.001546	1.99E-02	1.10E-02	0.0208468	
				-0.93	8.79	3.69	6.82	0.149033983
			Barrett Resources Corp	0.000861	1.24E-02	3.95E-03	0.0163058	
				0.38	3.98	0.96	3.87	-0.239876475
2002	106	2/20/2002	BJ Services Co	-0.0045342	8.30E-03	1.52E-02	0.0056408	

Year	No	Date	Merger Companies	Fama-French Model				
				$\alpha$	$\beta$	s	h	CAR
			Great Lakes Chemical Corp	-1.23 -0.001666	2.15 1.32E-02	2.34 9.77E-04	0.86 0.0121017	-0.078044243
	107	3/11/2002	Chesapeake Energy Corp	-1.91 -0.0023357	14.3 1.17E-02	0.63 1.58E-02	7.74 0.0083418	0.127282164
			Canaan Energy Corp	-1.14 0.0002494	5.36 3.61E-04	4.28 -6.72E-03	2.2 -0.0032001	0.031929307
	108	5/28/2002	Conoco Inc	0.09 -0.0001233	0.09 3.98E-03	-1.34 -1.31E-03	-0.63 -0.0012376	0.633446954
			Gulf Indonesia Resources Ltd	-0.11 0.0008387	3.44 5.64E-03	-0.65 3.63E-03	-0.52 0.0082816	-0.116762654
	109	2/12/2002	Giant Industries Inc	0.44 -0.000306	2.93 1.37E-02	1.08 1.11E-02	2.09 0.0163371	0.021093871
			BP PLC	-0.16 -0.0005899	7 7.29E-03	3.39 4.31E-03	5.01 0.0061058	0.052212439
	110	5/29/2002	Newfield Exploration Co	-0.6 -0.000095	7.07 4.11E-03	2.49 6.54E-03	3.56 0.0006173	-0.024910875
			EEX Corp	-0.07 -0.0050203	2.79 1.89E-02	2.53 2.10E-02	0.2 0.0103687	-0.081514829
	111	3/25/2002	Royal Dutch Petroleum	-1.58 -0.0007684	5.85 9.59E-03	3.71 5.53E-03	1.56 0.008453	0.210768005
			Pennzoil Quaker State Co	-0.84 -0.0004963	10.03 1.31E-02	3.37 1.34E-02	4.88 0.0074545	0.18572992
	112	3/18/2002	Santos Ltd	-0.25 -0.0007931	6.35 3.49E-03	3.79 3.28E-03	1.99 0.0013681	0.44532821
			Esenjay Exploration Inc	-0.65 -0.00276	2.74 1.20E-02	1.5 5.39E-03	0.61 0.0076963	-0.208273736
	113	2/5/2002	Tesoro Petroleum Corp	-0.96 -0.000326	4.07 1.17E-02	1.06 1.25E-02	1.48 0.0123602	-0.045781871
			Valero Energy Corp	-0.18 0.0003141	6.17 1.08E-02	3.96 6.14E-03	3.98 0.0125847	-0.028154112
	114	8/20/2002	Unocal Corp	0.2 0.0005389	6.35 5.04E-03	2.18 -4.83E-03	4.53 0.0001723	-0.241665453
			Pure Resources Inc	0.55 -0.0004961	6.15 -6.84E-05	-3 2.52E-04	0.09 -0.0000837	0.028166882
	115	4/11/2002	Williams Energy Partners	-0.45 0.001251	-0.06 -9.82E-05	0.13 -1.61E-03	-0.04 -0.0011166	0.286289864
			Williams Cos Inc	0.87 -0.0024572	-0.06 1.07E-02	-0.87 -1.38E-03	-0.44 0.0058326	0.355923147
				-1.14 4.73		-0.36 1.39		0.482860187
2003	116	2/24/2003	Devon Energy Corp	0.0012412 1.07	8.89E-03 9.58	-1.05E-03 -0.52	0.0057374 2.53	-0.025856076
			Ocean Energy Inc	0.0010582 0.91	8.96E-03 9.61	7.28E-04 0.36	0.0047508 2.09	0.001909861
	117	5/29/2003	Edge Petroleum Corp	-0.0005721 -0.29	2.40E-03 1.5	9.42E-03 2.71	0.003716 0.89	-0.368488116
			Miller Exploration Co	0.0125503 1.25	2.23E-02 2.8	8.72E-03 0.51	0.0421834 2.04	0.77202323
	118	3/31/2003	Evergreen Resources Inc	0.0008965 0.84	7.28E-03 8.5	6.88E-03 3.7	0.0021655 1.03	-0.204596787
			Carbon Energy Corp	0.0008344 1.2	-3.68E-04 -0.67	-6.77E-04 -0.57	0.0016754 1.24	-0.019689778
	119	7/1/2003	Unit Corp	0.0005957 0.4	1.30E-02 11.04	9.53E-03 3.68	0.0103946 3.3	-0.136185565
			PetroCorp Inc	0.0010452 1.33	4.27E-04 0.68	2.28E-04 0.17	0.0001928 0.12	0.278571632
2004	120	4/15/2004	EnCana Corp	0.0005369 0.66	3.38E-03 3.34	2.65E-05 0.02	0.0103391 3.95	-0.107821635
			Tom Brown Inc	0.0003475 0.42	6.44E-03 6.22	2.60E-03 1.75	0.0107141 3.99	-0.269754142
	121	5/24/2004	Forest Oil Corp	-0.000528 -0.52	7.19E-03 5.22	1.13E-03 0.58	0.0131374 3.88	0.172813363
			Wiser Oil Co	0.0022905 1.73	1.14E-03 0.63	3.79E-03 1.5	0.0134854 3.05	0.308093875
	122	4/7/2004	Kerr-McGee	-0.0009586 -0.96	8.14E-03 10.38	-4.72E-04 -0.28	0.0028775 1.49	0.02936751
			Westport Resources Corp	0.0009191 0.72	8.50E-03 8.62	8.38E-03 3.93	0.0069043 2.84	0.035541946
	123	12/16/2004	Noble Energy Inc	0.0003287 0.44	7.96E-03 6.48	5.49E-03 3.27	0.0159105 7.87	0.084705179
			Patina Oil & Gas Corp	-0.0027095 1.14E-02		-3.15E-03	0.0148374	

Year	No	Date	Merger Companies	Fama-French Model						
				$\alpha$	$\beta$	s	h	CAR		
2004	124	6/9/2004	Petro Canada	-0.0003026	2.96E-03	1.85E-03	0.0147563	0.040934432		
			Prima Energy Corp	-0.31	2.2	0.98	4.32	0.137198993		
	125	5/4/2004	Pioneer Natural Resources	0.0003955	7.78E-03	1.63E-02	0.0070567	-0.028876116		
			Evergreen Resources Inc	0.28	4	5.96	1.43	0.08253691		
	126	2/12/2004	Plains Exploration & Production Co	0.000585	1.01E-02	5.02E-03	0.0094649	-0.008078709		
			Nuevo Energy Company	-0.39	-0.64	1.43	0.73	0.130524413		
	127	2/4/2004	Valero Energy Corp	0.00169	6.62E-03	7.49E-03	0.0158406	0.092754821		
			El Paso Corp	0.0006137	4.52E-03	2.00E-03	0.0151601	0.029236475		
	128	11/1/2004	Valero LP	0.62	4.24	1.18	4.86	0.224653362		
			Kaneb Pipeline Partners LP	-0.0030481	2.06E-02	4.95E-04	0.0190981	-0.055837467		
	2005	129	4/4/2005	Chevron Corp	0.0003144	3.64E-03	2.70E-03	0.0093604	0.135224675	
				Unocal	0.46	3.17	1.78	4.72	0.042017177	
		130	12/12/2005	ConocoPhillips	0.1	1.61	3.3	3.3	-0.024939718	
				Burlington Resources Inc	-0.0029813	1.09E-02	-2.90E-03	0.0222353	0.057267866	
		131	11/8/2005	Delta Petroleum Corp	-1.08	2.27	-0.42	2.88	-0.090804495	
				Castle Energy Corp	0.0007396	9.94E-03	5.88E-03	0.0186258	-0.128434851	
		132	1/26/2005	Energy Transfer Partner LP	0.81	6.41	2.63	7.48	0.056774706	
				American Electric Power Co Inc	-0.0033494	1.70E-02	-2.48E-03	0.0429621	0.053328718	
		133	9/19/2005	Norsk Hydro ASA	-1.16	3.36	-0.32	4.53	-0.280539939	
				Spinnaker Exploration Co	0.000289	1.82E-02	3.87E-04	0.0384395	-0.16689305	
		134	10/13/2005	Occidental Petroleum Corp	0.31	11.44	0.16	12.83	0.002051833	
				Vintage Petroleum Inc	-0.0015336	1.80E-02	1.51E-02	0.0371299	0.276087728	
		135	4/4/2005	Petrohawk Energy Corp	-1.05	7.35	3.91	8.25	-0.262137645	
				Mission Resources Corp	-0.0004051	1.19E-02	1.01E-02	0.0328278	0.076195444	
		136	7/11/2005	Pogo Producing Co	-0.22	3.96	2.12	5.92	0.213613029	
				Unocal Corp	0.0014836	4.89E-03	1.75E-03	0.0061298	0.005526895	
		137	4/25/2005	Valero Energy Corp	2.24	4.36	1.1	3.36	-0.450049118	
				Premcor Inc	-0.0000645	8.70E-03	-3.36E-03	0.0082589	-0.360373669	
		2006	138	6/23/2006	Anadarko Petroleum Corp	-0.12	9.74	-2.66	5.7	-0.018853518
					Kerr-McGee Corp	0.0007254	1.08E-02	3.01E-03	0.0149784	0.224823647
			139	5/30/2006	Kinder Morgan Inc Management	0.85	7.42	1.36	6.12	0.084860308
					Kinder Morgan Inc	-0.0012536	1.31E-02	1.30E-02	0.032104	0.123938159
140			7/8/2006	MDU Resources Group Inc	-1.17	7.08	4.63	10.31	-0.00352948	
				Cascade Natural Gas Corp	-0.0004044	1.52E-02	7.48E-04	0.0298343	0.123938159	
141			4/21/2006	Petrohawk Energy Corp	0.0003722	1.48E-02	1.53E-02	0.0405466	0.123938159	
					0.32	7.26	4.95	11.71		

Year	No	Date	Merger Companies	Fama-French Model				
				$\alpha$	$\beta$	s	h	CAR
			KCS Energy Inc	-0.42	6.63	1.88	7.38	-0.188803302
				0.0005148	2.14E-02	4.52E-03	0.0503838	
	142	6/12/2006	Plains All American Pipeline LP	0.43	9.78	1.33	11.49	-0.233284041
				-0.000087	6.38E-03	1.00E-03	0.0116293	
			Pacific Energy Partner LP	-0.14	5.58	0.58	4.87	0.035143945
				-0.0006929	5.85E-03	5.12E-03	0.0114199	
2007				-1	4.72	2.72	4.41	-0.107633458
	143	1/7/2007	Forest Oil Corp	-0.0031887	1.41E-02	6.88E-03	0.0261037	
				-1.89	4.44	1.49	3.75	-0.007316931
			The Houston Exploration Co	-0.0017085	8.36E-03	4.24E-03	0.0284715	
				-1.73	4.51	1.58	6.98	0.152753998
	144	6/19/2007	General Electric Co	-0.0000358	0.0073661	-5.29E-03	-8.10E-03	
				-0.09	10.38	-4.38	-4.11	-0.046619579
			Regency Energy Partners LP	0.0003526	0.0014004	1.69E-04	5.66E-03	
				0.51	1.16	0.08	1.69	0.0868
	145	7/17/2007	Plains Exploration & Production Co	-1.87E-05	0.0101508	1.07E-03	9.79E-03	
				-0.02	6.08	0.36	1.95	-0.305520494
			Pogo Producing Co	-2.29E-04	0.0107466	1.30E-03	1.83E-02	
				-0.23	6.17	0.42	3.48	0.05746252



## **Appendix 10**

### **Fama-French Four Factors Model Result (GLS)**

Year	No	Date	Merger Companies	Fama-French 4 Factors Model					CAR	
				$\alpha$	$\beta$	s	h	u		
1981	1	5/6/1981	Dome Petroleum Ltd Canada	0.0000967	0.0151804	-0.0024627	0.016899	0.0099137	0.0523781	
			Conoco Inc	0.06	5.48	-0.61	3.05	2.62		
	2	6/26/1981	Seagram Ltd	-0.0004239	0.0071052	-0.0088922	0.0011457	-0.0122397	-0.268322	
			Conoco Inc	-0.49	4.47	-3.81	0.36	5.63		
	3	7/7/1981	Du Pont	-0.0008272	0.0087604	0.0029505	0.0076125	0.0033752	0.648418	
			Conoco Inc	-1.15	6.54	1.54	2.98	1.82		
Conoco Inc			-0.000158	0.0065345	-0.0092762	-0.002905	0.0094692			
1982	4	2/11/1982	Allied Corp & Continental Group	0.0010369	0.0145514	-0.0043173	-0.0000153	-0.0079235	0.0540762	
			Supron Energy Corp	1.14	8.54	-1.79	0	-3.39		
	5	8/16/1982	Occidental Petroleum Corp	0.0007728	0.0059887	-0.0101495	-0.0040774	0.0076857	0.0049247	
			Cities Service Co	-0.16	3.53	-3.5	-0.82	3.7		
	6	11/1/1982	Damson Oil Corp	0.0013363	0.0129744	0.0004556	-0.001194	-0.0014758	0.172038	
			Juniper Petroleum Corp	0.73	3.03	-3.63	-1.08	2.83		
	7	12/20/1982	Mesa Petroleum Co	0.0003215	0.0111324	-0.0061814	0.0006627	-0.0052065	-0.098761	
			General American Oil Co of Texas	0.34	5.37	-2.39	0.21	-2.07		
	8	12/21/1982	Burlington Northern Inc	0.0014262	0.0014363	-0.0090735	-0.0428023	0.0167715	-0.823724	
			El Paso Co	0.41	0.19	-0.96	-3.76	1.81		
	1983	10	1/3/1983	National Distillers & Chemical Corp	-0.0003885	0.0104257	-0.0002654	-0.0023545	-0.0017575	0.2255823
				Suburban Propane Gas Corp	-0.47	5.36	-0.12	-0.87	-0.74	
		11	1/10/1983	Phillips Petroleum Co	-0.0003885	0.0104257	-0.0002654	-0.0023545	-0.0017575	0.0993248
				General American Oil Co of Texas	-0.47	5.36	-0.12	-0.87	-0.74	
		12	2/9/1983	Goodyear Tire and Rubber Cor	-0.0002852	0.0096322	0.0106401	-0.0029626	-0.016726	0.0288964
				Celeron Corp	-0.14	2.27	1.88	-0.51	-3.73	
		13	4/4/1983	Internorth Inc	0.0002814	0.0020391	-0.0060395	-0.0105735	-0.0140546	-0.125647
				Belco Petroleum Corp	0.14	0.54	-1.21	-1.85	-3.94	
		14	4/22/1983	Northwest Industries Inc	0.0012476	-0.0021419	-0.0064471	-0.0208763	-0.0108151	-0.192454
				Pogo Producing Co	0.68	-0.61	-1.39	-3.95	-3.28	
		15	5/23/1983	Diamond Shamrock Corp	0.0001544	0.0124429	-0.0045886	-0.0048968	-0.001213	-0.290638
				Natomas Co	0.15	6.64	-1.84	-1.73	-0.69	
		16	6/8/1983	CSX Corp	-0.0009069	0.0097233	0.0076963	-0.0012134	-0.0104606	0.1175137
				Texas Gas Resources Corp	-0.73	4.12	2.45	-0.34	-4.69	
17		8/26/1983	Burlington Northern Inc	-0.0009069	0.0097233	0.0076963	-0.0012134	-0.0104606	0.1655053	
			El Paso Co	-0.73	4.12	2.45	-0.34	-4.69		
18		9/12/1983	Williams Cos	0.0011045	0.0079413	-0.0011446	0.0067296	-0.0022593	0.3796889	
			Northwest Energy Co	-0.13	5.36	-0.58	3	-1.64		
19		10/3/1983	Kaneb Services Inc	0.0024725	0.0027466	-0.0000234	-0.010786	-0.0011418	-0.011992	
			Moran Energy Inc	1.77	1.07	-0.01	-2.78	-0.48		
20		12/15/1983	Lear Petroleum Corp	0.0018086	-0.0028448	-0.0201148	-0.0110774	-0.0139212	-0.245542	
			Mcrae Consolidated Oil & Gas	1.29	-1.13	-6.02	-2.88	-5.94		
21		12/28/1983	Pennzoil Co	0.0028777	-0.0041792	-0.0064808	-0.0223693	-0.0105867	0.0624474	
				1.35	-1.09	-1.28	-3.84	-2.99		

Year	No	Date	Merger Companies	Fama-French 4 Factors Model					
				$\alpha$	$\beta$	s	h	u	CAR
			Getty Oil Co	-0.71	0.16	-2.2	-2.53	-4.11	0.5338409
				-0.0009237	0.0030913	-0.0000132	-0.0144103	-0.0104512	
1984	22	1/9/1984	Texaco Inc	-0.51	0.99	0	-2.54	-3.96	0.1720194
				0.0333346	-0.0003897	-0.0012029	0.0008585	-0.0001539	
			Getty Oil Co	185.01	-1.08	-2.38	1.36	-0.41	-0.002553
			Getty Oil Co	0.0008323	0.0188741	-0.0043047	0.008311	-0.0144088	
1984	23	1/25/1984	Howell Corp	0.58	6.71	-1.09	1.69	-4.89	-0.040979
				0.0000959	0.0124932	0.0120371	-0.0029566	-0.0126061	
			Howell Petroleum Corp	0.05	3.24	2.27	-0.46	-2.96	0.5656232
			Howell Petroleum Corp	0.0000997	0.0133622	0.0072329	-0.0055208	-0.0142215	
1984	24	1/25/1984	Royal Dutch Shell Group Netherlan	0.06	3.73	1.47	-0.92	-3.6	-0.083523
				-0.0006246	0.0163664	0.0043923	0.0050448	-0.0092202	
			Shell Oil Co	-0.82	10.08	1.97	1.85	-5.14	-0.099384
			Shell Oil Co	-0.0013527	0.0166876	-0.0001633	0.0039162	-0.0154876	
1984	25	1/26/1984	Damson Oil Corp	-1.23	7.09	-0.05	0.99	-5.96	-0.43871
				-0.0008042	0.0195184	0.014713	0.003607	-0.0106877	
			Dorchester Gas Corp	-0.4	4.65	2.56	0.51	-2.31	-0.047107
			Dorchester Gas Corp	0.0005842	0.0163412	0.0108322	0.001905	-0.0127645	
1984	26	3/6/1984	Chevron Corp	0.28	3.7	1.79	0.26	-2.66	-0.088913
				-0.0016626	0.0202406	-0.001209	0.0120412	-0.0124752	
			Gulf Corp	-1.85	9.97	-0.47	3.86	-5.33	0.123234
			Gulf Corp	0.000984	0.0142207	-0.0054038	0.0100909	-0.0014764	
1984	27	3/12/1984	Mobil Corp	0.88	5.76	-1.7	2.63	-0.51	-0.373455
				-0.0012075	0.0203568	-0.001916	0.0127241	-0.0095289	
			Superior Oil Co	-1.44	10.88	-0.81	4.51	-4.52	0.0337178
			Superior Oil Co	-0.0001474	0.0144951	-0.0066255	0.0060525	-0.0069631	
1984	28	11/6/1984	Houston Natural Gas Co	-0.1	4.29	-1.54	1.19	-1.83	0.2315038
				-0.0005742	0.0079526	0.0049508	0.0130872	-0.0101332	
			Texas Eastern Corp	-0.38	1.83	0.99	2.47	-2.07	0.0366848
			Texas Eastern Corp	-0.0036274	0.0027984	-0.0017169	0.0103803	-0.0003652	
1984	29	11/18/1984	Placer Development Ltd Canada	-1.26	0.35	-0.19	1.06	-0.04	-0.031511
				0.0005507	0.010438	0.0128052	0.0087834	-0.0093978	
			Prairie Production Co	0.5	3.39	3.59	2.33	-2.59	-0.070656
			Prairie Production Co	0.0011547	0.004603	0.0016216	0.0037229	-0.0011012	
1985	30	2/26/1985	SunShine Mining Co	0.65	0.95	0.29	0.63	-0.19	-0.273496
				-0.0016462	0.0054838	0.006972	0.0116136	-0.0151114	
			Woods Petroleum Co	-1.27	1.31	1.54	2.33	-2.82	0.3875656
			Woods Petroleum Co	-0.0020375	0.0218657	0.014932	0.0019278	0.0190817	
1985	31	3/4/1985	Coastal Corp	-1.72	5.87	3.72	0.44	4.01	-0.09511
				-0.0013176	0.0167121	0.0122008	0.0158011	-0.000632	
			American Natural Resources Co	-1.14	4.28	2.93	3.48	-0.13	-0.004212
			American Natural Resources Co	-0.0014692	0.0203733	0.004399	0.0158097	0.0154313	
1985	32	6/19/1985	Tenneco Inc	-0.82	3.39	0.69	2.26	2.04	-0.300994
				-0.0006402	0.0117538	-0.0014097	0.0132935	-0.0053417	
			Goodyear Tire & Rubber Co	-0.84	4.68	-0.52	4.75	-2.06	0.0987796
			Goodyear Tire & Rubber Co	-0.0003508	0.0135663	-0.0006437	-0.0015805	0.0024002	
1985	33	7/19/1985	Diversified Energies Inc	-0.45	5.23	-0.23	-0.55	0.9	0.0178337
				-0.0005479	-0.0025663	-0.0042919	-0.0154442	0.006065	
			Dyco Petroleum Corp	-0.18	-0.26	-0.39	-1.42	0.61	-0.085806
			Dyco Petroleum Corp	-0.0007381	0.0072345	0.0078609	0.0130772	-0.009823	
1985	34	8/12/1985	Midcon Corp	-0.36	1.09	1.05	1.78	-1.45	-0.508308
				0.0006512	0.0056028	0.001905	0.0063838	-0.0062168	
			United Energy Resources Inc	0.77	2.16	0.59	2.1	-2.33	0.1800713
			United Energy Resources Inc	0.0017451	0.0013345	0.005446	-0.0016166	-0.0072417	
1985	35	9/10/1985	Pacific Gas & Electric Co	1.78	0.44	1.45	-0.45	-2.32	-0.051935
				0.0002617	0.0079188	-0.0071644	0.0035598	0.0058699	
			Pacific Gas Transmission Co	0.35	3.43	-2.47	1.26	2.38	-0.050505
			Pacific Gas Transmission Co	0.0004933	0.0134978	0.0136975	-0.002325	0.0030915	
1985	36	10/22/1985	Burlington Northern Inc	0.37	3.34	2.69	-0.47	0.71	0.2123035
				0.000791	0.0109097	-0.0061368	-0.0007576	-0.0012371	
			Southland Royalty Co	0.98	4.7	-2	-0.24	-0.47	-0.058529
			Southland Royalty Co	-0.0003642	0.0111755	-0.0002162	0.0033054	-0.0100476	
1985	37	12/31/1985	Occidental Petroleum Corp	-0.26	2.76	-0.04	0.61	-2.19	-0.397267
				0.0000276	0.0132766	0.0009374	0.0139721	-0.0074155	
			Midcon Corp	0.02	3.83	0.2	2.88	-1.8	-0.110062
			Midcon Corp	0.0009217	0.011017	0.0002168	0.0088486	-0.005037	
1986	38	5/13/1986	Louisiana Land & Exploration Co	0.67	2.87	0.04	1.65	-1.11	-0.315531
				0.0003466	0.0075775	-0.0069173	0.015809	-0.0249043	
			Inexco Oil Co	0.28	2.73	-1.65	3.4	-6.79	-0.061035
			Inexco Oil Co	-0.0014743	0.0286882	0.0324831	0.0401969	-0.0395765	
1986	39	6/12/1986	Triton Energy Corp	-0.46	4.06	3.05	3.39	-4.24	0.2175589
				-0.0001982	0.0098523	0.0061197	0.0185749	-0.0171218	
			Worldwide Energy Corp	-0.11	2.41	1	2.69	-3.19	0.0576711
			Worldwide Energy Corp	-0.0028944	0.0173313	0.0211675	0.0154333	-0.0264513	
1986	40	12/18/1986	Questar Corp	-0.96	2.61	2.13	1.37	-3.03	0.1687754
				0.0008157	0.0073355	0.0072825	0.000736	-0.0051523	

Year	No	Date	Merger Companies	Fama-French 4 Factors Model					
				$\alpha$	$\beta$	s	h	u	CAR
1987			Universal Resources	0.87	2.65	0.2	-2.07	0.87	-0.085653
				-0.0032436	0.0100505	0.0140931	-0.0076095	-0.0216627	
	41	10/5/1987	Arkla Inc	-1.45	2.25	2.13	-0.86	-3.62	0.2795419
				-0.0002225	0.01144	0.0086509	0.0076156	-0.0001618	
	42	3/27/1987	Entex Inc	-0.33	8.42	4.58	3.04	-0.07	0.3116443
				-0.0003957	0.0143158	0.0212602	0.0136808	-0.0033255	
	43	6/23/1987	Conquest Exploration Co	-0.25	4.47	4.78	2.32	-0.64	-0.319322
				0.0011188	0.0112211	0.0013901	0.0059318	-0.0070365	
	44	1/16/1987	Energy Development Partner Ltd	1.23	5.96	0.49	1.71	-2.92	-0.298367
				0.0003811	0.0161778	0.0008372	0.0149944	-0.0118146	
45	12/15/1987	Mesa Limited Partnership	0.41	8.53	0.29	4.3	-4.87	-0.08325	
			-0.0000871	0.0131773	0.0083947	0.0086717	-0.0015955		
46	7/15/1988	Witco Corp	-0.04	3.42	1.49	1.17	-0.28	-0.186107	
			0.0006022	0.0134903	0.0062206	0.0181532	-0.009805		
47	2/24/1988	British Petroleum Co	0.34	4.14	1.3	2.91	-2.05	0.2201951	
			-0.0054962	0.0056679	0.0037816	0.0076486	0.0148084		
48	9/27/1988	Utilicorp Utd Inc	-1.86	0.77	0.34	0.71	1.49	-0.551595	
			-0.0061892	0.0114835	-0.0037759	0.0193603	-0.023355		
49	4/21/1989	Raytheon Company	-1.33	1.27	-0.28	1.04	-1.88	-0.519838	
			-0.0024676	0.0012771	-0.0033506	0.0064561	-0.0018275		
50	2/22/1989	Panhandle Eastern Corp	-1.56	0.41	-0.72	1.04	-0.44	0.1453865	
			-0.001303	0.0101219	0.0074713	0.0115621	-0.0049913		
1988			KN Energy Inc	-1	6.96	4.81	2.92	-1.53	-0.138346
				0.000476	0.0118339	0.0129596	0.0047289	0.0020519	
	46	7/15/1988	Calumet Inds Inc	0.05	11.63	10.76	1.48	1.05	0.1462059
				-0.0003795	0.0077361	0.0071441	-0.013706	-0.0028766	
	47	2/24/1988	Lear Petroleum Corp	-0.13	2.72	2.12	-1.54	-0.53	0.1132934
				0.0009189	0.0050293	0.0009013	0.0025052	0.0051575	
	48	9/27/1988	Michigan Energy Resources Co	0.82	4.43	0.69	0.76	2.13	0.0266813
				-0.002843	0.0178075	0.0206415	0.0331421	0.0113727	
	49	4/21/1989	Standard Havens	-1	6.23	6.27	3.97	1.87	0.0127438
				0.0005957	0.0068769	0.0070177	0.001342	-0.0018455	
50	2/22/1989	Texas Eastern Corp	0.65	7.38	6.42	0.46	-1.08	0.0153988	
			0.0016696	0.0066322	0.007193	0.0040123	0.0019269		
1989			Grace (W.R) & Co	1.6	6.2	5.73	1.2	0.98	-0.026387
				-0.0003915	0.0098426	0.0011731	-0.0007648	0.0049663	
	49	4/21/1989	Standard Havens	-0.82	6.66	0.64	-0.26	1.89	0.0403501
				-0.0030255	0.0436496	0.0463816	0.00098	0.0348715	
	50	2/22/1989	Panhandle Eastern Corp	-0.39	1.83	1.58	0.02	0.82	-0.129601
				-0.0004414	0.0073547	-0.0040251	-0.0002575	0.0082574	
	51	3/3/1992	Grace Energy Corp	-0.49	2.99	-1.35	-0.05	1.75	0.2504037
				0.0010412	0.01702	0.0062694	0.0184995	-0.0037268	
	52	6/18/1993	Apache Corporation	0.51	3.04	0.92	1.63	-0.35	-0.122524
				0.0003543	0.0153336	0.0073627	0.0066048	-0.0005441	
53	12/13/1994	Williams Cos	0.34	8.72	2.86	1.97	-0.18	0.0357775	
			-0.0018809	0.0108928	0.0097088	0.001808	-0.0138795		
54	5/4/1995	Barret Resources Corp	-1.25	4.3	2.62	0.38	-3.19	-0.539833	
			0.0004756	0.0106417	0.0066766	0.009531	0.001726		
55	8/25/1995	Enron Crop	0.35	3.22	1.68	2.2	0.44	-0.33861	
			0.0002493	0.0029455	0.0034621	0.0082459	-0.0044239		
56	7/22/1996	Seagull Energy Corp	0.16	0.8	0.78	1.7	-1.01	0.0327546	
			0.0007455	0.0180784	0.0148673	0.0171484	-0.0056023		
57	9/23/1996	Global Natural Resources Inc	0.49	4.72	0.36	1.5	1.27	0.2014436	
			-0.0003231	0.0110912	0.0068951	0.0059864	-0.0048415		
58	12/13/1994	Transco Energy Co	-0.37	5.53	2.36	1.58	-1.42	-0.2881	
			0.0005691	0.0127639	0.001431	0.0076828	0.0058631		
59	5/4/1995	Plains Petroleum Co	0.55	5.19	3.95	3.29	-1.38	0.3547676	
			0.0017559	0.0070609	0.0049324	0.0006423	-0.0015168		
60	8/25/1995	Coda Energy Inc	1.51	2.37	1.54	0.14	-0.44	0.1388177	
			0.0003759	0.0085497	0.0075589	0.0033637	0.0003856		
61	5/4/1995	Plains Petroleum Co	0.39	3.4	2.96	0.94	0.13	-0.054855	
			0.0002018	0.0071104	0.0051144	0.0033528	0.0019366		
62	7/22/1996	Diamond Shamrock Inc	0.19	2.63	1.86	0.87	0.63	-0.179401	
			0.0007455	0.0180784	0.0148673	0.0171484	-0.0056023		
63	7/22/1996	Global Natural Resources Inc	0.55	5.19	3.95	3.29	-1.38	0.507597	
			0.0017559	0.0070609	0.0049324	0.0006423	-0.0015168		
64	9/23/1996	Ulramar Corp	1.51	2.37	1.54	0.14	-0.44	1.6867654	
			0.0003759	0.0085497	0.0075589	0.0033637	0.0003856		
65	9/23/1996	Diamond Shamrock Inc	0.39	3.4	2.96	0.94	0.13	-0.066436	
			0.0002018	0.0071104	0.0051144	0.0033528	0.0019366		
66	7/22/1996	Seagull Energy Corp	0.19	2.63	1.86	0.87	0.63	0.0869371	
			0.0007455	0.0180784	0.0148673	0.0171484	-0.0056023		

Year	No	Date	Merger Companies	Fama-French 4 Factors Model					CAR
				$\alpha$	$\beta$	s	h	u	
1997	58	7/17/1997	Burlington Resources Inc	-0.0011663	0.0095544	0.0041442	0.0037098	0.0017222	
			Louisiana Land & Exploration Co	-1.41	4.25	1.86	1.23	0.72	-0.079178
	59	5/27/1997	Columbia Gas System Inc	-0.001747	0.0125511	0.0048942	0.0080774	0.0024845	
			Alamco Inc	-1.54	3.96	1.56	1.91	0.74	0.1352035
	60	6/20/1997	Forcenergy	0.000361	0.0101348	0.0028435	0.0087502	0.0030706	
			Edisto Resources Corp	0.51	5.3	1.55	3.33	1.49	-0.006542
	61	10/20/1997	Kindier Morgan Energy Partners LP	0.0007919	0.0027022	0.003395	0.0002375	0.0079514	
			Santa Fe Pacific Pipeline Partner LI	0.64	0.82	1.07	0.05	2.24	-0.306795
	62	6/24/1997	Louis Dreyfus Natural Gas Corp	0.0027809	0.0042969	0.0008452	-0.000056	0.0080296	
			American Exploration Co	1.58	0.91	0.19	-0.01	1.6	0.500907
	63	7/7/1997	Meridian Resources Corp	0.0001417	0.0072966	0.0093616	0.0052044	0.0042809	
			Cairn Energy USA Inc	0.1	2.04	2.7	1.06	1.11	0.0839231
	64	4/7/1997	Mesa Inc	0.0024327	-0.0063352	-0.000485	-0.0181985	0.0023892	
			Parker & Parsley Petroleum Co	0.77	-0.76	-0.06	-1.63	0.25	-0.332219
	65	6/17/1997	Santa Fe Energy Resources Inc	-0.0005195	0.0059507	0.0087112	0.0057244	0.0047161	
			McFarland Energy	-0.81	3.52	4.91	2.52	2.45	-0.338057
	66	11/24/1997	Williams Cos Inc	-0.0000267	0.0129835	0.0061083	0.0091378	-0.0029276	
			Mapco Inc	-0.02	4.33	2.09	2.24	-0.91	0.1108793
	67	5/4/1998	Atlantic Richfield Co	9.06E-06	0.0076277	0.0042525	-0.0001672	0.0053597	
			Union Texas Petroleum Holding Inc	0.01	2.03	1.16	-0.03	1.33	0.4573787
	68	8/11/1998	British Petroleum Co PLC	-0.0004453	0.015419	0.0125114	0.014574	0.0033924	
			Amoco Corp	-0.3	3.78	3.07	2.64	0.78	-0.088407
	69	12/23/1998	Chevron Corp	-0.000878	0.0097431	0.0094139	0.0060936	0.0054458	
			Rutherford-Moran Oil Corp	-0.52	2.17	2.09	1	1.14	-0.292546
	70	12/1/1998	Exxon Corp	0.0021741	0.0094961	-0.0009485	0.00543	0.0093059	
			Mobil Corp	0.73	1.11	-0.12	0.48	0.99	-0.03858
	71	10/15/1998	Kerr-McGee	0.000183	0.0127535	0.00937	0.0119246	0.0021433	
Oryx Energy co			0.15	3.59	2.78	2.54	0.55	-0.141211	
72	6/18/1998	Lyondell Petrochemical Co	0.0008299	0.0066724	0.0034615	0.0076642	0.0067839		
		Atlantic Richfield Co	0.63	1.9	1.02	1.59	1.81	0.0519606	
73	3/23/1998	Plains Resources Inc	0.0006675	0.0063359	0.0051821	0.0084453	0.0006533		
		Goodyear Tire & Rubber Co	0.48	1.71	1.46	1.67	0.17	-0.231338	
74	5/29/1998	Pogo Producing Co	-0.000552	0.0088807	-0.0111708	0.0055883	-0.0083831		
		Arch Petroleum Inc	-0.29	2.23	-2.44	0.87	-1.38	-0.135121	
75	11/25/1998	Seagull Energy Corp	-0.0005129	0.0067144	0.0015984	0.003376	-0.0039225		
		Ocean Energy Inc	-0.77	4.93	1.02	1.54	-1.88	-0.217549	
76	11/16/1998	Vulcan Materials Co	-0.0039415	0.0131068	0.0016074	0.0107377	-0.0088139		
		CalMat Co	-1.32	2.21	0.23	1.1	-0.91	-0.117706	
1999			-0.000411	0.0061883	0.0061526	-0.0007435	0.0008003		
			-0.4	3.11	2.58	-0.23	0.25	0.1692383	

Year	No	Date	Merger Companies	Fama-French 4 Factors Model							
				$\alpha$	$\beta$	s	h	u	CAR		
2000	77	4/1/1999	BP Amoco PLC	0.0006087	0.0075154	-0.0037457	0.0031153	-0.0075586			
			Atlantic Richfield Co	0.57	4.87	-1.92	1.03	-3.95	0.0109671		
	78	6/1/1999	Crompton & Knowles Corp	-0.0004516	0.0069584	-0.0030755	0.003892	-0.0089256			
			Witco Corp	-0.41	4.47	-1.56	1.28	-4.62	-0.203112		
	79	5/20/1999	Devon Energy Corp	-0.0011727	0.0153268	0.0064512	0.0134133	-0.004469			
			PennzEnergy Co	-0.7	6.56	2.21	3.09	-1.68	-0.030429		
	80	2/24/1999	Dominion Resources Inc	-0.0031224	0.0064988	-0.001887	0.0027652	-0.0103823			
			Remington Energy Ltd	-1.85	2.75	-0.64	0.63	-3.85	0.5247915		
	2001	81	11/6/2000	Amerada Hess Corp	-0.0001964	0.0090885	0.003869	0.0028387	-0.009304		
				Lasmo PLC	-0.14	4.72	1.61	0.8	-4.29	0.170542	
		82	3/16/2000	BP Amoco PLC	-0.0068071	0.0055045	-0.0068926	-0.004077	-0.011478		
				Vastar Resources Inc	-2.21	1.28	-1.28	-0.51	-2.37	-0.17452	
		83	10/16/2000	Chevron Corp	-0.0001681	0.0045406	-0.0015528	0.0080928	0.0026415		
				Texaco Inc	-0.28	5.19	-1.39	4.71	2.38	0.2132566	
		84	12/27/2000	Hunt Oil Co	-0.001971	0.0098401	0.0049292	0.0116437	-0.0069761		
				Berkley Petroleum Corp	-0.7	2.43	0.95	1.46	-1.35	0.9814409	
		85	3/20/2000	North Coast Energy Inc	-0.0003163	0.0084017	0.0028926	0.0158678	0.0020649		
				Beiden & Blake Corp	-0.26	4.9	1.43	6.42	1.22	-0.158062	
		86	10/20/2000	Stone Energy Corp	-0.0006388	0.0115437	0.0062134	0.0138708	-0.0021206		
				Basin Exploration Inc	-0.32	4.04	1.84	3.36	-0.75	0.0576665	
		87	12/22/2000	USX-Marathon Group	-0.0025503	0.0057012	0.0084236	0.0022008	-0.0075119		
				Pennaco Energy Inc	-0.81	1.13	1.58	0.28	-1.45	0.1033456	
		2002	88	7/10/2001	Amerada Hess Corp	0.0012624	0.0160973	0.0096421	0.0161519	-0.0014912	
					Triton Energy Ltd	0.85	6.83	3.87	4.43	-0.62	-0.232944
89			2/12/2001	Anadarko Petroleum Corp	-0.0007678	0.0054982	-0.002085	0.0117009	0.0034513		
				Berkley Petroleum Corp	-0.67	3.35	-1.09	4.97	2.05	0.0740972	
90			6/25/2001	Anadarko Petroleum Corp	-0.0013536	0.0074112	-0.0014488	0.0142712	0.0032759		
				Gulfstream Resources Canada Ltd	-1.12	4.27	-0.72	5.72	1.84	-0.097338	
91			2/8/2001	Calpine Corp	-0.0031912	0.0028958	0.0046404	0.0033307	-0.003075		
				Encal Energy Ltd	-1.73	1.15	1.59	0.94	-1.47	0.8752565	
92			5/29/2001	Conoco	0.0019581	0.0095395	0.0016594	0.0109752	-0.001016		
				Gulf Canada Resources Ltd	1.22	4.4	0.66	3.58	-0.57	-0.722173	
93	8/14/2001		Devon Energy Corp	0.0029834	0.0093199	0.0186959	0.0304058	0.014756			
			Mitchell Energy & Development Cor	0.33	0.65	1.23	1.37	1	0.1514951		
94	9/10/2001		Dominion Resources Inc	0.0014328	0.0127331	0.008854	0.0084387	-0.0078733			
			Louis Dreyfus Natural Gas Corp	0.87	4.87	3.19	2.08	-2.93	0.0124363		
95	5/23/2001		EOG Resources Inc	-0.0001534	0.0094544	0.0081762	0.0171143	0.0018846			
			Energy Search Inc	-0.09	3.75	2.77	4.69	0.74	-0.362087		
96	5/14/2001		Kerr-McGee	-0.0009831	0.0172895	0.0101401	0.0222672	-0.0025951			
				-0.36	4.43	2.22	3.94	-0.66	-0.118243		

Year	No	Date	Merger Companies	Fama-French 4 Factors Model					
				$\alpha$	$\beta$	s	h	u	CAR
			HS Resources Inc	-0.71	6.58	3.28	6.47	2.12	0.16873
				0.0004438	0.0164979	0.0062973	0.018082	0.0038506	
				0.26	6.87	1.96	5.45	3.38	-0.284407
	97	12/18/2001	Magnum Hunter Resources Inc	-0.0006044	0.0112711	0.0109016	0.0104534	0.0049576	
				-0.32	5.54	3.29	2.92	2.48	0.1665253
			Prize Energy Corp	-0.0004699	0.0050922	0.0026157	0.0096211	-0.0017486	
				-0.3	3.17	1	3.4	-1.11	-0.090867
	98	11/18/2001	Phillips Petroleum Co	-0.0005919	0.0057293	0.0056033	0.0061596	0.0008855	
				-0.53	4.87	3.02	3.34	0.92	0.3591034
			Conoco Inc	-0.0004098	0.0057112	0.0039947	0.0059289	0.0020621	
				-0.34	4.4	1.95	2.91	1.94	0.3457764
	99	2/4/2001	Phillips Petroleum Co	0.0003373	0.005546	-1.60E-06	0.0090937	0.0002416	
				0.27	3.32	0	3.88	0.24	0.0399394
			Tosco Corp	-0.000106	0.007286	0.0010107	0.0109244	0.0012797	
				-0.08	4.07	0.5	4.35	1.21	0.0300036
	100	3/1/2001	Plains All American Pipeline LP	0.0007675	0.0032159	0.0007624	0.0039903	-0.0006875	
				0.85	2.69	0.56	2.37	-1.04	0.0296723
			Murphy Oil Corp	-0.0010522	0.0074301	0.0049754	0.0138893	0.0014607	
				-0.74	4.03	2.38	5.35	1.43	0.2005425
	101	7/17/2001	Tesoro Petroleum Corp	-0.0009752	0.0117925	0.0140458	0.0136037	0.0001214	
				-0.6	4.88	4.6	4.11	0.1	0.2224826
			BP PLC	-0.001455	0.0052409	0.00243	0.0066932	-0.0005135	
				-1.34	3.39	1.24	3.16	-0.69	0.0498007
	102	3/20/2001	Valero Energy Corp	-0.0008568	0.0125956	0.0052998	0.0156713	-0.0000776	
				-0.49	5.51	2.01	4.86	-0.06	0.079424
			Huntway Refining Co	0.0008723	-0.0018309	-0.0010745	-0.0003361	0.0061133	
				0.21	-0.34	-0.17	-0.04	2.12	0.4490461
	103	5/7/2001	Valero Energy Corp	0.0005362	0.011945	0.0054467	0.0141469	0.0004481	
				0.32	5.17	1.75	4.41	0.4	0.4609176
			Ultramar Diamond Shamrock Corp	0.0008578	0.0103692	0.0020752	0.01284	0.0012408	
				0.67	5.98	0.89	5.33	1.48	0.2754449
	104	5/7/2001	Williams Cos Inc	-0.0015224	0.0198069	0.0104499	0.0204333	0.0007294	
				-0.92	8.64	3.38	6.42	0.66	0.1281737
			Barrett Resources Corp	0.0011084	0.0111317	0.001396	0.0132717	0.0033555	
				0.5	3.56	0.33	3.06	2.22	-0.30739
2002									
	106	2/20/2002	BJ Services Co	-0.0044731	0.0125549	0.0149408	-0.0038998	0.0105693	
				-1.22	2.93	2.32	-0.48	2.08	0.0064635
			Great Lakes Chemical Corp	-0.0016767	0.0126459	0.0008066	0.0136515	-0.0015036	
				-1.92	12.32	0.52	6.99	-1.23	0.1112243
	107	3/11/2002	Chesapeake Energy Corp	-0.0023958	0.015653	0.0161338	-0.0017811	0.0106745	
				-1.19	6.54	4.48	-0.39	3.7	-0.113237
			Canaan Energy Corp	0.0005463	-0.0009549	-0.0096508	-0.0067358	0.0038587	
				0.2	-0.25	-1.88	-1.28	2.1	0.5740808
	108	5/28/2002	Conoco Inc	-0.0002517	0.0052429	-0.0011029	-0.002837	0.0026055	
				-0.22	3.63	-0.55	-1.09	1.48	-0.123753
			Gulf Indonesia Resources Ltd	0.0007649	0.0069886	0.0034305	0.0067635	0.0022866	
				0.41	2.9	1.02	1.55	0.78	0.0177451
	109	2/12/2002	Giant Industries Inc	-0.0003222	0.0131067	0.0112211	0.0177454	-0.0014344	
				-0.17	6.02	3.41	4.22	-0.55	0.0485161
			BP PLC	-0.0005565	0.0100959	0.0045739	-0.0018922	0.0078832	
				-0.6	9.36	2.81	-0.91	6.06	-0.000171
	110	5/29/2002	Newfield Exploration Co	-0.000318	0.0066136	0.0070847	-0.0022297	0.0048361	
				-0.22	3.6	2.75	-0.67	2.16	-0.100399
			EEX Corp	-0.0052313	0.0209436	0.0215253	0.0082125	0.0040809	
				-1.65	5.18	3.8	1.12	0.83	0.1962707
	111	3/25/2002	Royal Dutch Petroleum	-0.0008735	0.0122141	0.0058294	0.002768	0.0063026	
				-1	11.64	3.71	1.37	4.99	0.2122382
			Pennzoil Quaker State Co	-0.0005465	0.0144269	0.0135802	0.0045519	0.0031393	
				-0.28	6.11	3.85	1	1.1	0.4584597
	112	3/18/2002	Santos Ltd	-0.0007914	0.0027177	0.0033809	0.0032369	-0.0020506	
				-0.65	1.89	1.55	1.17	-1.18	-0.216003
			Esenjay Exploration Inc	-0.0027479	0.0138889	0.0051763	0.002459	0.0052871	
				-0.96	4.16	1.03	0.38	1.31	-0.024527
	113	2/5/2002	Tesoro Petroleum Corp	-0.0002244	0.0137458	0.012676	0.0067064	0.0056151	
				-0.13	6.58	4.06	1.67	2.24	0.0167597
			Valero Energy Corp	0.0003997	0.0125031	0.006387	0.007624	0.0048879	
				0.25	6.7	2.29	2.13	2.18	-0.204673
	114	8/20/2002	Unocal Corp	0.0002904	0.0062893	-0.0043951	-0.0010048	0.0026983	
				0.3	6.24	-2.73	-0.52	2.06	0.0477864
			Pure Resources Inc	-0.000528	0.0006908	0.0003338	-0.0016477	0.0017354	
				-0.48	0.53	0.17	-0.66	1.11	0.2870774
	115	4/11/2002	Williams Energy Partners	0.0012002	0.0004586	-0.0007658	-0.0004647	-0.0008329	
				0.84	0.24	-0.36	-0.17	-0.8	0.3501688
			Williams Cos Inc	-0.0024136	0.0098061	-0.0017474	0.0077455	-0.0020505	
				-1.12	3.68	-0.46	1.55	-0.65	0.4645769
2003									
	116	2/24/2003	Devon Energy Corp	0.0011506	0.010577	-0.0001547	0.0048353	0.0032888	
				1	9.01	-0.08	2.12	2.26	-0.013719

Year	No	Date	Merger Companies	Fama-French 4 Factors Model					
				$\alpha$	$\beta$	s	h	u	CAR
			Ocean Energy Inc	0.00103	0.0095959	0.0010332	0.0044919	0.0011502	
				0.89	8.07	0.5	1.94	0.78	0.0065709
	117	5/29/2003	Edge Petroleum Corp	-0.0007114	-0.0002519	0.0076263	0.0047333	-0.0049339	
				-0.36	-0.12	2.11	1.13	-1.88	-0.339104
			Miller Exploration Co	0.0123864	0.0196898	0.0074051	0.042321	-0.00497	
				1.23	1.86	0.41	2.04	-0.38	0.804959
	118	3/31/2003	Evergreen Resources Inc	0.0008274	0.0085524	0.0075664	0.0014406	0.0025149	
				0.78	7.84	4.01	0.68	1.86	-0.185209
			Carbon Energy Corp	0.0008199	-0.0001345	-0.000536	0.0015139	0.0004871	
				1.18	-0.19	-0.44	1.1	0.56	-0.015462
	119	7/1/2003	Unit Corp	0.0009937	0.0164716	0.0120916	0.0101976	0.0065628	
				0.68	10.57	4.57	3.31	3.35	-0.173902
			PetroCorp Inc	0.0010983	0.0008775	0.0005729	0.0001779	0.0008653	
				1.4	1.04	0.4	0.11	0.81	0.2734447
2004									
	120	4/15/2004	EnCana Corp	0.0000398	0.0038098	0.0020311	0.0119986	-0.0037478	
				0.05	3.76	1.22	4.49	-2.31	-0.095438
			Tom Brown Inc	-0.0002168	0.0069525	0.0048765	0.0125574	-0.0042305	
				-0.25	6.69	2.86	4.59	-2.55	-0.25629
	121	5/24/2004	Forest Oil Corp	-0.0012144	0.0089199	0.0049334	0.0151485	-0.0080929	
				-1.2	6.2	2.24	4.48	-3.46	0.2073127
			Wiser Oil Co	0.0016354	0.0027782	0.0073436	0.0155062	-0.0078083	
				1.23	1.47	2.53	3.48	-2.54	0.339253
	122	4/7/2004	Kerr-McGee	-0.0010084	0.0090044	0.0000772	0.002544	0.0016901	
				-1.01	8.96	0.04	1.3	1.36	0.0263835
			Westport Resources Corp	0.0009445	0.0079638	0.0081547	0.0071272	-0.0009805	
				0.74	6.3	3.75	2.89	-0.63	0.0377152
	123	12/16/2004	Noble Energy Inc	0.0005649	0.0068649	0.0031551	0.0116817	0.0056496	
				0.76	5.45	1.71	4.75	3.03	0.0869897
			Patina Oil & Gas Corp	-0.0028776	0.0120672	-0.0013862	0.0180321	-0.0039407	
				-0.94	2.27	-0.18	1.73	-0.5	0.0397473
	124	6/9/2004	Petro Canada	-0.0002853	0.0028833	0.0018156	0.0144017	0.0002565	
				-0.29	1.94	0.81	4.13	0.1	0.1372348
			Prima Energy Corp	0.0000654	0.0092032	0.0192913	0.0086585	-0.0059232	
				0.05	4.32	6.01	1.73	-1.66	-0.024633
	125	5/4/2004	Pioneer Natural Resources	-0.0000698	0.0079093	0.0017385	0.0134607	-0.0037923	
				-0.07	6.3	0.89	4.33	-1.89	0.1047498
			Evergreen Resources Inc	-0.0027939	-0.0001124	0.0149523	0.013539	-0.0145421	
				-0.9	-0.03	2.32	1.32	-2.2	0.0748556
	126	2/12/2004	Plains Exploration & Production Co	-0.0001631	0.0099212	0.0063015	0.0101546	-0.002196	
				-0.15	8.25	2.92	2.91	-1.06	0.1156786
			Nuevo Energy Company	0.0018942	0.0067296	0.0064313	0.0149167	0.0020034	
				1.45	4.81	2.56	3.68	0.83	0.1064227
	127	2/4/2004	Valero Energy Corp	0.0004766	0.0041829	0.0031184	0.0158662	-0.0018801	
				0.48	3.89	1.61	5.01	-1.03	0.0440939
			El Paso Corp	-0.0036445	0.0195441	0.0044795	0.0220952	-0.0086183	
				-1.35	6.75	0.86	2.59	-1.75	0.3064543
	128	11/1/2004	Valero LP	0.0002144	0.0041041	0.0038219	0.0107984	-0.0022657	
				0.32	3.42	2.23	4.84	-1.34	-0.039446
			Kaneb Pipeline Partners LP	0.0000579	0.0020969	0.0055609	0.0073212	-0.0003028	
				0.08	1.6	2.98	3.01	-0.16	0.1376172
2005									
	129	4/4/2005	Chevron Corp	-0.0030294	0.0116257	-0.0056401	0.0198301	0.0039438	
				-1.1	2.36	-0.74	1.96	0.54	0.0400944
			Unocal	0.0008239	0.0089179	0.0017397	0.0099459	0.0102926	
				0.93	5.87	0.74	3.19	4.55	-0.083549
	130	12/12/2005	ConocoPhillips	-0.0035368	0.0139474	-0.0060073	0.0283294	0.0123737	
				-1.23	2.55	-0.73	2.07	1.43	0.0362897
			Burlington Resources Inc	-0.0000925	0.0121168	-0.0063665	0.0111684	0.0238344	
				-0.12	8.33	-2.92	3.07	10.34	0.1288433
	131	11/8/2005	Delta Petroleum Corp	-0.0016088	0.0136749	0.0086477	0.0147747	0.0194518	
				-1.14	5.33	2.16	2.2	4.44	-0.163768
			Castle Energy Corp	-0.0004391	0.0081974	0.0046869	0.0148572	0.0153593	
				-0.25	2.55	0.93	1.76	2.8	-0.19236
	132	1/26/2005	Energy Transfer Partner LP	0.0015094	0.0047771	0.0012707	0.0052956	0.0008354	
				2.28	4.08	0.73	2.28	0.49	0.0559325
			American Electric Power Co Inc	-0.000145	0.00915	-0.0021951	0.0106898	-0.0027183	
				-0.27	9.94	-1.6	5.85	-2.03	0.0567547
	133	9/19/2005	Norsk Hydro ASA	0.0006752	0.0094872	0.0005447	0.0062993	0.0081735	
				0.8	6.34	0.23	1.69	3.3	-0.304882
			Spinnaker Exploration Co	-0.001293	0.0110566	0.0093966	0.0192718	0.0116593	
				-1.25	5.84	3.2	4.09	3.71	-0.199363
	134	10/13/2005	Occidental Petroleum Corp	-0.0005028	0.0120613	-0.0047973	0.010971	0.0170974	
				-0.77	10.09	-2.57	3.65	8.47	-0.103136
			Vintage Petroleum Inc	0.0002402	0.0099838	0.0067739	0.0114656	0.0260023	
				0.23	5.2	2.26	2.37	8.01	0.1356897
	135	4/4/2005	Petrohawk Energy Corp	0.0042779	0.0022807	-0.0049786	-0.0062673	0.0126331	
				1.12	0.33	-0.47	-0.44	1.24	-0.281773
			Mission Resources Corp	0.0031045	0.0146845	0.0173368	0.0075136	0.014263	



Year	No	Date	Merger Companies	Fama-French 4 Factors Model					CAR
				$\alpha$	$\beta$	s	h	u	
				1.22	3.28	2.5	0.82	2.14	0.0483416
	136	7/11/2005	Pogo Producing Co	-0.000049	0.0090805	0.0201859	0.0030748	0.0163469	
			Unocal Corp	-0.03	2.68	3.83	0.41	3.2	0.2127002
				0.0009219	0.008085	-0.0016388	0.0043792	0.0141702	
	137	4/25/2005	Valero Energy Corp	1.01	4.9	-0.64	1.2	5.69	0.0021941
			Premcor Inc	0.0000384	0.0111638	0.0046286	0.0006068	0.0140213	
				0.01	2.03	0.53	0.05	1.68	-0.414398
				0.0009267	0.0075056	0.0019725	0.0094509	0.0129255	
				0.89	4.09	0.68	2.44	4.66	-0.330853
2006									
	138	6/23/2006	Anadarko Petroleum Corp	-0.0030337	0.0175839	-0.0049571	0.0132108	0.0202415	
			Kerr-McGee Corp	-1.06	3.05	-0.59	1	2.65	0.0580204
				-0.002307	-0.0016448	-0.0045059	0.0273453	0.006015	
	139	5/30/2006	Kinder Morgan Inc Management	-0.8	-0.29	-0.55	2.1	0.8	0.2032444
			Kinder Morgan Inc	-0.0010513	0.003839	0.0022998	0.0111623	0.0024547	
				-2.04	3.66	1.57	4.72	1.7	-0.022386
				-0.0003695	0.0096545	-0.0020154	0.0071183	0.0071324	
	140	7/8/2006	MDU Resources Group Inc	-0.66	8.46	-1.27	2.76	4.52	0.0715726
			Cascade Natural Gas Corp	0.0002936	0.0108851	-0.0015941	0.0098279	0.0029769	
				0.51	9.41	-0.95	3.72	1.95	-0.003891
				-0.0004179	0.0106861	0.005279	0.0064649	-0.0044744	
	141	4/21/2006	Petrohawk Energy Corp	-0.63	7.94	2.7	2.1	-2.52	0.1236266
			KCS Energy Inc	-0.0007577	0.009891	0.0026672	0.0170207	0.0180336	
				-0.58	3.81	0.73	2.82	4.69	0.0726313
				0.0001562	0.0105317	-0.0033319	0.0171034	0.0331294	
	142	6/12/2006	Plains All American Pipeline LP	0.16	5.11	-1.15	3.58	10.88	0.2420245
			Pacific Energy Partner LP	-0.0000651	0.0060322	0.0008762	0.0109728	0.0005497	
				-0.1	4.65	0.48	3.76	0.32	0.0315822
				-0.0005903	0.0045647	0.0033677	0.0072821	0.0043723	
				-0.86	3.28	1.71	2.33	2.34	-0.11125
2007									
	143	1/7/2007	Forest Oil Corp	-0.0021574	0.008734	0.0030131	0.0151909	0.0127146	
			The Houston Exploration Co	-1.27	2.4	0.63	1.93	2.79	0.0066078
				-0.0014003	0.0067665	0.0030807	0.0251859	0.0037468	
	144	6/19/2007	General Electric Co	-1.39	3.14	1.1	5.42	1.39	0.1574924
			Regency Energy Partners LP	-0.0000995	0.0080029	-0.0049083	-0.0070204	-0.0029076	
				-0.25	10.52	-4.07	-3.49	-2.24	-0.053097
				0.0003826	0.001102	-4.85E-06	0.0051428	0.0013276	
	145	7/17/2007	Plains Exploration & Production Co	0.56	0.85	0	1.5	0.6	0.0922437
			Pogo Producing Co	0.0001212	0.0088432	0.0010918	0.0080758	0.0070635	
				0.13	4.96	0.37	1.59	1.98	-0.306124
				-2.56E-05	0.0088345	0.0012348	0.0158852	0.0102676	
				-0.03	4.78	0.4	3.02	2.77	0.0575213