Exxon Mobil Acquisition of Pioneer Natural Resources: A Test of Market Efficiency

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On October 23, 2023, ExxonMobil announced a record-setting $59.9 billion all-stock acquisition of Pioneer Natural Resources, marking the largest energy sector M&A deal of the 21st century. This research employs event study methodology to test the semi-strong form of the EMH, which posits that markets rapidly absorb information, preventing significant stock price gains from new data. The study analyzes the impact of this merger on the stock prices of 30 NYSE-traded energy companies. By examining historical stock and S&P 500 index data, the research calculates holding period returns and average excess returns. Results reveal statistically significant positive impacts on stock prices and an overreaction approximately 30 days prior to the announcement, suggesting anticipatory market behavior. Following the announcement, stock prices declined towards equilibrium, aligning with semi-strong EMH principles. The findings support the semi-strong EMH, indicating potential trading opportunities up to 30 days before the announcement, consistent with behavioral finance literature. This case study offers valuable insights into M&A strategies within the energy sector and underscores the influence of external factors, regulatory changes, and industry knowledge on market responses.

Keywords: mergers, acquisitions, market efficiency, event study, stock prices

INTRODUCTION

Exxon's acquisition of Pioneer on October 23, 2023, became the largest M&A deal in the energy sector in the twenty-first century, and ninth largest of all time. M&A are pivotal events that reshape industries by influencing corporate strategies, market dynamics, and shareholder value.

The energy sector is often characterized by capital-intensive operations and fluctuating commodity prices, and has seen some of the largest M&A deals in history, among these, Exxon's acquisition of XTO Energy, not Pioneer. Successful M&A typically creates significant advantages for shareholders by enhancing the financial performance of the combined entities through synergy. By merging, companies can reduce operating costs through economies of scale while maintaining or even boosting revenue streams. Ultimately, this results in increased profitability. Additionally, combining with a competitor can strengthen market presence by expanding market share and improving competitive positioning. The newly increased market power enables the company to exert greater influence over pricing, supply chains, and industry

standards. M&A deals also enhance research and development, as well as product diversification, further improving long-term value for shareholders (Bacon & Von Gersdorff, 2008).

Exxon's merger with Pioneer has had a significant impact on the energy sector, but its significance extends beyond the companies involved, affecting the entire energy sector. The EMH claims that stock prices fully reflect all available information and make rapid adjustments to new disclosures. This study investigates whether the announcement of Exxon's acquisition of Pioneer supports the semi-strong form of the EMH, which asserts that stock prices have an immediate reaction to publicly available information, preventing investors from earning abnormal risk-adjusted returns based on such disclosures. In the finance literature, event studies evaluate how public announcements impact risk adjusted stock returns. These studies encompass both anticipated and unexpected events, which significantly influence financial markets. The speed of market reactions tests market efficiency and varies on whether investors anticipated the event due to prior insights or similar past occurrences.

To explore this hypothesis, the event study methodology is applied to data collected before and after the event announcement. This approach evaluates abnormally high returns by comparing actual stock returns to expected returns. The study focuses on the market returns of 30 energy sector companies listed on the NYSE, and analyzes holding period returns, average excess returns, and cumulative average excess returns before, during, and after the announcement. By analyzing these returns, this study determines whether stock prices anticipated the acquisition or reacted only after the public disclosure. A positive market reaction preceding the event would suggest information leakage or investor anticipation, consistent with behavioral finance theories. On the contrary, an immediate reaction upon announcement would also align with the semi-strong form of EMH. This event study evaluates the semi-strong form of the EMH by examining risk adjusted stock price returns' reactions to significant market events. It investigates whether such events challenge or support market efficiency principles, asserting that investors cannot consistently earn above-normal risk-adjusted returns using publicly available information. By analyzing a diverse sample of companies, the study provides insight into how markets respond to major announcements and the complexities of behavioral finance dynamics (Ross 2016).

LITERARY REVIEW

Mergers and Acquisitions

M&A involves companies combining through buying, selling, or merging to strengthen their market position. This process enables businesses to collaborate, expand, and improve their financial stability without the lengthy process of establishing a new entity from scratch. In some cases, M&A occurs through hostile takeovers, where one company purchases a controlling interest in another by acquiring a majority of its outstanding shares. After merging, companies may adopt the acquiring firm's name, the target company's name, or create a new brand altogether. Some mergers occur at the corporate level, allowing businesses to operate independently under a shared ownership structure. These decisions are driven by management's strategy for maximizing brand strength, market presence, and operational efficiency within their industry (Bacon & Von Gersdorff, 2008).

Market Efficiency

This study tests market efficiency on and around the period of Exxon's merger announcement with Pioneer. Fama (1970, 1976) defined market efficiency in three forms: weak-form, semi-strong-form and strong-form. Under weak form efficiency, no investor can earn an above-normal risk-adjusted return by making investment decisions based on past information. Numerous studies support the random walk theory in favor of the weak form of the market efficiency hypothesis (Fama, 1965; Alexander, 1961; Fama and Blume, 1966; Granger and Morgenstern, 1970). According to the weak form efficiency, the stock price reacts so quickly to past information that no investor can earn an above-normal, risk-adjusted return (i.e., higher than the risk-adjusted return using the S&P 500 index) by acting on this information. For example, if an investor reviews a firm's annual report, discovers strong positive earnings results for the past year, and buys the firm's stock and the stock price remains constant, the market is said to be weak form efficient

based on past information (Bacon & Reis, 2024; Bacon & Howell, 2021; Bacon& Cannon, 2018; Bacon & Gobran, 2017; Bacon & Spradlin, 2019; Bacon & George, 2023).

According to the semi-strong-form market efficiency hypothesis, no investor can earn an above-normal, risk-adjusted return by acting on publicly available information. Tests of semi-strong form efficiency (Fama, Fisher, Jensen, & Roll, 1969; Ball & Brown, 1968; Aharony & Swary, 1980; Joy, Litzenberger, & McEnally, 1977; Watts, 1978; Patell & Wolfson 1979; Scholes, 1972; Kraus & Stoll, 1972; Mikkelson & Partch, 1985; Dann, Mayers, & Raab, 1977) support the semi-strong-form market efficiency hypothesis that no investor can earn an above normal risk adjusted return using public information such as dividend announcements, sale of stock announcements, repurchase of stock announcements, accounting statements, stock split announcements, block trades, and earnings announcements. If the market is semi-strong form efficient, then the stock price reacts so quickly to all public information that no investor can earn an above-normal, risk-adjusted return by acting on the public announcement. If one buys the stock on the announcement and still does not achieve an above-normal risk-adjusted return, the market is semi-strong form efficient (Bacon & Reis, 2024; Bacon & Spradlin, 2019; Bacon & Gobran, 2017; Bacon & Hutchinson, 2020; Bacon & George, 2023). Tung & Marsden (1998) found a positive relationship between information quality and market trading profits, supporting the semi-strong form efficiency hypothesis.

Strong-form efficiency theory hypothesizes that no investor can earn an above-normal, risk-adjusted return using past, public, or private information. Studies testing strong form efficiency (Jaffe, 1974; Finnerty, 1976; Givoly & Palmon, 1985; Friend, Blume, & Crockett, 1970; Jensen, 1968) have yielded mixed results. The market reacts to an event even before it is made public. Essentially, investors must refrain from acting on insider information, which is an illegal act. If an investor uses inside information and buys the stock on the event before the public announcement, and earns no above normal risk adjusted return, the market is strong form efficient (Bacon & Hutchinson, 2021; Bacon & Spradlin, 2019; Bacon & Gobran, 2017; Bacon & George, 2023 Bacon & Reis, 2024).

Market Efficiency and Investment Advice

This study tests the semi-strong market efficiency theory by using the standard event study methodology in the finance literature (Bacon &Greis, 2008; Bacon & Gobran, 2017; Bacon & George, 2023). If the market is semi-strong form efficient, then two popular methods of stock valuation become useless. Investors pay billions of dollars annually to analysts for investment advice based on these valuation models. If the market is efficient, these investors are wasting dollars on useless investment advice. Efforts to determine the "correct" value of stock are futile if the market is semi-strong form efficient, as the "correct" price is the market price that instantly responds to all available information (Bacon & Howell, 2021; Bacon & Cannon, 2018; Bacon & George, 2023).

Market Analysis

A popular finance valuation model that is questioned by efficient market theory is technical stock analysis. Technical analysis utilizes historical stock prices to predict future prices. Technical analysts identify buy and sell targets based on past price movements with charts and graphs. Often called chartists, they closely examine factors such as demand, popular opinion trends, and investor moods (Gitman & Joehnk, 2002; Bodie, Kane., & Marcus, 2007). Technical analysis disregards minor short-term fluctuations in the market and focuses instead on how prices tend to move in long-term trends. Trend movements are identified by changes in supply and demand relationships and are detected in the market (Levy, 1966). Critics claim that past price behavior is not predictive of future prices and that the market moves in a random, unpredictable pattern. The market reacts to information, and since information arrives randomly, the market responds randomly. Critics also argue that if technical analysis were successful, the influx of many technical traders would economically bid away whatever profit potential exists (Levy, 1966; Bacon & Howell, 2021; Bacon & Cannon, 2018; Bacon & George, 2023; Bacon & Reis, 2024).

Semi-Strong Form Efficiency

This study tests the semi-strong form EMH claiming that stock prices reflect all public information making it impossible to earn an abnormal risk adjusted return by investing on public information rendering technical and fundamental stock analysis useless. This information includes historical stock prices from energy companies and the S&P 500 (Ross et al., 2016). This study tested the semi-strong form EMH by examining the risk-adjusted returns of 30 firms' stock prices from thirty trading days before the October 23, 2023, announcement to thirty days after. Ross defines an efficient market response as an immediate stock price adjustment to new information. There is no tendency for subsequent increases and decreases (Ross et. al., 2016; Bacon & Howell, 2021; Bacon & Cannon, 2018; Bacon & George, 2023 Bacon & Reis, 2024).

METHODOLOGY

This study examined a sample of 30 energy sector firms to test the impact of Exxon's acquisition announcement of Pioneer on stock price risk-adjusted returns. Table 1 provides a description of the study sample. The announcement of Exxon's acquisition of Pioneer occurred on October 23, 2023. Using the standard event study methodology from the finance literature, the study analyzed the sample of energy companies' risk adjusted returns against the corresponding S&P 500 Index returns with 6,570 observations to test the semi-strong form EMH with respect to the announcement of Exxon's acquisition of Pioneer (Reis & Bacon, 2024). The announcement date of the acquisition is day 0. Historical stock and corresponding S&P 500 prices used in this event study were obtained from the Yahoo Finance website (http://finance.yahoo.com). The following steps were taken to conduct the event study test.

The historical stock prices for the sample energy companies, as well as the S&P 500 index, were obtained for the period from -180 days to +30 days prior to the event date. Days -30 through +30 define the event period, and day 0 is the announcement date, October 23, 2023. The holding period returns of the sample companies and the corresponding S&P index were calculated for each day in this study period using the following formula: HPR = (Current day's closing price – Previous day's closing price) / Previous day's closing price. Then, a regression analysis was performed for the pre-event period from day -180 through day -31 using the actual daily returns for each energy sector company as the dependent variable and the corresponding S&P 500 daily returns as the independent variable. Table 2 shows the alphas and betas for each company. Next, the risk adjusted method was used to calculate the normal expected returns as follows: E(R) = alpha + (beta*Rm), where Rm is the return of the market (S&P 500 index). After that, the excess return was calculated as follows: ER = Actual Return (R) – Expected Return E(R). The Average excess returns (AER) were calculated for each day during the event period (from -30 through +30) as follows: AER = Sum of all excess returns for each day / N where: N equal the number of companies. Then, the Cumulative AER (CAER) was calculated for the event period by adding the AERs for each day for the sample. Graphs of the AER and CAER were plotted for the event period and are included in Figure 1 and Figure 2 (Bacon & George, 2023).

TABLE 1
STUDY SAMPLE

TICKER	FIRM NAME	TRADED INDEX
CVX	Chevron Corporation	NYSE
SHEL	Shell plc	NYSE
COP	ConocoPhillips	NYSE
TTE	TotalEnergies SE	NYSE
ENB	Enbridge Inc	NYSE
PBR	Petróleo Brasileiro S.A.	NYSE
BP	BP p.l.c.	NYSE
EOG	EOG Resources Inc.	NYSE
EPD	Enterprise Products Partners LP	NYSE
WMB	The Williams Companies, Inc.	NYSE
CNQ	Canadian Natural Resources Limited	NYSE
ET	Energy Transfer LP	NYSE
EQNR	Equinor ASA	NYSE
OKE	ONEOK, Inc.	NYSE
KMI	Kinder Morgan, Inc.	NYSE
SLB	Schlumberger Limited	NYSE
PSX	Phillips 66	NYSE
TRP	TC Energy Corporation	NYSE
MPLX	MPLX LP	NYSE
LNG	Liquefied Natural Gas	NYSE
FANG	Diamond Back Energy, Inc.	NYSE
SU	Sun Core Energy, Inc.	NYSE
MPC	Marathon Petroleum Corporation	NYSE
OXY	Occidental Petroleum Corporation	NYSE
E	Eni S.p.A.	NYSE
HES	Hess Corporation	NYSE
TRGP	Targa Resources Corporation	NYSE
AMPY	Amplify Energy Corporation	NYSE
SUN	Sunoco LP	NYSE
NFE	New Fortress Energy, Inc.	NYSE

To test semi-strong market efficiency on the announcement, the following null and alternative hypotheses are used for the sample:

H10: *The risk adjusted return of the stock price of the sample is not significantly affected by this type of information on the announcement date.*

H11: *The risk adjusted return of the stock price of the sample is significantly positively affected by this type of information on the announcement date.*

H20: *The risk adjusted return of the stock price of the sample energy companies is not significantly affected by this type of information around the announcement date as defined by the event period.*

H21: *The risk adjusted return of the stock price of the sample of energy companies is significantly positively affected around the announcement date as defined by the event period.*

QUANTITATIVE TESTS AND RESULTS

This study evaluated how the market reacts to new information, focusing on whether investors can achieve above-normal risk-adjusted returns or if the market efficiently processes public announcements, such as Exxon's merger with Pioneer. The analysis aimed to determine whether such events provoke significant market reactions and reveal insights about market efficiency. When examining Exxon's merger announcement, differences between Actual Average Returns (AAR) and Expected Average Returns (EAR) during the event period provided critical evidence. Essentially, the question explored was: Is it possible to outperform the market? Employing a paired t-test to scrutinize the statistical distinction between risk-adjusted daily average excess returns and cumulative average excess daily returns over the event period (day -30 to +30), the findings substantiated alternative hypotheses H10 and H21. T-tests of AER and CAER indicate a difference at the 5% significance level. The implications suggest a significant positive impact on the stock prices of the sample firms prior to the announcement date and a significant negative impact on the stock prices of the sample firms after the announcement date.

The Average Excess Return (AER) and Cumulative Average Excess Return (CAER) graphs below illustrate market efficiency and the relationship to time, particularly around the announcement date (Day 0). The CAER graph indicates that the merger announcement influenced stock prices both before and after the announcement, as values remained at a relatively constant increase from day -30 to 0, followed by a steady decrease from day 0 to day +30, gradually erasing all the pre-announcement gains and returning to equilibrium. This pattern suggests that it might be possible for an investor to outperform the market prior to the announcement. Additionally, evidence of potential insider information emerges, with stock prices starting to climb approximately 30 days before the official announcement. This supports the theory that the market reacts to information prior to its announcement. The evidence supports semi-strong market efficiency, as the CAER rose prior to the announcement, thereby disallowing any above-normal risk-adjusted returns on the announcement date, in support of H10. Consistent with market efficiency theory (Fama, 1998), the pattern of risk adjusted returns aligns with the tenets of semi-strong market efficiency.

FIGURE 1
TIME VS. AVERAGE EXPECTED RETURN

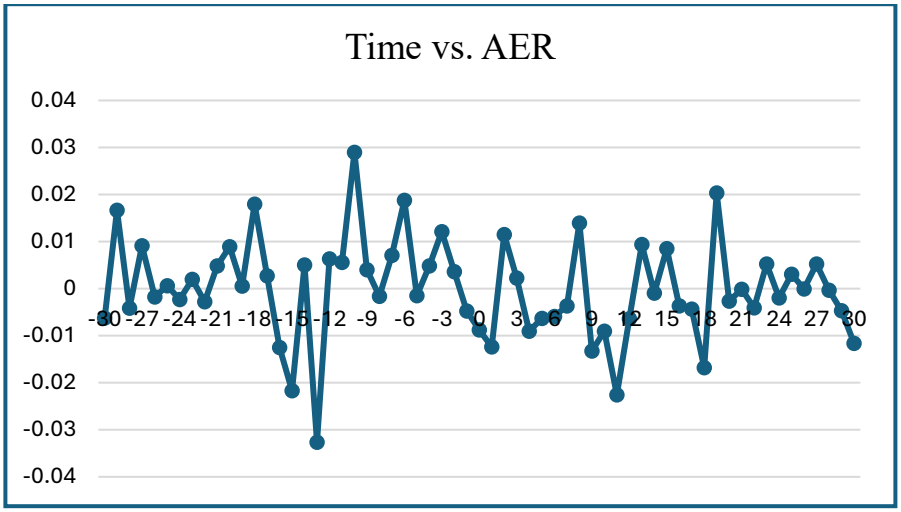
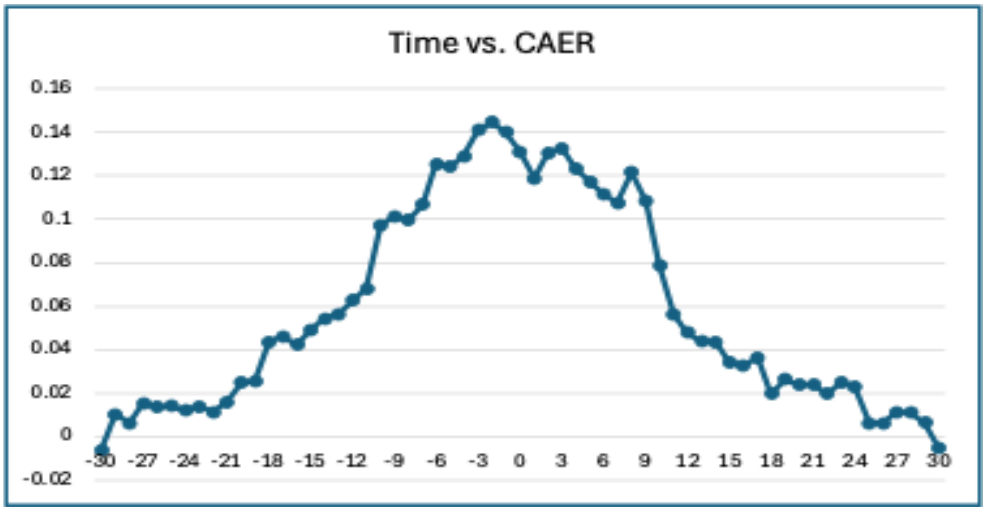


FIGURE 2
TIME VS. CUMULATIVE AVERAGE EXPECTED RETURN



CONCLUSION

The acquisition of Pioneer by Exxon shows the significant impact of mergers and acquisitions in the energy sector. This study tested the semi-strong form of the EMH by examining stock price risk adjusted return reactions to this announcement. The analysis revealed that market participants responded to the announcement with significant adjustments in stock prices, as indicated by the AER and CAER data. The findings demonstrated a rise in risk adjusted stock price returns leading up to the public announcement (day -30 to day 0), suggesting anticipatory market behavior and the possible influence of insider information. Evidence shows a steady decline in risk-adjusted stock price returns following the announcement, from day 0 to day +30, returning to pre-event equilibrium.

Moreover, the results support the principles of semi-strong market efficiency, as no investor could earn above-normal, risk-adjusted returns by acting on the merger announcement on day 0, since the market had already reacted to the information prior to its public disclosure. While the data indicated opportunities for

abnormal returns prior to the announcement, consistent with insider trading and behavioral finance theories, the market's adjustment following the announcement affirmed the EMH theory. By Day +30, returns had returned to their pre-announcement equilibrium, underscoring the market's resilience and efficiency.

This study offers insight into the market dynamics surrounding major corporate events. For investors and financial institutions, the Exxon-Pioneer merger highlights the importance of timing and information accuracy in decision-making. The effects of this acquisition extend beyond shareholder gains, providing insights into strategic consolidation and its impact on market behavior in the energy sector.

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