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Validating Stock Market Reactions to Acquisition Announcements

David R. King*

Florida State University, Department of Management, 821 Academic Way, Tallahassee, Florida, USA

****Corresponding author:** David R. King, Florida State University, Department of Management, 821 Academic Way, Tallahassee, FL 32306-1110, Florida, USA. Email: drking@fsu.edu*

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Abstract

A comparison of the stock market's reaction to the acquisition of General Dynamics aircraft division by Lockheed to a valuation of resulting cash flows suggests stock market reactions to acquisition announcements is a good predictor of performance. Following an acquisition, a target, including financial reporting, is integrated into an acquirer, making validation of stock market reactions with accounting data difficult. Additionally, research questions the value of the stock market's reaction to acquisition announcements even though they can represent significant changes to the stock price of associated firms. Present results confirm the stock market's reaction to an acquisition announcement is consistent with a valuation of post-acquisition cash flows, validating both estimating techniques.

Keywords: Acquisition Valuation; Acquisition Performance; Capital Asset Pricing Model (CAPM); Discounted Cash Flow (DCF) analysis

Introduction

Acquisitions involve discrete events that modify the competitive dynamics of affected industries and represent an important corporate level strategy [1], and the drama surrounding acquisitions consistently captures media attention. In the short-term, acquisition announcements with their high dollar value and potential disruption for affected workers and communities grab headlines. However, the long-term implications of acquisitions are also significant. In consolidating know-how, production facilities, and technologies, acquisitions risk losing employees and desired capabilities. The consolidation of resources and related capacity can also threaten the market position and profitability of remaining firms [2]. The long-term implications of acquisitions reflect the complexity of these transactions that is also reflected in a government review process, and approximately 20 percent of announced acquisitions are abandoned [3].

Following announcement, a period of due diligence is required before an acquisition can be completed. Part of the due diligence process involves firms filing a notification with the Federal Trade Commission (FTC) and the Department of Justice (DOJ), or agencies responsible for

Antitrust investigation and enforcement[1]. The filing includes information about the firms, including lines of business, and details on the proposed transaction. Firms must wait at least 15 days, after submitting a filing, to allow the government time to review the proposed transaction for possible antitrust concerns before an acquisition can be completed. The FTC and DOJ are responsible for assessing the likely effects of a deal in a market. In the case of defense industry acquisitions, the Department of Defense (DOD) participates in the review process to ensure a coordinated U.S. Government position, as the DOD manages associated contracts with defense firms [4]. The DOD review examines a proposed acquisition's impact on innovation, competition, national security, and the defense industrial base. Following the end of the Cold War, there was significant consolidation of U.S. defense firms with only a handful of prime contractors remaining after 2004, see Figure 1.

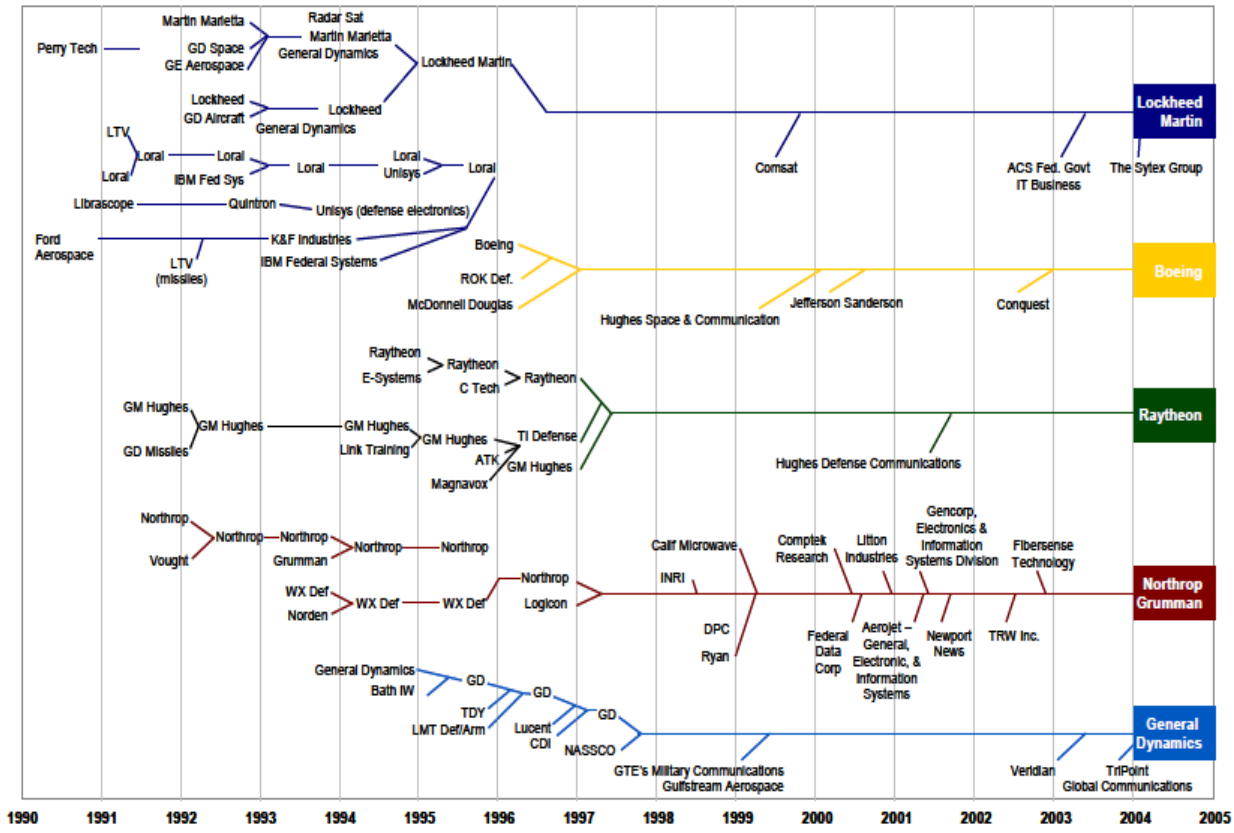

Figure 1: Defense Firm Consolidation (1990-2004)

However, research suggests that acquisitions do not increase firm performance on average [5]. As a result, there are questions the ability of firms to achieve expected benefits from an acquisition. Estimates of the expected value of acquisitions should prevent the completion of poor deals. However, firm managers may complete acquisitions in the face of negative information [6], or hubris may play a role in the pursuit of acquisitions [7]. Hubris may help explain acquisitions in that executives are often "rewarded" with higher pay packages to

[1] The merger filing, review process and accompanying waiting period are established in the Hart-Scott-Rodino Antitrust Improvement Act of 1976.

compensate them for the increased responsibility of running a bigger company [8]. For example, at least nine executives negotiated higher compensation packages following the merger of Hewlett Packard and Compaq [9] in what was later identified as a poor combination. This contributes to a potential concern that acquisition valuation is sensitive to assumptions that may be biased to support an acquisition [10], and that acquisitions do not significantly influence acquiring firm profitability [5,11,12].

By contrast, the stock market reaction to acquisition announcements represents an independent estimate of an acquisition's outcomes [13]. However, proposed acquisitions are often defended on the expectation of realizing synergies between the firms that depends on private information that may not be available to the stock market [14]. The validity of the stock market's reaction as a predictor of acquisition performance is worth examination [15, 16]. For example, most of the research on acquisition activity uses stock market measures of performance [5] that assumes the stock market can predict acquisition performance. Additional background on acquisition valuation methods is provided next.

Summary of Acquisition Valuation Methods

Acquisition valuation methods either directly or indirectly rely on estimates of the future cash flows of a combined firm. [17] describes a procedure of estimating the value of discounted cash flows that is widely used in estimating the value of an acquisition. This valuation procedure estimates the net present (current) value of anticipated revenues from increased sales after considering the cost of goods sold, overhead, depreciation, and a firm's cost of capital. Ideally, the estimate of the current value of combining operations should exceed the price of an acquisition. The process requires making several assumptions, and the most important begins with an estimate of what sales growth can be achieved by a combined firm.

Valuation of an announced acquisition by the stock market assumes an "efficient" market that adjusts a firm's stock price based on information about a firm's prospects and business conditions. While perfect information is not available, most research assumes "semi-strong" efficiency or that new information is quickly considered by markets to set firm prices [18]. Event studies that consider the reaction of the stock market to "new" information such as acquisition announcements assume semi-strong efficiency. Extant research tends to support assumptions about semi-strong market efficiency in that studies consistently show stock prices quickly adjust to new information on firm-specific changes [18]. Still, the validity of stock market reactions to predict acquisition performance has not been empirically examined due to challenges in examining distinct firm cash flows following an acquisition.

A Single Case Study Comparison of Valuation Methods

The potential implications of acquisition activity necessitate assessing stock market reactions as a predictor of M&A performance. It is difficult to prove or disprove assumptions surrounding acquisition activity (Ravenscraft and Scherer, 1987) [19], and the ability to incorporate an additional prediction could benefit policy makers and executives. The primary challenge in assessing the accuracy of predictions is that time is required to observe actual cash flows. However, following acquisitions operating results are only reported for a combined firm. This means that the value of previously independent operations cannot usually be estimated with

public information, as only the cash flows from the combined firm are publicly reported after an acquisition.

The current research uses the acquisition of General Dynamics' aircraft division by Lockheed Martin to answer whether the stock market provides a valid prediction of the value of an acquisition[2]. The value of contract awards and associated cash flows are a matter of public record in the defense industry, facilitating an assessment of the ability of the stock market to predict the value of an acquisition from cash flows. However, even in the defense industry there is significant uncertainty about the potential level of cash flows. For example, Table 1 shows how procurement quantities for the F-22 changed over time. Additionally, in 1999, the House of Representatives voted to eliminate funding for the F-22 program [20] that would have effectively cancelled the program. The ex-ante uncertainty about acquisition cash flows contributes to the need for the passage of time to assess the accuracy of predicted acquisition performance by using realized cash flows.

Year	Quantity	Related Event
1986	750	Initial Air Force requirement to replace F-15 aircraft
1993	442	Congressional budget cuts delay F-22 development and anticipated production quantities
1997	339	Congress caps F-22 production budget
2003	279	Updated estimate of procurement quantity under Congressional cap
2008	187	Final F-22 production quantity with last aircraft delivered in December 2011

Table 1: F-22 Procurement Quantity Changes.

Based on the publicly available information Lockheed acquired General Dynamics' Fort Worth division for $1.52 billion, in 1993 [21], procuring General Dynamics' portion of the F-22 contract and F-16 production. Both Lockheed Martin's stock price reaction to the acquisition announcement and the value of actual and predicted cash flows from Lockheed Martin's acquisition of General Dynamics' aircraft division can be estimated. Though the stock market reaction to Lockheed Martin's announced acquisition of General Dynamics' aircraft division was positive [22], the acquisition was criticized as a potential misstep [23], as the sales price was eight times earnings or a premium above what other defense firms were selling for at the time [24][3].

Stock Market Valuation

An event study is used to identify the stock market's reaction to Lockheed Martin's announced acquisition of General Dynamics' aircraft division. The purpose of an event study is to measure the effect of a single event on a firm's performance [25], and prior research has used event studies and market reactions as an indication the anticipated performance of acquisitions [18, 8, 19].

[2] Lockheed Martin contract information and government budget documents were accessed to complete this research. Additionally, the current firm name of Lockheed Martin is used throughout for consistency even though the merger of Lockheed and Martin Marietta was not completed until 1995.

[3] The stock price premium cannot be estimated because Lockheed Martin only acquired a division of General Dynamics and not the entire firm.

Most of the literature examining M&A performance uses stock market measures of performance using the Capital Asset Pricing Model (CAPM) methodology [26]. CAPM is an ex ante measure of performance that assumes stock market reactions can be used to predict future performance [27].

An event study using the CAPM methodology measured the abnormal return for Lockheed's stock relating to its announced acquisition of General Dynamics' aircraft division. To compute abnormal return, Lockheed's return was regressed against the market return using the following equation:

$$R_{it} = \alpha_{it} + \beta_{it} R_{mit} + \varepsilon_{it} \qquad (1)$$

where:

R_{it} = daily stock return for stock i on day t;

R_{mt} = daily stock return for market portfolio on day t.

The above model was estimated after the market closed on 8 December 1992, or the day Lockheed announced its acquisition of General Dynamics' aircraft division [24], for the period from –266 to –11, which corresponds to 255 trading days in a year. The analysis excludes the ten days prior to December 9, 1992, or the day the market reacted to the acquisition announcement to control for any pre-announcement leakage effects.

Calculation of the Abnormal Return (AR) for Lockheed Martin is limited to the day it was announced to minimize the potential contamination by other events, using the following equation:

$$AR_{it} = R_{it}^{\%} - \hat{R}_{it} \qquad (2)$$

where:

$R_{it}^{\%}$ = the realized return for stock i on day t;

$\hat{R}_{it}$ = the predicted value of the return for stock i on day t using equation (1).

The resulting analysis indicates that the announcement that Lockheed Martin would acquire General Dynamics' aircraft division coincided with a positive, abnormal return of 6.68 percent in Lockheed Martin's stock. An analysis of discounted cash flows associated with Lockheed's acquisition of General Dynamics' aircraft division is examined next.

Discounted Cash Flow Valuation

Through its acquisition of General Dynamics' aircraft division, Lockheed Martin was able to gain cash flows related to F-16 aircraft contracts and an additional 32.5 percent share of F-22 contracts. After acquiring General Dynamics, Lockheed Martin's share of the F-22 program was 67.5 percent with the remaining 32.5 percent belonging to Boeing under the original partnering agreement. The value of F-16 and F-22 contracts is substantial and for a $1.52 billion investment Lockheed Martin gained access to multi-billion-dollar cash flows that can be specifically traced to its acquisition of General Dynamics' aircraft division.

Since the acquisition was completed, in 1993, U.S. and foreign governments awarded an additional $13 billion in F-16 contracts to the former General Dynamics' aircraft division. Although F-16 production for the U.S. government has ended, funding to modify and sustain the operation of the U.S. Air Force's F-16 fleet currently averages $317 million a year through 2009, and this level of funding is expected to continue for several years as F-16 aircraft are anticipated to remain in U.S. Air Force inventory beyond 2018. This means that, in addition to F-16 production, Lockheed Martin could gain up to $5 billion in cash flows related to sustaining U.S. Air Force F-16 operations. Additionally, there are potential follow-on sales opportunities to the seventeen-plus foreign nations that have bought F-16 aircraft [28]. However, these cash flows and the potential for selling additional F-16 aircraft, including twenty-four to Pakistan [29] are not included[4].

Over $45 billion in government contracts have been awarded to Lockheed Martin for the development and production of F-22 aircraft, and it is estimated that an additional $12 to $32.4 billion will be awarded to complete F-22 production. Several billion dollars of contracts were awarded for sustaining and modifying F-22 aircraft over the decades the aircraft operates. In estimating F-22 and other cash flows that could be tied to the acquisition of General Dynamic's aircraft division, a conservative approach was used. For example, the value of additional contracts that Lockheed Martin won (e.g., the Joint Strike Fighter) or may receive as a result of its General Dynamics' aircraft division acquisition are not included, and no cash flows beyond 2018 are included in the analysis.

Estimates of the value of the additional 32.5 percent share of the F-22 contract and the F-16 program is based on the actual dollar value of F-22 and F-16 contract awards to Lockheed Martin. The dollar value of defense contracts is announced when they are awarded, but firms receive cash flows from contracts over time. Therefore, cash flows from a contract are estimated by spreading the total dollar value of a contract out over five years from the year of contract award using a beta distribution where 30 percent of funding is received in the first 2.5 years and 70 percent in the final 2.5 years. These values provide an estimate cash flows from 1993 to 2003 and are conservatively biased to shift payments toward the end of contracts, and projected spending was used for 2004 to 2008, including sustainment costs. Subsequent years (2008 to 2018) were based on historical program funding levels and entered as average annual values.

After establishing an estimate of future cash flows, the value of actual and estimated cash flows from General Dynamic's aircraft division, in 1993, is estimated using the discounted cash flow procedure described by [17][5]. Some of the key assumptions are that operating income is estimated to be 12 percent of cash flows, as the U.S. government limits the profit earned on defense contracts; a discount rate of 3.95 percent, an estimate of the long-term inflation rate from Treasury Inflation Protection Securities, is used; and a corporate income tax rate of 30 percent is assumed. Discounted cash flow analysis results in a $1.6 billion valuation of General Dynamics' Fort Worth division compared to its $1.52 billion purchase price[6]. Therefore, a conservative

[4] Excluding these cash flows has a conservative impact on the present valuation.
[5] A copy of the spreadsheet used to perform the valuation of cash flows is available upon request.
[6] Sensitivity analysis indicates that the valuation only falls below its purchase price when profit falls below 11 percent or the discount rate is 5.5 percent, or higher.

estimate indicates that the value of actual and estimated cash flows exceeded the purchase price of General Dynamics' aircraft division.

Discussion

Although it involves only a single example, the results validate the ability of cash flow analysis to value acquisitions and the use of stock market reactions as a predictive of acquisition performance. An analysis of the value of Lockheed Martin's cash flows following its acquisition of General Dynamic's aircraft division is consistent with the stock market's reaction to the acquisition announcement.[7] An implication is that stock market reactions have utility in predicting acquisition outcomes [30]. Evaluating stock market and cash flow estimates of acquisition outcomes also has implications for management research and practice, as well as opportunities for future research.

Research Implications

Confidence in different acquisition performance measures is a consistent concern [31]. Research rarely uses multiple measures of performance, and even less often compares predicted and actual performance. Current results suggest that stock market reactions can be valid predictors of follow-on accounting performance.

There are also concerns about competitiveness impacts of acquisitions [32]. Government reviews of acquisition filings need to serve the public interest, and better understanding acquisition activity will aid policy makers in evaluating the impact of acquisitions. While the acquisition of General Dynamic's aircraft division increased Lockheed Martin's competitiveness, the acquisition also resulted in a healthier supplier as evidenced by Lockheed Martin winning the subsequent competition for the Joint Strike Fighter. This implies that estimates of acquisition outcomes, such as the stock market reaction, can be used as a tool to help assess competition and industrial base implications of acquisitions.

Managerial Implications

Given the current study's findings that the stock market reaction appears predictive of acquisition performance, managers would benefit from reconsidering deals that receive an unfavorable market reaction [33]. Executives have a personal stake in paying attention to the stock market's reaction to an acquisition announcement. For example, in the three weeks following the announcement that it was acquiring Compaq, Hewlett Packard's stock fell by 35 percent [34] and the public firing of Carly Fiorina as CEO by Hewlett Packard's board of directors involved concerns about the acquisition failing to meet expectations [35]. This negative outcome may have been prevented had the 35 percent drop in Hewlett Packard's stock price following the Compaq announcement resulted in a reevaluation of the merger during the due diligence period. The negative reaction of the stock market to acquisition announcements is not isolated to Hewlett Packard and continues to have relevance for executives. For example, the

[7] While a unique case, there is no reason to preclude the application of this finding to other industries. A combination of the passage of time and available information allowed an accurate estimate of the value of General Dynamics' aircraft division. At the time of the acquisition, significant uncertainty about cash flows existed.

stock of America West fell 11 percent in one day in April 2005, after acquisition negotiations with U.S. Airways were announced [36].

An additional implication for is that the current results validate the use of discounted cash flow analysis in pricing or developing offers for acquired firms. Additionally, stock market reactions of acquisition announcements can be used to crosscheck estimates. When the stock market's reaction is inconsistent with estimates that justify an acquisition, assumptions behind estimates should be reevaluated. For research, this case validates the use of stock market reaction measures (e.g., CAPM) in performing studies to better understand acquisition phenomenon and their impact.

Limitations and Future Research

The primary limitation of the current paper is that it is based on a single example. However, comparison of accounting performance to cross-check the validity of the stock market's reaction to an acquisition announcement is rarely available. Results may differ for other cases, or in other industries where contract values are less public and potentially more uncertain. Still, the discounted cash flow analysis appears robust to modeled assumptions. When possible, future research should use multiple measures of performance and report predicted and actual performance.

In closing, results support the continued use of cash flow and stock market valuation of acquisition outcomes. Stakeholders in an acquisition announcement may want to heed the stock market's reaction to an acquisition announcement. This may require a shift in perspective. Instead of questioning the information available for stock market valuations of acquisitions, it may be worth questioning the assumptions of executives pursuing acquisitions. Avoiding the completion of acquisitions with significantly negative stock market reactions to their announcement may lead to an improvement in the average performance of acquisitions. Improved acquisition performance would have societal benefits by avoiding the destruction of wealth, loss of jobs, and decreased industrial capabilities.

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