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# What drives merger decision making behavior? Don't seek, don't find, and don't change your mind[☆]

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## ARTICLE INFO

## ABSTRACT

Despite the constant and frequent merger activity across various industries in the U.S. and throughout the world, limited evidence of the success of corporate mergers has been documented. The vast body of academic research demonstrates that most mergers add no value or reduce shareholder value for the acquiring firm. Given the failure of so many mergers, the question of why mergers continue to occur in large numbers remains. Overconfidence and optimism have come to the forefront as the most common behavioral explanations for the continued prevalence of ill-advised mergers. This paper investigates a different type of behavioral bias that also may influence merger and acquisition decisions—confirmation bias. Using a unique experimental data set, we provide evidence in support of the existence of confirmation bias in merger decision making behavior, particularly with respect to the behavior of actual corporate executives.

## 1. Introduction

In regard to corporate mergers, repeated analyses by academics, management consultants, and investment bankers have reached the same conclusion. In the short-term to medium-term, fewer than half of all mergers add value.[1] Additionally, one study reported that less than 30 percent of companies found that their M&A transactions achieved their stated objective within the planned time frame.[2] The shareholders whose company is bought end up richer, while the shareholders of the buyer seldom do. Although merging is not always a mistake, it is quite risky. Historically, actual merger activity has been difficult to rationalize in terms of traditional finance theory. However, in the past 20 years, more behavioral explanations have been utilized to provide a theoretical basis for merger activity. Roll (1986) was first to propose a non-rational motivation for corporate merger activity with the "hubris hypothesis." More recently, overconfidence and optimism have come to the forefront as the most common behavioral explanations for the continued prevalence of ill-advised mergers (Malmendier and Tate, 2005). "Excessively optimistic and overconfident executives press on with an acquisition, even when the reaction in financial markets is negative."[3] However, this paper presents evidence of a different type of behavioral bias that may also

[1] Sirower (1997) and Economist (1999).
[2] Deloitte Consulting (2000).
[3] Shefrin (2006, p. 162).

influence merger and acquisition decisions—confirmation bias. Using experimental methods, this paper examines merger and acquisition decision making behavior and provides evidence in support of the presence of confirmation bias.

The existence of a confirmation bias in the merger and acquisition decision making process could have implications for many aspects of business management. For example, understanding confirmation bias could be important when developing CEO compensation plans. Typically these executive compensation plans are designed to tie compensation with firm performance for the purpose of eliminating agency problems. However, evidence of a behavioral bias that would interfere with an executive's ability to properly evaluate investment opportunities may or may not be adequately addressed with current compensation schemes. As demonstrated by Bolton et al. (2005) and others, the explanations for the level and structure of CEO compensation have significant policy implications. Correspondingly, the type of biases and behaviors that affect executive decision making should influence the design of compensation plans. The existence of these biases may also have significant implications for the enforcement of the *Sarbanes-Oxley Act of 2002* which is used to hold executives accountable for corporate malfeasance.

### 1.1. Determinants of corporate merger activity

#### 1.1.1. Traditional theory

Financial theory tells us that the value of any asset is equal to the present value of its cash flows. In that context, a publicly held firm is merely a bundle of cash flows expected to be received in the future. Under the standard assumption that investors diversify to hold the market portfolio, merger activity does not necessarily add shareholder value. Mergers simply combine the rights to cash flows that are already held by diversified investors; investors who should be indifferent between receiving future cash flow streams from two separate firms or from one merged firm formed by combining them. Nonetheless, several major, non-mutually exclusive reasons are typically offered to explain merger activity (Bower, 2001; Warshawsky, 1987): limit competition and/or gain market share; extend product line; expand geographically; wrest corporate control from entrenched, inefficient management in order to realize greater profitability; gain tax advantages; exploit inefficiencies in the financial markets that leave corporate equities undervalued relative to their *intrinsic* worth.

In terms of a more rigorous theoretical basis for merger activity, there are a number of diverse theories. We know that modern finance theory is predicated on several assumptions that hold only as approximations in financial markets. Transaction costs, agency costs, informational asymmetries, taxation, and government regulation are all assumed away in most financial models. The presence of these and other market frictions could create situations in which mergers theoretically have the potential to create shareholder value. These theoretical explanations can be grouped into five major categories: microeconomics, financial distress, capital markets, taxation, economic shocks.

#### 1.1.2. Empirical evidence of merger success

Corporate mergers usually have episodic occurrences across industries within the United States and around the world. Notwithstanding the previous theoretical explanations, the empirical evidence suggests on average that little to no short-term or medium-term benefits and limited long-term benefits are achieved from merging. Hogarty (1970) found that performance of heavily merging firms to be generally worse than the average investment performance of firms in their respective industries. Additionally, he found mergers to have a neutral impact on profitability. Lev and Mandelker (1972) could not point to any clear effect of merging on riskiness of the acquiring firm, growth rate in the post-merger years, financial structure, percentage of income taxes paid, or liquidity position of the acquiring firm. Haugen and Langetieg (1975) also found that mergers fail to produce economically significant changes in the distribution rates of return to the stockholder. Firth (1979) studied mergers and takeovers in the United Kingdom and found that on average there were no gains associated with takeovers and that there were in fact small losses.

Jensen and Ruback (1983) claimed that mergers and acquisitions create social welfare by allowing the most efficient distribution of corporate assets. They reported that successful acquiring firms earned average risk-adjusted excess returns of 3.8 percent with acquisitions and approximately 0 percent with mergers.[4] However, these results were challenged by a flood of event studies finding negative returns to the shareholders of acquirers during the 1970s and 1980s (Sirower, 1997). Generally, these studies demonstrated that the mean returns to acquirers pursuing acquisition strategies were significantly negative, with only approximately 35 percent of acquisitions being met with positive stock market returns on announcement (Sirower, 1997). Even Jensen and Ruback (1983) revealed that as the event window expanded, the returns to acquiring firms deteriorated significantly.

More recently, Cummins and Weiss (2004) conducted a market model event-study of mergers and acquisitions in the European insurance industry over the period 1990–2002. They found that European mergers and acquisitions created small negative cumulative average abnormal returns for acquirers and substantial positive cumulative average abnormal returns for targets. Additionally, Moeller et al. (2008) examined a sample of 12,023 acquisitions by public firms from 1980 to 2001 and found that shareholders of these firms lost a total of $218 billion when acquisitions were announced. Most merger event studies find that, in the long-term, acquiring firms are found to experience negative abnormal returns (Scherer, 1988).

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[4] Based on a relatively short event window of no more than 1 month before and one month after announcement.

Lewellen et al. (1989) offered risk reduction as another explanation for merger activity. However, when they empirically tested the hypothesis, they found no evidence in their sample that risk reduction for the acquiring firm is the typical outcome or that when it occurs it is differentially costly for the shareholders. Some recent papers do find some positive effects from mergers (see Pillof, 1996; Rau and Vermaelen, 1998; Gugler et al., 2003; Ramaswamy and Waegelein, 2003). However, overall the empirical results generally show a negative long-term impact on profitability.

The remainder of the paper proceeds as follows. Section 2 establishes the basis of our behavioral explanation and discusses confirmation bias with respect to merger integration costs. Section 3 discusses our experimental study. Section 4 presents our experimental data and results. Section 5 discusses alternative explanations. Section 6 provides concluding remarks.

## 2. Behavioral biases and mergers

Most of the reasons put forth to explain merger activity lack a definitive theoretical basis and the empirical evidence of post-merger performance has been inconsistent at best. While the traditional theories in the merger literature are disparate, they do have two commonalities. The explanations: (1) are based on the idea that the merger decision is a rational action and (2) fail to explain completely the empirical outcomes observed.

Along slightly different lines, Roll (1986) suggested hubris as a motive for corporate takeovers and mergers. "Hubris on the part of individual decision makers in bidding firms can explain why bids are made even when a valuation above the current market price represents a positive valuation error. Bidding firms infected by hubris simply pay too much for their targets." Empire building and overconfidence are the prominent behavioral theories that have been put forth. We accept these arguments as a partial explanation but explore the possibility that they may be acting in combination with other behavioral biases. Specifically, we investigate the possibility of the existence of confirmation bias which could cause executives to mistakenly pursue mergers that are not advisable.

### 2.1. Theoretical basis: confirmation bias

Confirmation bias is generally described as a situation in which an individual attaches too much importance to information that supports his views relative to information that runs counter to his views (Shefrin, 2006). While much of the research on confirmation bias focuses on the scrutiny applied to new information, evidence suggests the problem is much deeper. Confirmation bias also determines the type of information individuals seek.

Ross and Anderson (1982) describe how confirmation bias can lead to the persistence of false beliefs. Lord et al. (1979) show that given an initial set of beliefs, individuals will tend to take new information confirming their beliefs as beyond question, while subjecting disconfirmatory information to intense scrutiny. Such a process would lead individuals to become more and more certain of whatever initial belief they have.

In terms of confirmation bias influencing the type of information individuals seek, Wason (1968) gives a simple illustration of this effect in which a subject is shown four cards with 'E,' 'K,' '4,' and '7' written on the exposed face. Subjects are told that each card has a letter written on one side, and a number written on the other side. Further, the subjects are given a hypothesis to test: Every card with a vowel on one side has an even number on the other side. Subjects are then asked which cards must be turned over to test the hypothesis. Most respond that 'E' and '4' should be turned over. Turning over the 'E' and finding an odd number would disconfirm the hypothesis. However, turning over a '4' and finding a consonant would provide no information. Turning over the '4' could only provide confirming evidence (as would turning over the 'E' and finding an even number). Alternatively, almost no subjects think to turn over the '7.' Turning over the '7' and finding a vowel would provide disconfirming evidence, while finding a consonant would provide no information regarding the hypothesis. Thus, it appears individuals will seek any information that is possibly confirming, while shunning information that can only disconfirm prior beliefs.

When a potential merger arises, new information must be sought concerning the profitability to the acquiring firm regarding the merger. Much like the hypothesis from Wason's study, all information is sought to answer a specific question, "Should we acquire *Company X*?" Asking the question in this way naturally delineates nearly all information into the categories of positive (or possibly confirming) and negative (or possibly disconfirming) information. Items dealing with the costs of integrating the new firm are closely associated with not going through with a merger, while information regarding the potential savings and synergies are closely associated with executing the merger.

When evaluating mergers, our conjecture is that executives exhibit a sort of selection/confirmation bias. Within the context of a merger, cost information may be thought to have greater potential to disconfirm the merger, while information on savings may more likely confirm the merger. Thus, we expect individuals will regard cost and savings information very differently depending on their prior inclination toward the merger. We want to test the hypothesis that, with respect to merger decision making, executives actively seek confirming evidence while avoiding potentially disconfirming evidence (exhibit confirmation bias).

### 2.2. Empirical context: merger integration costs

The focus on integration costs associated with recent high profile merger disasters suggests that confirmation bias could exist with respect to the evaluation of merger integration costs. For example, Quaker Oats Company's $1.7 billion purchase

**Table 1**
Cumulative direct integration costs for top 20 mergers between 1998 and 2004.

| Date | Target | Acquiror | Industry | Deal value ($US mil) | Rank value ($US mil) | Integration costs ($US mil) |
|---|---|---|---|---|---|---|
| 11/4/1999 | Warner-Lambert Co. | Pfizer Inc. | Healthcare | 89,167.7 | 88,771.1 | 13,113.0 |
| 9/13/2000 | JP Morgan and Company Inc. | Chase Manhattan Corp. | Financial | 33,554.6 | 33,554.6 | 6,529.0 |
| 9/15/1999 | General Instrument Corp. | Motorola Inc. | Telecommunications | 10,935.5 | 1,883.8 | 3,992.0 |
| 12/1/1998 | Mobil Corp. | Exxon Corp. | Energy and Power | 78,945.8 | 86,398.8 | 3,189.0 |
| 12/17/2001 | Immunex Corp. | Amgen Inc. | Healthcare | 16,900.0 | 16,684.6 | 3,000.0 |
| 9/4/2001 | Compaq Computer Corp. | Hewlett-Packard Co. | Financial | 25,263.4 | 1,915.5 | 2,498.0 |
| 10/16/2000 | TexaCo Inc. | Chevron Corp. | Energy and Power | 42,872.3 | 43,318.3 | 2,139.0 |
| 8/4/1999 | Union Carbide Corp. | Dow Chemical Company | Materials | 11,691.5 | 11,813.5 | 1,767.0 |
| 1/14/2004 | Bank One Corp. | JP Morgan Chase and Co. | Financial | 58,760.6 | 58,760.6 | 1,365.0 |
| 6/8/1998 | Wells Fargo Capital Corp. | Norwest Corp. | Financial | 34,352.6 | 34,352.6 | 1,120.0 |
| 7/17/2000 | Fort James Corp. | Georgia-Pacific Corp. | Consumer Staples | 11,198.5 | 11,213.3 | 868.0 |
| 6/7/1999 | Honeywell Inc. | AlliedSignal Inc. | High Technology | 15,601.2 | 15,495.9 | 642.0 |
| 12/4/2000 | Quaker Oats Company | PepsiCo Inc. | Consumer Staples | 14,391.7 | 14,306.0 | 639.0 |
| 10/27/2003 | FleetBoston Financial Corp. | Bank of America Corp. | Financial | 49,260.6 | 49,260.6 | 618.0 |
| 8/3/1998 | American Stores Co. | Albertsons Inc. | Retail | 11,864.6 | 11,719.7 | 600.0 |
| 6/25/2000 | Nabisco Group Holdings Corp. | RJ Reynolds Tobacco Holdings | Consumer Staples | 11,065.5 | 15,151.5 | 597.0 |
| 9/28/2003 | John Hancock Financial Services Inc. | Manulife Financial Corp. | Financial | 11,062.6 | 11,062.6 | 475.0 |
| 6/21/2004 | SouthTrust Corp. | Wachovia Corp. | Financial | 14,155.8 | 14,155.8 | 444.0 |
| 10/19/1998 | Fred Meyer Inc. | Kroger Co. | Retail | 12,890.4 | 1,812.4 | 403.0 |
| 7/10/2000 | SDL Inc. | JDS Uniphase Corp. | High Technology | 41,143.6 | 40,992.6 | 392.8 |
| 11/17/2003 | Travelers Property Casualty Corp. | St Paul Cos Inc. | Financial | 16,136.1 | 16,136.1 | 300.0 |
| 8/8/2000 | GPU Inc. | FirstEnergy Corp. | Energy and Power | 11,826.9 | 10,913.7 | 140.0 |
| 3/29/2000 | Seagate Technology Inc. | Veritas Software Corp. | High Technology | 18,515.2 | 17,677.2 | 90.0 |
| 10/18/1998 | HBO and Company | McKesson Corp. | High Technology | 14,319.7 | 1,810.0 | 3.7 |

of Snapple Beverage Corporation in late 1994 stands as one of the worst acquisitions of the 1990s. While the acquisition had a number of issues, the costs associated with integration often were cited as one of the primary reasons for its failure.

> Still bleeding from its acquisition last year of Snapple, the Quaker Oats Company warned Wall Street today that earnings in the quarter ending Dec. 31, 1995 would fall short of expectations. Quaker also announced plans for a $40 million pre-tax charge against earnings in the quarter, mostly to cover **the cost of getting rid of overcapacity in Snapple's bottling operations**.[5]

Ex ante, savings and synergies not integration costs and restructuring costs are the focus of most mergers. However, as in the previous example, ex post integration costs are often cited as the reason for the failure of specific mergers. "...technology integration can often cost more than expected and undermine the purpose of a merger."[6] Thus, we start by quantifying the magnitude of recent direct merger integration and restructuring costs.[7]

Mergers with substantial integration costs, like the Snapple merger, are not isolated incidents. When reviewing the cumulative direct integration costs[8] of the top twenty mergers since 1998, we see that integration costs can be non-trivial[9] (see Table 1). When evaluating a sample of all U.S. company mergers over $5 billion between 1990 and 2004,[10] we confirm that integration costs are considerable. Yearly restructuring costs as large as 15 percent of net revenue could be found. Upon a closer examination of average restructuring cost, we see that even 5 years after any given merger, the acquiring firm on average still realizes restructuring expenses. Four years after a merger, average costs are higher than the year immediately after the merger (see Fig. 1).[11] Thus, our data, which contain all mergers over $US 5 billion, show that the integration and

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[5] Feder (1995, p. D-1).

[6] Manchester (2002, p. 16).

[7] While we focus on direct costs, in addition to the direct costs associated with merger integration, there are also indirect costs associated with the ability to manage human capital.

[8] Direct integration costs information obtained from acquiror annual reports. For mergers after 1998, number reflects the sum of all integration costs identified in annual reports from year of merger through 2004. For mergers in 1998, number reflects the sum of all integration costs identified in annual reports from year of merger through 2003.

[9] Rank value and deal value estimates obtained from the Thomson Financial database. Rank value is calculated by subtracting the value of any liabilities assumed in the transaction from the transaction value and by adding the target's net debt. Net debt is straight debt plus short-term debt plus preferred equity minus cash and marketable securities as of the date of the most current financial information prior to the announcement of the transaction.

[10] Using the Securities Data Corp. (SDC) database, we first compiled a list of *all* mergers over $5 billion between 1990 and 2004. After deleting internationally based companies, we also purged our list of any transaction that was not a true merger but was a buyback, recapitalization, restructuring, or acquisition by a private equity firm/investor group/management team. Additionally, we eliminated from the sample all acquiring firms that had multiple acquisitions over any 5-year period. Total final sample includes 51 companies.

[11] Based on a subsample of our data so that 4 years after restructuring can be observed. Subsample contains 20 companies and covers mergers occurring between 1990 and 1999.
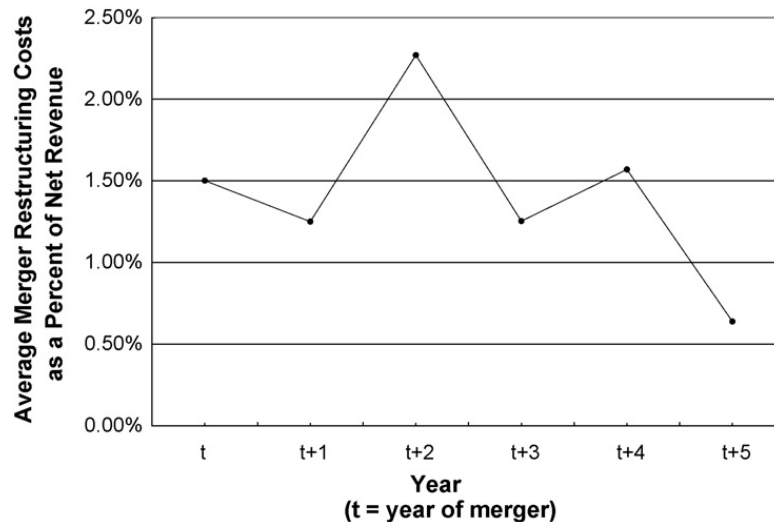
**Fig. 1.** Average restructuring costs as a percent of net revenue, 1990–1999.

restructuring costs are a significant and recurring expense associated with mergers. Consequently, any biases in assessing these costs could have profound effects on merger decisions.

## 3. Experimental study

### 3.1. Discussion of experimental approach

Given the anecdotal and empirical evidence linking the failure of many mergers to integration issues and costs, what can we learn from an experimental study in this area? Similar to Croson et al. (2004) who experimentally examine synergies and externalities associated with mergers and acquisitions, this paper uses experimental methods to examine questions involving behavioral biases associated with merger and acquisition decision making. We test for the presence of confirmation biases in merger and acquisition decision making behavior. Within the context of our experiment, we focus on two types of confirmation bias: (i) individuals seeking information that can confirm but not disprove a hypothesis, (ii) individuals spending less time analyzing disconfirming evidence.

With respect to merger and acquisition decisions, an experimental approach enables us to rule out many behavioral explanations such as empire building and "no information availability" bias and to focus on cognitive reasons. Thus, the experimental data can paly a key role in helping to shape the behavioral literature on merger theory.

Several methodologies have been employed to determine how decision-makers use information in the process of making decisions—called *process tracing* (Russo, 1977). The most prominent of these process tracing techniques involves monitoring the acquisition of information throughout the decision process (see Payne et al., 1978, for a review of various techniques.) Typically, information is hidden but labelled by topic. A subject is then allowed to access information as they wish, before making a decision. The experimenter tracks the information that is accessed, the order in which it is accessed, and the time spent on each topic. This is then related to the decision that is made and the data are analyzed for statistical patterns and significance. For the purposes of our question, an experimental approach using a process tracing technique is superior to field data, since we can collect precise data on the amount of time spent evaluating information and the specific order in which the information was gathered. Additionally, numerous experimental studies have demonstrated that subjects are not dispassionate with respect to their decisions in an experimental study. (e.g., Harte and Koele, 1995 demonstrate a very high correlation between process tracing responses and actual decisions.)

### 3.2. Process tracking experiment

To empirically test our theory that corporate executives exhibit confirmation bias, we use a process tracing methodology to track the decision making behavior in two separate experiments conducted in an experimental economics laboratory. We obtain data on what information subjects seek, in what order the information is acquired, how much information is acquired, and for what duration is the information examined. (For experiment instructions see Appendix A.1.)

#### 3.2.1. Procedure
In an experimental economics laboratory at an ivy league university, subjects were presented a series of three case studies accessed through the use of an internet browser. For each case study, the first page presented to the subject would

place the participant in some decision making capacity at a firm considering the acquisition of another firm.[12] A general description of the activities of these firms, and the potential motivation for the merger was given. At the bottom of the page was a list of hyper-linked pages labelled Competition and Market Share, Financials, Integration Issues, Legal and Regulatory Considerations, Operating Synergies, Acquiring Company Information, Target Company Information, Tax Ramifications, and Proceed to Final Decision. (For an example, see Appendix A.2) Clicking each information link would bring the individual to another page containing information on the relevant topic. Going back to the original page (to access other information or make a final decision) required the subject to reveal their current intention as to whether the firm should carry out the merger or not. Clicking on the link labelled "Final Decision" lead subjects to a page where they would recommend one of three options: (i) submit a [high $] bid to acquire the company, (ii) submit a [low $] bid to acquire the company, (iii) do not bid. Subjects were informed that if they selected the [low $] bid option, then there was only a 0.5 probability of acquiring the company.

The case studies were designed to draw attention to various aspects of a potential merger. For example, one case considered firms that operate in separate geographic regions, where merging may not allow firms to cut many jobs or shut down facilities. A sample case appears in Appendix A.2. Further, we designed the case studies to mimic the types of case studies typically presented in job interviews or MBA/business classroom exercises. Thus, the format was familiar to all of the subjects.

With each of the three cases, subjects were presented with one of four different "treatments": (i) high integration costs and high savings from operating synergies, (ii) high integration costs and low savings from operating synergies, (iii) low integration costs and high savings from operating synergies, (iv) low integration costs and low savings from operating synergies. The cases were presented to each individual in random order. Case versions and treatments were randomized using the same process.

Subjects were informed that the computer would track the order in which they accessed information, the time spent on each page, as well as the intermediate and final decisions for each case. Following the three case studies, subjects were asked a short series of questions regarding their experience and the importance of the information they used.

### 3.2.2. Subjects

Two types of subjects were used in this experiment: business undergraduates and business executives.[13] The first group consisted of 55 undergraduate business majors at an ivy league university. The second group consisted of executive practitioners: CEOs (4), presidents (5), senior vice presidents (1) and other senior executives (5) of large companies. The executive subjects were recruited as they attended a meeting of the alumni of the same ivy league university as the undergraduate subjects. It is important to note that the this paper has better control over the subject pool than many other experiments using both professionals and students (see for example, Burns, 1985; Fehr and List, 2004; Haigh and List, 2005). The executive subjects were alumni of the same university *and* department as the student subjects.

### 3.2.3. Subject payments

After a final decision in a case, the student subjects would be awarded points equal to the net present discounted profit realized from either the merged or non-merged company (calculated from the information in the case study). In addition, from the intermediate choices selected, the student subjects were awarded one-half the average points that would have resulted from making the corresponding final decision.[14]

The first round was played as a practice round, with subjects informed of their point totals, but not receiving any money or other compensation. Subjects were informed that they had seven minutes for each case to provide a final decision or no points would be awarded. In each of the two other cases, student subjects were paid $5 plus approximately $2 for every 100 points earned in the experiment.

The executive subjects received the same information as those in the student subjects. Following Fehr and List (2004), we were concerned with offering rewards that were substantial enough for the executives to take the game seriously. Fehr and List overcame this problem with Costa Rican CEOs by scaling the incentives up by a factor greater than ten for CEOs as compared to students. With a group of CEOs and other officers of large US companies, we felt the level of monetary rewards that were possible to offer to any individual would not achieve our objective. Since the amount of money we could provide as incentive for the executive subjects was not likely to be salient, no monetary rewards were given. Rather, prior to participation, it was announced that point totals would be announced by name to all participants with the participant obtaining the highest point total receiving a university alumni director's chair (valued over $400) and the participants with the next four highest point totals receiving coffee table books. Post experimental debriefings suggest that the executives took the experiment very seriously, and desired to do well.

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[12] All acquisitions are to be made using stock.

[13] The composition of our subject pool is similar to Dyer et al. (1989) who using both students and business executives find "similar results are reported almost without exception across" the two groups.

[14] This is done to make intermediate decisions incentive compatible.

**Table 2**
Subject decisions.

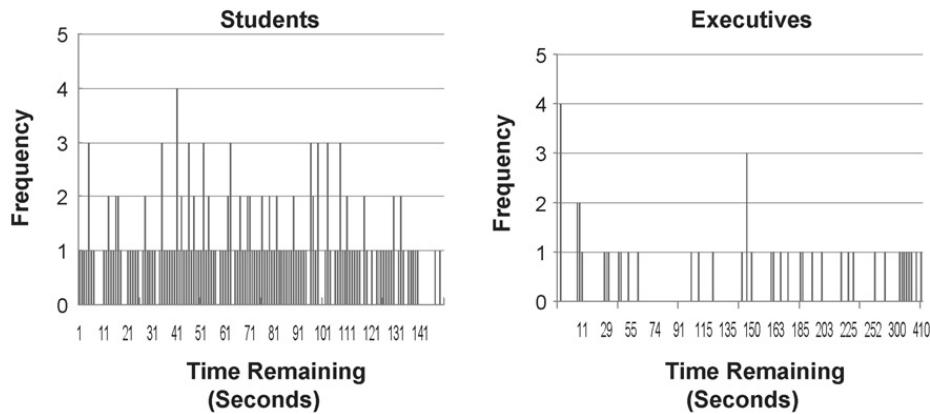|  | Number of final decision obs. | % Did not bid | % Bid low price | % Bid high price |
|---|---|---|---|---|
| Students | 165 | 24 | 46 | 30 |
| Executives | 45 | 40 | 42 | 18 |



**Fig. 2.** Distribution of time remaining after final decision.

**Table 3**
Integration issues and synergies.

|  | % that did NOT look at integration issues | % that did NOT look at costs | % that did NOT look at synergies | % that did NOT look at savings |
|---|---|---|---|---|
| Students | 6.7 | 18.8 | 13.9 | 21.1 |
| Executives | 28.9 | 51.1 | 44.4 | 48.9 |

## 4. Data and results

### 4.1. Data overview and summary statistics

There were a total of 2333 decision observations from the experiments. 2034 of the total observations were from student subjects while 299 of the total observations were from executive subjects. The experimental data suggest that a majority of the subjects (61 percent) had a predisposition to go with the merger at the beginning of each case.[15] Executives were less likely to make a final decision in favor of a merger (see Table 2).

Executives reviewed an average of 20 information pages prior to making a final decision, while the students reviewed 37 (85 percent more) information pages before making a final decision. This was not due to any sort of time constraint since, on average, the executives spent less total time per case (269 s) than the students (283 s).[16] Generally, the maximum time allowed per case (7 min) was not a binding constraint for any of the subjects. There were only 5 of the 210 cases in which a subject used all of the time available to make a final decision. Fig. 2, which shows the distribution of time remaining for students and executes, confirms that time was not a binding constraint for almost all of the subjects.

In the total sample, several pages influenced subjects to change from a no bid to a yes bid (see Fig. 3). Yet, when comparing the differences between students and executives we see that many different pages influenced students to change from a no bid to a yes bid but the savings page was the chief influence for executives (see Fig. 4). The cost page was the primary page that influenced both students and executives to change from a yes bid to a no bid (see Figs. 5 and 6). Given the fact that the integration issues and synergies have the largest influence on a subject changing bids, the differences in viewing patterns of students and executives is particularly striking (see Table 3).

Executives and students had similar page visitation patterns *except* with respect to the integration issues, cost, competition, and target company financials information (see Fig. 7). Given Wall Street analysts use target financials and competition information to assess the quality of mergers, it is understandable that executives could be more focused on target financials and competition information. However, the most striking executive and student differences are found in the integration issues and cost page visitation. While 93.3 percent of the students visited pages pertaining to integration issues, only 71.1 percent of executives visited the integration issues pages. Additionally, 81.2 percent of the students visited the cost pages

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[15] 60 percent of the student subjects and 62 percent of the executive subjects had a predisposition to approve the merger. This is based upon initial bid information.

[16] The difference in time used between executives and students was not significant. Chi-squared = 0.224 with 1 df and *p*-value of 0.6360.
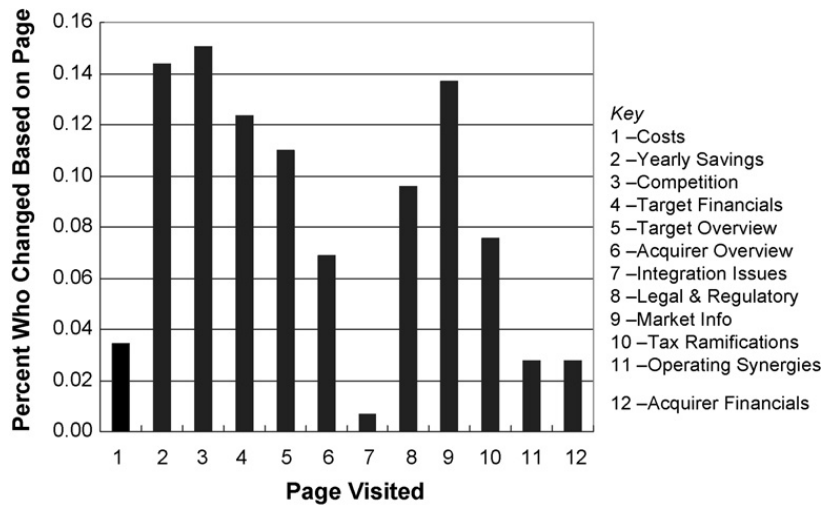
**Fig. 3.** Pages which caused subject to change from a no bid to a yes bid—total sample.
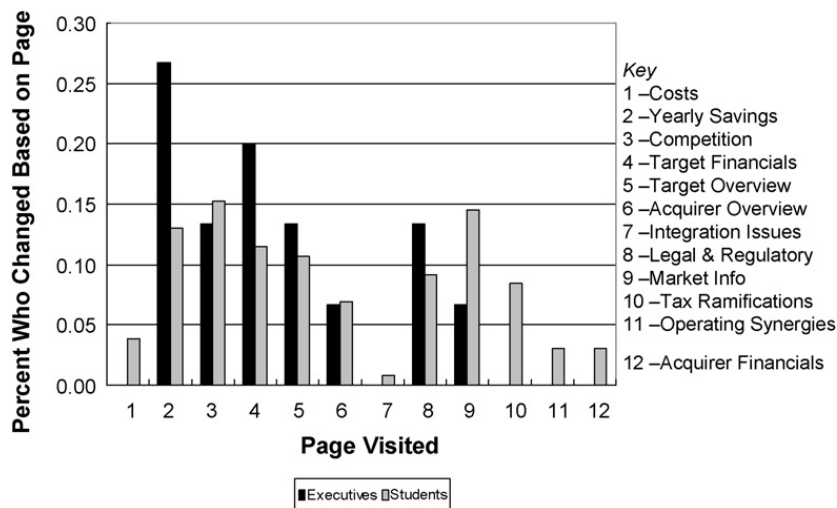
**Fig. 4.** Pages which caused subject to change from a no bid to a yes bid.
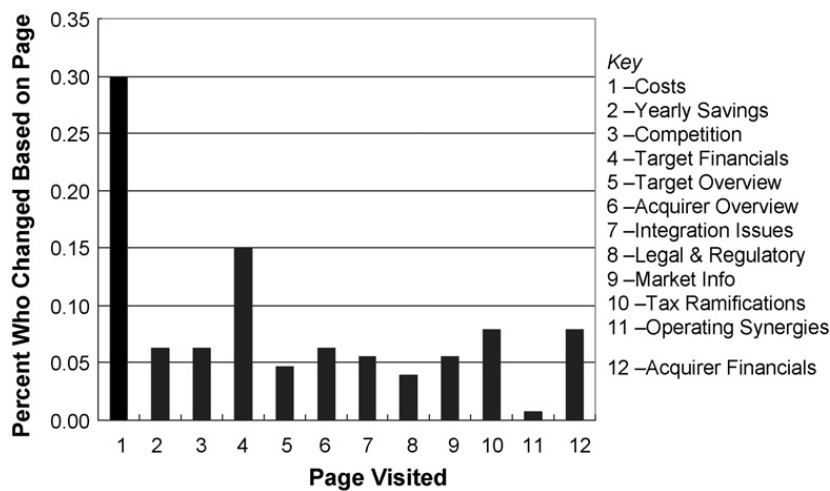
**Fig. 5.** Pages which caused subject to change from a yes bid to a no bid—total sample.
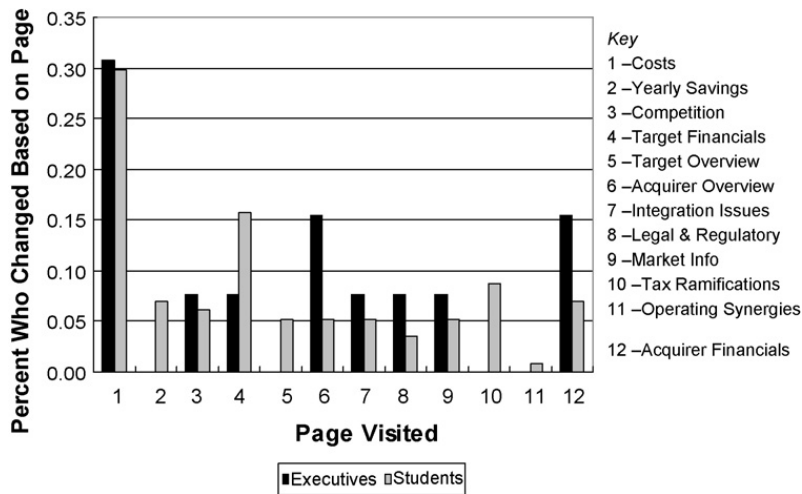
**Fig. 6.** Pages which caused subject to change from a yes bid to a no bid.
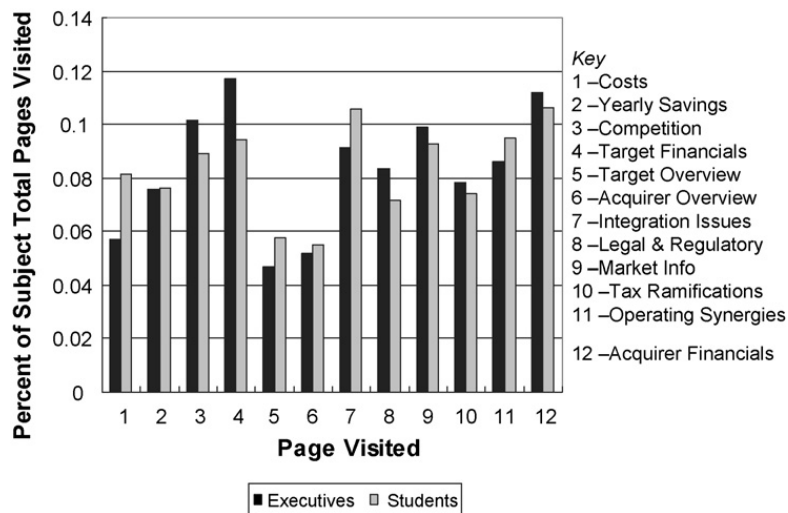


**Fig. 7.** Page visitation patterns.

with only 48.9 percent of the executives looking at any cost related information before making a final decision (see Table 3). The fact that fewer executives even visited the integration issues and cost pages has big implications when we recall from Fig. 5 that whether or not a subject reviewed these pages had important ramifications for how the subject bid. Subjects who decided not to bid visited the cost pages much more than subjects who decided to bid (see Table 4).

If, however, the decision maker has already chosen not to bid based upon other information, there would be no need to access the cost information. Yet, conditional on deciding not to bid, executives visited cost pages at much lower rates than students. Executives who did not bid visited the cost pages 61.1 percent of the time while students who did not bid visited cost pages 95.0 percent of the time (see Table 4).

Generally, we find inertia with respect to subject decisions. In addition to fewer types of pages influencing executives to change their decisions, we also observed that executives were less likely than students to change their decisions at all. The probability density of decision conditional on previous decision shows that executives had more inertia in their decision making and had fewer big swings (see Table 5, Figs. 8 and 9). Specifically, in Table 5 we see that executives were less likely than student to adjust their bid decisions as they reviewed new information. Particularly noteworthy is the fact that an executive's decision either to bid high or to not bid at all exhibited the same amount of inertia.

**Table 4**
Cost and savings visitation conditional on final bid.

| | Final no bid | | Final yes bid | |
|---|---|---|---|---|
| | Students | Executives | Students | Executives |
| Visited cost page | 95.0% | 61.1% | 42.4% | 40.7% |
| Visited savings page | 92.5% | 55.6% | 43.8% | 48.1% |

**Table 5**

Probability density of decision conditional on previous decision.

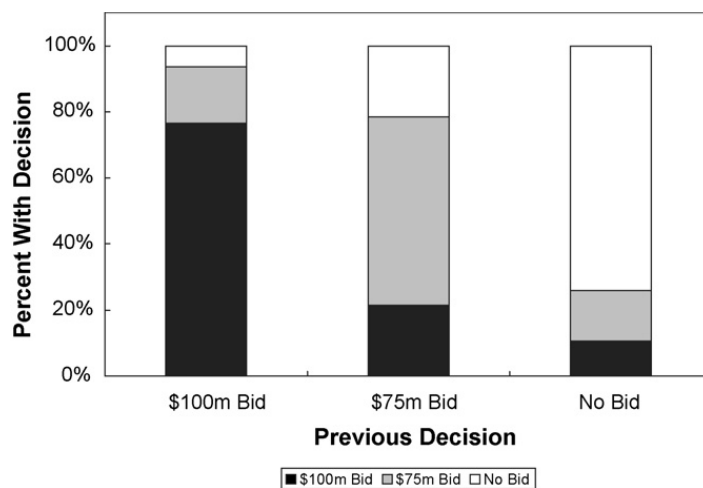| Decision | Previous decision | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total sample | | | Executives | | | Students | | |
| | $100m bid | $75m bid | No bid | $100m bid | $75m bid | No bid | $100m bid | $75m bid | No bid |
| $100m bid | 66% | 14% | 4% | 88% | 9% | 2% | 63% | 14% | 5% |
| $75m bid | 25% | 72% | 23% | 12% | 76% | 11% | 27% | 72% | 27% |
| No bid | 8% | 14% | 72% | 0% | 15% | 88% | 10% | 14% | 68% |



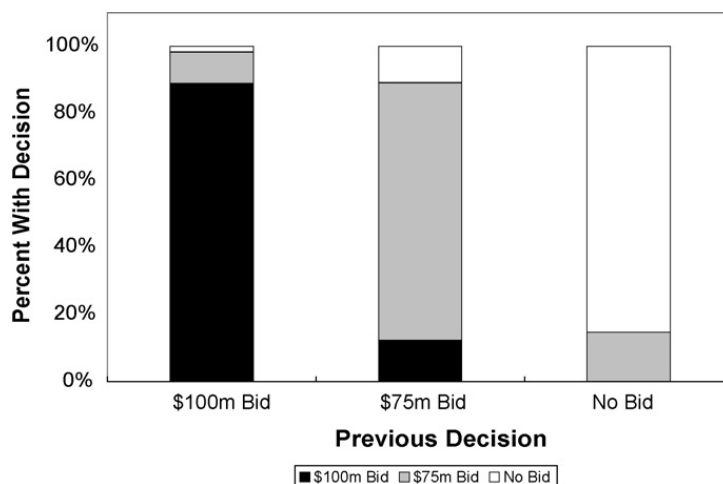**Fig. 8.** Probability density of decision conditional on previous decision—students.



**Fig. 9.** Probability density of decision conditional on previous decision—executives.

### 4.2. Confirmation bias

In the context of our experiment, we define confirmation bias as: (i) Type I—a subject not seeking additional information which could potentially change the final decision and (ii) Type II—a subject spending less time analyzing disconfirming evidence. Columns 1 through 4 of Table 6 summarize how we define Type I subject confirmation bias with respect to integration issues and cost information.[17],[18]

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[17] Note that in the main rounds of the experiment, the cases with "Views Integration Issues - No" and "Views Costs - Yes" are not possible since the cost page could only be reached by first visiting the integration issues page. Also, the cases with "View Synergies - No" and "Views Savings - Yes" are not possible since the savings page could only be reached by first visiting the synergies page.

[18] Since there could be some concern over framing effects with respect to viewing costs and savings, we performed additional rounds of the experiment (using 46 undergraduate subjects) in which the subjects were able to access the "Costs" and "Savings" buttons from the main page. We found that the results of these experimental rounds were consistent with our previous results.

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**Table 6**
Type I confirmation bias characterization and results.

| If subject: | | | Then subject: | Total sample | Students | Executives |
|---|---|---|---|---|---|---|
| Initially bids | Views integration issues | Views costs | Exhibits confirmation bias | Displaying bias | Displaying bias | Displaying bias |
| *Panel A* | | | | | | |
| Yes | No | No | Yes | 9.1% | 4.8% | 24.4% |
| No | No | No | Yes | 2.4% | 1.8% | 4.4% |
| Yes | Yes | No | Yes | 8.1% | 6.7% | 13.3% |
| No | Yes | No | No | 6.2% | 5.5% | 8.9% |
| Yes | Yes | Yes | No | 43.3% | 48.5% | 24.4% |
| No | Yes | Yes | No | 31.0% | 32.7% | 24.4% |
| Percent showing confirmation bias with respect to costs | | | | 19.5% | 13.3% | 42.2% |

| If subject: | | | Then subject: | Total sample | Students | Executives |
|---|---|---|---|---|---|---|
| Initially bids | Views synergies | Views savings | Exhibits confirmation bias | Displaying bias | Displaying bias | Displaying bias |
| *Panel B* | | | | | | |
| No | No | No | Yes | 10.0% | 8.5% | 15.6% |
| Yes | No | No | Yes | 10.5% | 5.5% | 28.9% |
| No | Yes | No | Yes | 1.9% | 2.4% | 0.0% |
| Yes | Yes | No | No | 4.8% | 4.8% | 4.4% |
| No | Yes | Yes | No | 27.6% | 29.1% | 22.2% |
| Yes | Yes | Yes | No | 45.2% | 47.7% | 28.9% |
| Percent Showing Confirmation Bias With Respect to Savings | | | | 22.4% | 16.4% | 44.4% |
| Total Percent Showing Confirmation Bias[a] | | | | 34.8% | 26.7% | 64.4% |

[a] Percentages eliminate double counting.

**Table 7**
Type II confirmation bias.

| | Average time spent Reviewing page (s) | |
|---|---|---|
| | Students | Executives |
| Synergies page | 7.0 | 7.9 |
| Savings page | 38.2 | 41.1 |
| Integration issues page | 40.9 | 31.7 |
| Cost page | 27.0 | 24.3 |

In the entire sample we find evidence of Type I confirmation bias with respect to cost and savings information. 19.5 percent of the sample exhibited confirmation bias with respect to cost information and 22.4 percent of the total sample exhibited confirmation bias with respect to the savings information. We observe substantial differences in confirmation bias between the student and executive subjects. 42.2 percent of the executives exhibited confirmation bias with respect to cost information and 44.4 percent of the executives exhibited confirmation bias with respect to savings information. Correspondingly, only 13.3 percent of the students exhibited confirmation bias with respect to cost information and 16.4 percent of the students exhibited confirmation bias with respect to the savings information.

With regard to our Type II confirmation bias, conditional on visiting the operating synergies page, executives spent approximately the same average amount of time reviewing the operating synergies information (Executives: 7.9 s; Students: 7.0 s). Conditional on visiting the savings page executives spent approximately the same average amount of time reviewing the savings information (Executives: 41.1 s; Students: 38.2 s). Difference in means tests reveal that both of the differences in student and executive average times are not significant ($p$-value of 0.41 for the operating synergy page and a $p$-value of 0.41 for the savings page).

We see that the executives and students reacted similarly to synergy and savings information in terms of time spent evaluating the information. Yet, this is not the case with integration issues and cost information. In fact, most of the the main differences in the behavior of the executives and students come with respect to the integration issues and cost pages (see Table 7).

Conditional on visiting the integration issues page, executives spent much less time than students reviewing the information (Executives: 31.7 s; Students: 40.9 s). A difference in means test indicates that this difference is significant with a $p$-value of 0.02. Conditional on visiting the cost page, executives and students spent approximately the same amount of time (Executives: 24.3 s; Students: 27.0 s, $p$-value of 0.52). Since we do observe that executives and students spend the same average amount of time on certain pages (e.g., the synergy and savings pages), we cannot assume that executives are generally better at gleaning facts from reports. If that were the case, then the average time spent on each page would be lower for executives.

**Table 8**
Subject performance—score.

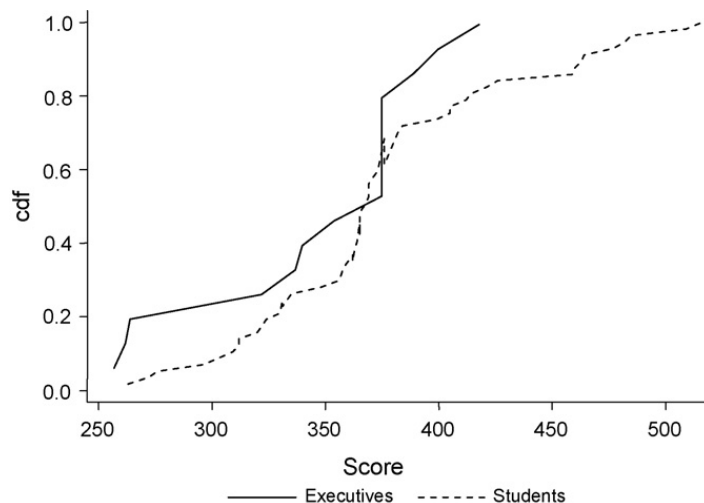| | Score | | | | |
|---|---|---|---|---|---|
| | Mean | Std. dev. | Median | Min | Max |
| Students | 374 | 59 | 366 | 263 | 516 |
| Executives | 349 | 51 | 376 | 258 | 419 |



**Fig. 10.** Cumulative distribution functions of executive and student scores.

**Table 9**
Subject performance—score conditional on final decision.

| | Final no bid | | | | Final yes bid | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. dev. | Min | Max | Mean | Std. dev. | Min | Max |
| Students | 187 | 7 | 167 | 205 | 183 | 49 | 82 | 328 |
| Executives | 187 | 7 | 167 | 202 | 173 | 47 | 77 | 284 |

The executives were less likely to change their decisions. Moreover, they spent less time reviewing information that had the greatest potential to affect the final decision and were less likely to review that key information at all. We take these results as strong evidence of the existence of Type I and Type II confirmation bias in the executive subjects.

The different decision making processes between executive and student subjects also produced different results. When scores were calculated based on the net present discounted profit realized from either the merged or non-merged company, the average performance of the student subjects was better than that of the corporate executives (see Table 8).[19] This is further illustrated by a graph of the the cumulative distribution functions of executive and student scores which reveals that the students scores nearly first order stochastically dominated the executive scores *except for around the mean score* (see Fig. 10). This result, while somewhat surprising, is consistent with other experimental findings. For example, Haigh and List (2005) documented that professional traders exhibited stronger behavioral biases that student subjects. In an experimental setting they found that the investment behavior of professional traders was consistent with myopic loss aversion to a *greater* extent than student subjects.

Given that the executives bid less frequently than the students, it is possible that they perform worse because they are too cautious. However, when we report the payoffs separately depending on whether or not the final decision was to merge we do not find that this is the case. Conditional on deciding not to merge, the executives and the students have similar scores. While, if the executives decide to bid, their scores are substantially lower (see Table 9).

## 5. Alternative explanations

While our experimental approach does enable us to rule out explanations of empire building or search costs, there could be other biases influencing the decision making process. Overconfidence has been shown to influence merger decisions (Malmendier and Tate, 2005) and the results of our subjects' initial decisions are not inconsistent with this premise. However, overconfidence fails to explain the asymmetries observed within our two subject pools.

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[19] This difference is statistically significant with a *p*-value of 0.0811.

**Table 10**
Subject performance—displayed risk aversion.

| Displayed risk aversion | Students | Executives |
| --- | --- | --- |
| Yes | 30% | 31% |
| No | 70% | 69% |

**Table 11**
Subject performance—displayed risk seeking.

| Displayed risk seeking | Students | Executives |
| --- | --- | --- |
| Yes | 53% | 42% |
| No | 47% | 58% |

Differences in risk aversion also, do not seem to be driving the results. Executives were less likely to make a final decision in favor of a merger (see Table 2). However, evidence suggests that this was not due to risk aversion. We see that executives did not "display risk aversion"[20] significantly more than students (see Table 10). With a $p$-value of 0.9475, the difference in means test confirms that there was no evidence of a difference in "displaying risk aversion." A higher percentage of the students did exhibit more "risk seeking"[21] than the executives (see Table 11). However, the difference in means test indicates that there also was little evidence of a difference in risk loving. While we cannot reject the null that the means are the same, the $p$-value of 0.5127 does caution us that this could be due to a sample size issue.

## 6. Concluding remarks

There is strong evidence that executives seek and evaluate merger information differently from non-executives. Executives review fewer pages of information than students and they are less likely to change their minds after reviewing new information. Since we observe that the student subjects reviewed 85 percent more pages of information than executive subjects, there is initial evidence to support a search cost story. (Executives have higher search costs and thus search less for information in general.) However, we observe that the executives specifically ignore integration issues and cost information relative to our student subjects. Given that the experimental setting creates a situation where all search costs are equivalent, a pure search cost story would not fully explain the results. Overconfidence could also be a relevant bias that we do not rule out. However, this explanation falls short when we observe the asymmetries relative to our control group. We are able to rule out differential risk aversion or risk seeking as an explanation. Our evidence also does not support the hypothesis that executives may be quicker at digesting certain types of information than others, since the executives do not even review certain information.

While executives and non-executives seem to access and evaluate the operating synergies and savings information similarly, the most striking differences between executives and non-executives come with respect to the integration issues and cost pages. For example, over 80 percent of the students accessed the integration cost information while over 50 percent of the executives made a final merger decisions without even looking at any associated cost information. Consequently, as was shown by Rabin and Schrag (1999), "an agent may with positive probability come to believe with near certainty in the wrong hypothesis." Additionally, our evidence is consistent with the DeBondt and Thaler (1985) result that people overreact to unexpected news and thus this could lead more experienced executives *not* to seek out specific types of news. Our data also show that this executive confirmation bias generates sub-optimal decisions, not necessarily excessive acquisition behavior. That fact that the executives perform worse than the student subjects supports our assertion that confirmation bias could lead to misguided merger decisions and is consistent with the general evidence that most mergers generate long run negative abnormal returns for the acquiring firm. While we are not suggesting confirmation bias is the *only* explanation for ill-advised merger activity, we are suggesting that there is strong experimental evidence supporting the existence of a confirmation bias that influences merger decision making behavior.

## Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2009.08.007.

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[20] Based upon final decisions and the probability associated with each final choice, *Displayed risk aversion* is defined as giving up expected value to reduce risk. Given choices A and B (*In the context of our experiment, choices A and B would constitute different values for a bid.*), where A had a weakly lower expected value than B but lower risk, choice A is a risk averse choice. Choice B is inconclusive.

[21] *Displayed risk seeking* being defined as giving up expected value to increase risk. Given choices A and B, where A had a weakly lower expected value than B but higher risk, choice A is a risk loving choice. Choice B is inconclusive.

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