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How Do Industry Peers Respond to Control Threats?

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This paper studies how industry peers respond when another firm in the industry is the subject of a hostile takeover attempt. The industry peers cut their capital spending, free cash flows, and cash holdings, and increase their leverage and payouts to shareholders. They also adopt more takeover defenses. The stock price reaction upon announcement of the takeover is positive and larger for peer firms with higher capital spending and higher free cash flows. Before the takeover attempt, the peer firms borrow less and invest more than predicted. Both stock returns and performance improve after the takeover attempt. These results are consistent with the argument that the control threat has important spillover effects for the other firms in the industry.

Keywords: hostile takeover; agency costs; investment decisions; capital structure
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1. Introduction

According to Jensen's (1986, 1993) free cash flow hypothesis, managers often refuse to shed funds that they cannot invest profitably, thereby expanding the firm beyond its optimal size. Such non-value-maximizing activities are more likely when (i) firms have the funds available to do so, (ii) they lack good investment opportunities, and (iii) managers do not have the right incentives (in terms of ownership or compensation contracts) to disgorge the free cash flows. Takeover attempts, and hostile takeover attempts in particular, can put a halt to this behavior and force firms to change their policies, either as an independent firm, or after the takeover has been completed. In fact, those firms that succeed in fending off a takeover often do so by cutting capital spending and committing to such a policy by increasing debt (see Denis and Denis 1993, Hendershott 1996, Berger et al. 1997, Safieddine and Titman 1999).

Jensen (1986, 1993) and Shleifer and Vishny (1988) noted that the free cash flow problem (large cash flows, combined with the lack of good investment opportunities) is not specific to a particular firm, but generally affects an entire industry. If this is the case, then a takeover attempt for one firm in an industry could also affect the behavior of the other firms, because they may feel that if they do not change their behavior, they will be next.

In this paper, we investigate this argument empirically and contrast it with a number of alternative hypotheses. We focus on two types of responses from industry peers. First, industry peers may change their investment and financing policies to diminish the control threat. For example, they may reduce their capital spending and commit to such a policy by increasing leverage. Second, industry peers may increase their takeover defenses to (further) insulate themselves from future takeover attempts.

We study these responses for a sample of peers of 202 firms that received hostile takeover bids from 1983 to 2005. We focus on hostile takeover attempts because such transactions are more likely to be of a disciplinary nature, but we also report the results for a sample of friendly transactions when we discuss alternative hypotheses.[1]

We first study whether the peers change their investment and financing policies over a period of two years after the control threat, and find that this is the case. Industry peers cut their capital spending relative to assets by between 7% and 9%, on average. They also increase their leverage relative to assets by between 11% and 17%. We also find a decline in cash balances and the level of free cash flows, and an increase in payouts to shareholders. These results are

[1] See Morck et al. (1988, 1989) for evidence indicating that hostile takeovers are related to agency problems in the target firm and its industry, whereas friendly takeovers are more synergistic, and see Schwert (2000) for evidence suggesting that hostile takeovers do not differ substantially from friendly takeovers.

consistent with the view that the threat to the independence of one firm in an industry leads to a decline in agency costs among its peers. The peers cut capital spending, reduce cash balances, and commit to a policy of not overinvesting in the future by increasing leverage. Consistent with this view, we report that those firms with the largest levels of (over)investment before the control threat experience the largest cuts in investment afterward.

We also study the peers' adoption of takeover defenses and find a small increase, even after controlling for the general rise in the adoption of takeover defenses in the economy over our sample period. Thus, whereas some actions taken by peers appear to be in the interest of shareholders, thereby reducing agency costs, others may lead to further entrenchment.

Next, we examine the stock price reaction of the industry peers when the control threat is announced and find that it is also consistent with the industry-wide agency cost argument. For the average takeover attempt, peers gain 0.50% on the announcement day. The stock price reaction is larger for firms with higher levels of overinvestment and free cash flows before the control threat, which are likely to be the firms with the largest agency costs.

Finally, we document improvements in long-term stock returns and valuations after the takeover attempt, which indicates that, on balance, the changes made by the peer firms are beneficial for shareholders.

We contrast our agency cost hypothesis with a number of alternative interpretations. One possibility is that the changes in financial and investment policies are due to changes in industry structure, and would have taken place even without the control threat (*the industry evolution hypothesis*). We provide various pieces of evidence showing that this is not the case. We show that our findings continue to hold when we control for changes in firm characteristics over time. In addition, we demonstrate that the industry peers were investing more than predicted by an empirical model of optimal investment and borrowing less than predicted by an empirical model of optimal leverage in the years before the takeover attempt; thus, the peers did not act optimally in the years preceding the takeover attempt.

Another possibility is that the bidder has discovered a better way of operating the target's assets (*the asset redeployment hypothesis*). This information becomes public as a result of the takeover attempt, allowing the industry peers to change their operating and financing policies in line with the target. The key difference between this hypothesis and the agency cost hypothesis is that peers change their policies voluntarily because it is better for their shareholders to do so, and not because they fear a takeover attempt themselves. Since the asset redeployment hypothesis does not rely on the disciplinary role of takeovers, the effects should be as pronounced for hostile as for friendly acquisitions. We find that this is not the case: few of the changes in policies are statistically significant for peer firms in friendly acquisitions.

Finally, it is possible that the takeover attempt indicates that the assets in the industry are undervalued (*undervaluation hypothesis*). Although consistent with the stock price reaction upon announcement of the takeover attempt, this hypothesis cannot explain why firms would change their investment policies. In addition, we report that our findings hold for firms with high valuations, suggesting that undervaluation is not the primary explanation for our results.

In sum, our results show that peer firms respond to the control threat by cutting capital spending and increasing leverage. These results are consistent with the argument that the control threat leads to a reduction in the agency costs of the peer firms in the industry. However, some firms also adopt more takeover defenses to protect themselves from hostile takeovers.

Our paper adds to the literature on the disciplinary effect of takeovers. Whereas Denis and Denis (1993), Hendershott (1996), Berger et al. (1997), and Safieddine and Titman (1999) illustrate that firms fend off takeover attempts through increases in leverage and cuts in inefficient investment, our evidence suggests that there are important spillover effects that also influence the targets' peers. Our results may also explain why some prior work (e.g., Healy et al. 1992, Servaes 1994) finds no or limited evidence of suboptimal investment on the part of takeover targets, as these targets are often compared to other firms in their industry. Our evidence indicates that inefficient investment may be an industry-wide phenomenon.

Our paper also complements prior studies focusing on the stock price response of peers, customers, and suppliers to horizontal takeover announcements (see Eckbo 1983, 1985; Stillman 1983; Fee and Thomas 2004; Shahrur 2005). These papers examine whether horizontal acquisitions lead to increased market power and find that, in general, this is not the case. Instead, they argue that the acquisitions improve industry efficiency, but they do not study changes in the financial policies or takeover defenses of industry peers. Our results suggest that at least some of the efficiency gains come from a reduction in the agency problems of the peers of the target firms. Our study is also related to Song and Walkling (2000), who provide evidence indicating that the stock price reaction for industry peers can be partly explained by the increased probability that the peers themselves will become takeover targets. Our evidence complements their study as we document the actions taken

by the peer firms to reduce the probability of being taken over.[2]

The remainder of this paper is organized as follows. We develop our hypotheses in §2. Section 3 contains our data collection procedure. Section 4 describes the results. Section 5 discusses the evidence in light of alternative explanations for our findings, and §6 concludes.

2. Hypotheses Development

Managerial discipline is an important motive for takeovers (see, e.g., Morck et al. 1988, 1989; Kaplan 1989; Martin and McConnell 1991; Denis and Serrano 1996; Holmstrom and Kaplan 2001). Takeover targets perform poorly, on average, before the acquisitions, and experience substantial managerial turnover after the acquisitions. Firms that successfully defeat takeover attempts often reduce investments and increase the amount of debt outstanding (see Denis and Denis 1993, Hendershott 1996, Berger et al. 1997, Safieddine and Titman 1999). Much of this evidence supports Jensen's (1986, 1993) free cash flow view, which suggests that managers often refuse to shed funds that they cannot invest profitably, expanding the firm beyond its optimal size. The market for corporate control limits this behavior, either because firms are taken over or because the takeover attempt forces firms to clean up their act if they wish to remain independent. Lambrecht and Myers (2007) propose a theory that formalizes Jensen's (1986, 1993) arguments. In their model, managers in industries with declining demand wait too long to disinvest because their interests are not fully aligned with those of shareholders. Increased leverage leads to more efficient investment decisions because the debt service reduces managers' rents.[3] Without sufficient leverage, hostile takeovers serve as a disciplining mechanism.

Jensen (1986, 1993) and Shleifer and Vishny (1988) note that the agency costs of free cash flow are not specific to a particular firm, but generally affect an entire industry. This is the case because large cash flows and the lack of investment opportunities are industry-wide characteristics. The existing literature provides some evidence in support of this view. For instance, Morck et al. (1989), in their study of the effectiveness of different control mechanisms in Fortune 500 firms, find that the *industry q* ratio of firms that receive hostile takeovers is 19% lower than the *industry q* of firms without a control change. They conclude that "poor industry performance is prevalent among targets of hostile takeovers" (Morck et al. 1989, p. 847). Along the same line, Shleifer and Vishny (1988, p. 11) argue that "hostile takeovers affect industries in decline or sharp change where managers fail to shrink operations rapidly enough or to make other adjustments." These papers, however, do not explore whether the industry peers of takeover targets change their policies in response to takeover attempts. This is the goal of our paper.

We focus on hostile takeovers because theoretical and empirical work suggest that hostile takeovers are more likely to be disciplinary than friendly takeovers (see, e.g., Morck et al. 1988, 1989; Lambrecht and Myers 2007). Schwert (2000), on the other hand, argues that hostility is more related to bargaining than entrenchment. However, some of Schwert's evidence does suggest that hostile targets perform worse and have lower valuations than friendly targets (see also Dong et al. 2006, for evidence that hostile targets have lower valuations than friendly targets).

We hypothesize that a hostile takeover attempt for one firm in an industry will also have repercussions for its peer firms. In particular, we expect peer firms to take actions to reduce agency costs and/or to protect themselves from takeovers, because if they do nothing, they may be next. The peer response could consist of (i) changes in their investment and financing policies and/or (ii) the adoption of takeover defenses.

Just like the takeover targets that succeed in fending off takeover bids, peers are likely to cut (inefficient) capital spending and commit themselves to such a policy by increasing debt. In addition, peers are likely to reduce their cash holdings and free cash flow, and increase their payouts to shareholders. In fact, if firms issue debt, while at the same time reducing investments and cash balances, then they will be forced to increase payouts to shareholders. If these changes are value increasing, we expect to find improvements in stock returns and valuation metrics in the years after the control threat.

Another means through which the industry peers can reduce the probability of being a takeover target is to adopt takeover defenses, a response we also investigate. Note, however, that this may not always be possible, since adding defenses may require shareholder approval. Hence, managers who value remaining in control will likely need to make changes to their financing and investment policies as well.

The agency cost hypothesis also has implications for the stock price reaction of the targets' peers at the announcement of the control threat. We expect a positive share price response for the peer firms, which stems from two sources: either (i) the control

[2] Song and Walkling (2000) study the first acquisition in an industry after a dormant period because they want to make sure the takeover is a surprise. We do not find that our results depend on the sequence of takeovers in an industry; although it is true that subsequent takeovers are perhaps less of a surprise, they may also reinforce the view that there is a systematic problem in the industry. It is likely that these effects offset each other.

[3] See also Grossman and Hart (1982), Stulz (1990), Zwiebel (1996), and Morellec (2004) for arguments that relate leverage to investment efficiency.

threat forces other firms in the industry to curtail their non-value-maximizing behavior, and the market anticipates these changes, or (ii) for those peers that do not respond, the likelihood of a future takeover increases, leading to a higher share price as well. We expect the reaction to be more positive for the peers with the highest levels of (over)investment and free cash flow, since these are the firms with the highest levels of non-value-maximizing behavior.

3. Data Collection

We gather data from the Securities Data Corp (SDC) database on all takeover attempts for U.S. listed firms during the period 1983–2005 ($n = 11{,}777$). Transactions are removed if the acquirer's goal is to purchase less than 50% of the shares of the target or if the acquirer already owns more than 50% of the shares before the announcement date, because these transactions are less likely to be of a disciplinary nature (remaining $n = 11{,}175$). We further remove transactions if they are not the first bid in an auction, where an auction is defined as either multiple takeover attempts made for the same firm within a one-year period or exceeding a one-year period if the prior offer is not withdrawn before the subsequent offer is made (remaining $n = 9{,}431$). Bids for financial firms are also removed from the sample because these firms are regulated, and it is difficult to measure leverage and investment in the financial sector (remaining $n = 7{,}196$). We then select only takeover attempts deemed hostile by SDC (remaining $n = 355$).[4] We include both successful and failed bids in our sample—the ultimate success of the initial bid should be irrelevant as long as the hostile takeover attempt indicates to other firms in the industry that they need to take action or could be targeted next.[5]

The list of firms operating in the industry (the industry peers) is constructed from the Earnings Supplement of the Standard and Poor's Industry Surveys.[6] This guide is published monthly and categorizes firms into industries using criteria similar to the ones used by Compustat.[7] We use the latest available Earnings Supplement before the takeover announcement to identify industry peers. Because the supplement only covers larger firms, we cannot identify peers of small targets (remaining $n = 202$). If the bidder is in the target's industry, we do not include it in the pool of peers, because our focus is on firms not directly involved in the transaction. Finally, we also remove peers that receive a takeover attempt themselves over the subsequent two years. Many of these firms are dropped from the databases as they are taken over, and it is therefore not possible to study the changes in their behavior.

Peers are included if they are listed on Compustat and have data available for at least one year before the announcement of the takeover and one year after its completion or withdrawal. If multiple bids occur in an industry in a particular year, the peer firms are only included once, and both targets are excluded from the list of peers.

We identify 2,548 peers of 202 hostile takeover targets. Panel A of Table 1 lists the takeovers attempts by year. The number of hostile acquisition attempts in the sample ranges from 0 in 1991, 1992, and 2005 to 40 in 1988. Although hostile takeovers were more frequent during the 1980s (see also Holmstrom and Kaplan 2001), approximately 32% of our observations occur during the 1990s and 2000s. The strong decline in the number of hostile takeovers in our sample in the early 1990s can be partially explained by the general decline in takeover activity. As takeover activity picked up again in the second half of the decade, there was a rise in hostile activity as well. However, the adoption of antitakeover laws at the state level and antitakeover charter amendments and other defenses at the firm level may have contributed to the overall decline in the level of hostile takeovers.[8]

[4] As we argued previously, we select hostile takeovers because they are more likely to be disciplinary in nature. This does not imply that all hostile takeovers are disciplinary, but the inclusion of nondisciplinary hostile takeovers will only add noise to our data, making it more difficult to detect changes in the behavior of peer firms. We have also verified the robustness of our inferences to more restrictive definitions of hostility, in which we eliminate two sets of cases where hostility may be proxying for bargaining: (i) takeovers in which the bidder revises its initial bid and the revised bid is accepted; (ii) takeover attempts where the firm is later acquired by a white knight. Our results are generally stronger when these cases ($n = 45$) are eliminated (but the difference with respect to the full sample is not statistically significant).

[5] We have also verified that there is no significant difference in the response of peers of targets involved in successful versus unsuccessful bids.

[6] We do not rely on CRSP or Compustat to construct a sample of industry peers. Guenther and Rosman (1994) and Kahle and Walkling (1996) indicate that the CRSP Standard Industrial Classification (SIC) codes are not very representative of the industries in which firms actually operate, which leads to less precise inferences. Compustat SIC codes appear to be more reliable. Unfortunately, firms change industries during their lives, and Compustat only keeps a record of the firms' historical SIC codes starting in 1987.

[7] Conversations with Standard and Poor's indicate that the firms included in the Industry Surveys are generally the same as the ones listed on the Compustat database at the time, except that some smaller firms are not included in the Earnings Supplement. The industry definition broadly corresponds to three-digit SIC codes.

[8] In addition, the Supreme Court's ruling in 1989 allowing Time Warner's directors to invoke the business judgment rule when rejecting Paramount's offer may have contributed to the decline in hostile takeovers over time. We have studied whether our findings weaken after 1989 and find that the effects we documents are generally smaller after 1989 than before 1989, but the differences between the two periods are not statistically significant.

Table 1 Description of the Sample

Panel A: Number of hostile takeovers by year

Year	Number of acquisitions
1983	4
1984	9
1985	19
1986	31
1987	23
1988	40
1989	11
1990	4
1991	0
1992	0
1993	1
1994	2
1995	12
1996	14
1997	11
1998	6
1999	3
2000	2
2001	2
2002	4
2003	2
2004	2
2005	0
Total	202

Panel B: Distribution of the sample in Fama–French 48-industry categories

Broad industry category	Number of acquisitions
Wholesale	21
Food products	16
Shipping containers	15
Utilities	13
Computer software	12
Chemicals	10
Automobiles and trucks	10
Other	105

Notes. The data on hostile takeover attempts are obtained from SDC. Firms are included if they meet the following criteria: (a) the acquisition is deemed hostile by SDC; (b) the acquirer's goal is to purchase more than 50% of the shares of the company; (c) the acquirer owns less than 50% of the shares of the company before the announcement; (d) the company is included in the Earnings Supplement of the Standard and Poor's Industry Surveys; (e) the company does not operate in the financial services sector. Only the first acquisition attempt in an auction is included.

The number of peers ranges from 1 to 70. The average number of peers is 14.61, with a median of 10 (not reported in the table). Panel B of Table 1 contains the broad industry categories (using the 48 Fama–French industries) of the firms in the seven industries that experience more than 10 hostile takeovers—the "other" category combines those industries with less than 10 hostile takeovers. The top three industries in numbers are wholesale, food products, and shipping containers.[9] Appendix A contains further details of the number of takeovers by year and industry for all 48 Fama–French industries.

4. Results

4.1. Changes in the Financing and Investment Policies

In this section, we examine the changes in capital expenditures, cash holdings, free cash flows, leverage, and payout ratios of the targets' peers. Ratios are averaged for the two years prior to the control threat and the two years after the completion of the takeover or its withdrawal date. We employ two years of data because it may take time for firms to change their policies, but if two years of data are not available, we employ one year only. To reduce the influence of outlier observations, we winsorize ratios that involve capital spending, cash, debt, and payout policy at the 99th percentile (the 1st percentile is zero), whereas free cash flow ratios are winsorized at the 1st and 99th percentiles.

Table 2 contains the results. In panel A, we treat each industry peer as an individual observation, such that industries with more firms receive more weight. When computing the p-values of the t-tests (for the means) we take into account the lack of independence across observations (if the peers respond to the same event, their actions are not independent). We are not aware of such a correction for sign tests (for medians); hence, those results should be interpreted cautiously. Finally, the number of observations varies slightly for each variable because not all Compustat data items are available for each company. In column (i), we report the mean and median levels of the variables in the two years before the control threat, and in column (ii) we report the changes in the two years after the control threat.

We start by examining capital spending, measured as the ratio of capital expenditures to assets. Consistent with our predictions, the peers' mean ratio of capital expenditures to assets declines by 0.53 percentage points (p-value = 0.00), and the median decline is 0.38 percentage points (p-value = 0.00). The change does not appear dramatic, but it is large economically. A cut in capital expenditures by 0.53 percentage points reflects a 7.2% decline in capital spending relative to a pre-control threat level of 7.38% (0.53% divided by 7.38%). Another way of assessing the economic importance is to compute how much more the peer firms would have invested if they had

[9] Note that to identify the peer firms, we follow the Earnings Supplement of the S&P Industry Survey and further partition the industries into narrower subcategories.

Table 2 Changes in Financial Characteristics of the Peers of Firms Receiving a Hostile Takeover Bid

	Level before takeover attempt (i)	Change after takeover attempt (ii)	Adjusted change after takeover attempt (iii)	*N*
		Panel A: Individual firm observations		
Capital expenditures over total assets	0.0738	−0.0053 (0.00)	−0.0081 (0.00)	2,492
	0.0635	−0.0038 (0.00)		
Adjusted investment ratio	0.0579	−0.0049 (0.05)	−0.0029 (0.06)	1,432
	0.0449	−0.0053 (0.00)		
Long-term debt over total assets	0.2034	0.0273 (0.00)	0.0224 (0.00)	2,516
	0.1968	0.0080 (0.00)		
Total debt over total assets	0.2452	0.0347 (0.00)	0.0266 (0.00)	2,504
	0.2428	0.0193 (0.00)		
Cash over total assets	0.0887	−0.0072 (0.00)	−0.0039 (0.05)	2,548
	0.0470	−0.0034 (0.00)		
Free cash flow over total assets	0.0748	−0.0083 (0.00)	−0.0095 (0.00)	2,255
	0.0764	−0.0040 (0.00)		
Dividends + repurchases/net income	0.6627	0.1219 (0.00)	0.0695 (0.00)	2,021
	0.5137	0.0360 (0.00)		
		Panel B: Data aggregated by control threat		
Capital expenditures over total assets	0.0811	−0.0076 (0.00)	−0.0099 (0.00)	202
	0.0682	−0.0056 (0.00)		
Adjusted investment ratio	0.0637	−0.0013 (0.79)	—	189
	0.0555	−0.0068 (0.02)		
Long-term debt over total assets	0.1967	0.0391 (0.00)	0.0358 (0.00)	202
	0.1781	0.0113 (0.00)		
Total debt over total assets	0.2387	0.0447 (0.00)	0.0389 (0.00)	202
	0.2229	0.0219 (0.00)		
Cash over total assets	0.0887	−0.0080 (0.00)	−0.0053 (0.02)	202
	0.0610	−0.0063 (0.00)		
Free cash flow over total assets	0.0753	−0.0092 (0.00)	−0.0088 (0.00)	202
	0.0791	−0.0056 (0.00)		
Dividends + repurchases/net income	0.6328	0.1382 (0.00)	0.0654 (0.07)	202
	0.4061	0.0307 (0.00)		

Notes. The peer firms are obtained from the Earnings Supplement of the Standard and Poor's Industry Surveys. Means are listed in the first line. Medians are listed in the second line. The means and medians are averaged over two years before and after the takeover attempt. A *t*-test is performed to compare means, taking into account the lack of independence of the observations. A sign test is performed to compare medians. The *p*-values of these tests are in parentheses. The adjusted change after takeover attempt (column (iii)) is computed as the coefficient on the *After* dummy variable in the following panel regression:

$$Ratio_{it} = bX_{it} + c\,After_{it} + e_{it},$$

where $Ratio_{it}$ is the ratio being studied for each firm i at time t, X_{it} is a vector of control variables, b is a vector of regression coefficients on the control variables, and $After_{it}$ is a dummy variable that takes on the value of 1 in the years after the completion or withdrawal of the hostile takeover and 0 otherwise, and c is the coefficient on the *After* dummy. We estimate the above model for the three years prior and three years after the takeover attempt. Standard errors are clustered at the transaction level, and the associated *p*-values are reported in parentheses. Appendix B contains a list of the control variables employed. In panel A, we report results for individual observations. In panel B, we first average all observations by control threat before averaging across control threats and before estimating the regressions.

maintained this ratio at the pre-control threat level; this amounts to $57.9 billion across all peers.

The above measure of investment relies only on regular capital expenditures. It does not include acquisition spending or research and development (R&D). Furthermore, it does not take into account that some capital spending is necessary to replace existing assets or that firms may sell some equipment during the year. The adjusted investment ratio, proposed by Richardson (2006), takes these potential omissions into account. It is computed as (*capital expenditures* + *cash acquisitions* + *R&D expenditures* − *sale of property, plant, and equipment (PP&E)* − *depreciation*)/*assets*. Our results using this variable, reported in the second row of panel A of Table 2, are very similar: both the mean and median levels of investment decline over the two years after the announcement of a hostile takeover attempt in the industry.

Next we study the peers' debt levels. Grossman and Hart (1982), Jensen (1986), and Lambrecht and Myers (2007), among others, argue that debt can limit a firm's ability to engage in non-value-maximizing

activities. If the peers want to signal their commitment to cutting excess investment, we expect them to increase leverage. Consistent with this prediction, we find a significant increase in leverage. Peers have a mean ratio of long-term debt to total assets of 20.34% in the two years prior to the control threat. In the two years after completion or withdrawal of the takeover, this ratio increases by 2.73 percentage points, on average (p-value = 0.00). Total debt (computed as long-term debt plus debt in current liabilities) to assets also increases substantially, from 24.52%, on average, to 27.99% (p-value = 0.00), an increase in the ratio of over 14%. Summed across all firms, this implies extra borrowing of $435 billion, compared to what it would have been had the ratio remained unchanged.

One concern with expressing debt as a fraction of assets is that leverage will also appear to increase as asset growth declines, which is likely given the decline in investment. Indeed, we find that the growth rate in assets declines by 1.61 percentage points (p-value = 0.00) after the control threat (untabulated results). Therefore, we also compute three other measures of leverage. First, we compute the growth rate in the level of total debt; this increases by 4.3 percentage points (p-value = 0.00) after the control threat. Second, we compute the raw change in the level of debt; this increases from $1.19 billion for the average firm in the year before the control threat to $1.66 billion two years afterward. Third, we compute the ratio of long-term debt issuance to assets (data on short-term debt issuance are not available); this ratio increases by 1.32 percentage points after the control threat, an increase of almost 22% compare to the level of 6.09% in the two years before the control threat. This evidence indicates substantial extra borrowing.

Another way of committing to lower capital spending is to reduce cash holdings, and we find evidence of such a reduction for the target firms' peers. Cash holdings decline by 0.72 percentage points as a fraction of assets, on average. In addition, we expect to see a decline in the level of free cash flow relative to assets, and find that this is also the case. We measure the level of free cash flow as operating income minus interest payments minus tax payments minus dividend payments (Lehn and Poulsen 1989), as a proxy for post-tax cash flow that is not distributed to securityholders as either interest or dividend payments. The level of free cash flow to assets declines by 0.83 percentage points. Both the cash and free cash flow declines are economically large: the percentage decline in cash holdings is 8.1% (from a pre-control threat level of 8.87%), and the percentage decline in free cash flows is 11.1% (from a pre-control threat level of 7.48%). Both of these results support the view that the peer firms reduce the funds available for investment.[10]

If the peer firms cut capital expenditures and cash balances, and increase leverage, it is likely that they are increasing distributions to shareholders. To verify whether this is the case, we add dividend payments to share repurchases and divide this sum by net income, only for those observations for which net income exceeds zero.[11] As reported in panel A of Table 2, this ratio increases after the control threat by more than 12 percentage points, on average, whereas the median increase is 3.6 percentage points.[12]

One potential shortcoming of the above analysis is that we make no adjustments for changes in the firm's fundamentals over time. Thus, it is possible that the changes we document are not caused by the takeover attempt, but rather by changes in firm characteristics. To investigate this possibility, we employ a regression framework and estimate the following panel regression:

$$Ratio_{it} = bX_{it} + c\,After_{it} + e_{it}, \tag{1}$$

where $Ratio_{it}$ is the ratio being studied for each firm i at time t, X_{it} is a vector of control variables, b is a vector of regression coefficients on the control variables, $After_{it}$ is a dummy variable that takes on the value of 1 in the years after the completion or withdrawal of the hostile takeover and 0 otherwise, and c is the coefficient on the *After* dummy. We estimate the above model for the three years prior and three years after the takeover attempt (using two years provides the same insights). The explanatory variables employed depend on the specific ratio being studied and are based on prior research (they are reported in Appendix B). The coefficient on *After* is reported in column (iii) of panel A of Table 2, together with its p-value, based on standard errors clustered at the transaction level. The findings of these analyses that control for changes in firm characteristics confirm our prior results: after a hostile takeover attempt takes place in an industry, peer firms cut investment,

[10] The decline in the cash holdings of the peer firms in our sample also leads to a decline in total assets. This will lead to a slight upward bias in any ratio that uses total assets as a deflator, and may explain why we find an increase in leverage ratios of the firms in our sample. We repeat all our tests using total assets minus cash as a deflator, and the economic and statistical significance of our findings is virtually unchanged.

[11] Net income is most often employed to scale payouts in the literature (see, e.g., Dittmar 2000, Almeida et al. 2004, Billet and Xue 2007). We continue to find evidence of a significant increase in payouts when we scale by total assets instead.

[12] There is virtually no change in these effects if we remove special dividends from the analysis. Median payout ratios increase by 3.84 percentage points, and mean payout ratios increase by 12.29 percentage points.

cash holdings, and free cash flows, and commit to this reduction in investment by increasing leverage and payouts. Thus, changes in firm characteristics cannot explain the changes we observe.[13]

In panel B of Table 2, we repeat the analyses of panel A, but we aggregate the data by control threat so that each control threat receives the same weight. Hence, we first compute the average of each ratio for each control threat, before computing the average across control threats. This approach also allows us to compute test statistics for median changes that are not affected by the lack of independence of the observations. In general, the changes reported in column (ii) of panel B are more substantial than those documented in panel A, and they continue to be highly significant, both statistically and economically. For example, the decline in capital spending of 0.76 percentage points from a level of 8.11% before the control threat represents a cut in investment of 9.4%.

When controlling for the changes in characteristics of the peer firms, we employ a similar approach. By control threat, we first average all ratios and explanatory variables for each of the three years before and after the threat. Then, we estimate the panel regressions.[14] The findings, reported in column (iii) of panel B of Table 2, continue to hold.[15]

The fact that our findings strengthen in panel B where each takeover attempt receives the same weight indicates that peer firms are more affected in concentrated industries, possibly because the takeover threat is more severe when there are fewer potential targets. We formally tests for such a relation and find that this is indeed the case: all the changes in financial and operating characteristics are significantly larger in more concentrated industries.

In sum, the findings in Table 2 indicate that the peer firms reduce capital spending and funds under managerial control, and commit to such a reduction in the future by increasing leverage.[16]

Table 3 Cross-Sectional Analysis of Changes in Investment Policies

	(i)	(ii)
Intercept	−0.0052 (0.00)	0.0013 (0.20)
Industry adj. investment	−0.5192 (0.00)	
Industry adj. investment if > 0		−0.7143 (0.00)
Industry adj. investment if < 0		−0.1975 (0.00)
N	2,466	2,466
Adjusted R^2	0.22	0.25

Notes. The dependent variable is the change in capital expenditures, computed as the difference between the ratio of capital expenditures to total assets over the two years after the completion or withdrawal of the takeover attempt and the same ratio over the two years before the announcement of the takeover attempt. The explanatory variable is industry adjusted-investment (and the split-up of this variable into its positive and negative parts) computed over the two years before the announcement of the takeover attempt. The *p*-values based on standard errors clustered at the transaction level are reported in parentheses.

Next, we investigate whether the firms that experience the largest reduction in capital spending surrounding the years of the control threats are the ones with the largest levels of prior excess investment. We estimate a regression of the change in investment after the control threat as a function of industry-adjusted investment before the control threat. The findings are reported in Table 3. We compute clustered standard errors in the regressions to take into account the lack of independence of observations related to the same control threat. Column (i) shows the basic regression model. The coefficient on industry-adjusted capital expenditures before the takeover is negative and highly significant. This is consistent with our prediction: peer firms that (over)invest the most before the control threat cut investment the most afterward. Of course, it is possible that capital spending is just mean reverting and that firms that invest a lot in one period invest less in the following period and vice versa. To see whether this explanation is valid, we reestimate this model, but divide industry-adjusted capital expenditures into its positive and negative parts. The results are reported in column (ii). The coefficient on industry-adjusted capital expenditures is −0.71 (p-value = 0.00) when it is positive, and only −0.20 (p-value = 0.00) when it is negative. The difference between the two coefficients is highly significant. This result indicates that the change in investment spending is not simply caused

[13] Note that in the reported models we do not control for cash flows in the investment regressions (see Fazzari et al. 1988), because cash flows could proxy for many factors: financial constraints, investment opportunities, and the opportunity to overinvest. Given our concern that peer firms may overinvest free cash flows, we would remove this effect if cash flows are controlled for. Our findings are very similar, however, if we control for free cash flow: capital expenditures as a fraction of assets decline by 0.70 percentage points (p-value = 0.00), after controlling for q and free cash flows.

[14] Note that we are unable to conduct this analysis for the adjusted investment ratio because the explanatory variables include year dummies—averaging these across time is not meaningful.

[15] We have also repeated this analysis for dividends and repurchases scaled by assets instead of net income. This ratio increases by 0.43 percentage points (p-value = 0.00) when we equally weight all peers, and by 0.54 percentage points (p-value = 0.00) when we first average characteristics for each control threat before estimating the regression model.

[16] We have also studied the level and the quality of the acquisitions made by the peer firms in our sample (using acquisition announcements from SDC). We do not find any significant differences in the level of acquisitions made by the peer firms or their announcement effect before and after the hostile takeover attempt. Thus, the cut in investment that we document does not appear to extend itself to acquisitions.

by mean reversion, because it is much stronger for firms with high levels of investment than for firms with low levels of investment. We obtain very similar results when we employ the adjusted investment ratio (instead of the ratio of capital expenditures to assets) or when we compute overinvestment as the residual of a regression model of optimal investment estimated for all firms on Compustat, except for our sample firms, using the explanatory variables detailed in Appendix B.

We also explore whether the peer firms that do not adjust their policies in response to the takeover threat become targets in hostile takeovers themselves. We focus on those peers that are the subject of a hostile takeover attempt three to five years after the original takeover threat.[17] This sample consists of 57 firms. We find little evidence that these peers change their policies (not reported in a table); there is no significant decline in capital spending and cash holdings and no significant increase in long-term debt. We do find that they increase short-term debt to finance an increase in payouts, which leads to a decline in free cash flow. This evidence suggests that there is an increased takeover threat for those firms that do not adjust their behavior sufficiently.

Altogether, the results of this section demonstrate that the target's peers change their financing, investment, and payout policies. Not only do we find that the peers reduce capital spending and free cash flows, but the reductions in capital spending come mostly from firms that were overinvesting (relative to their industry) to begin with.

4.2. Adoption of Takeover Defenses

The evidence presented up to this point is consistent with the view that actions taken by the managers of the peer firms in response to the hostile takeover threat are in the best interest of shareholders and reduce the level of agency costs in the firm. However, some managers who value control may also decide to adopt takeover defenses instead of (or in addition to) the activities we just documented. Such actions would not reduce agency problems, but further entrench management. This is what we explore in this section.

To determine the extent to which firms insulate themselves from takeover attempts, we employ the governance index (G-index) developed by Gompers et al. (2003) and the entrenchment index (E-index) developed by Bebchuk et al. (2009). These indices are constructed from the database maintained by the Investor Responsibility Research Center (IRRC). The database contains details on 24 corporate governance provisions for approximately 1,500 U.S. firms. The G-index is constructed by adding one for every provision that reduces shareholder rights, whereas the E-index is the sum of six of the key governance provisions (staggered boards, limits to shareholder by-law amendments, supermajority requirements for mergers, supermajority requirements for charter amendments, poison pills, and golden parachutes). Although not every provision is directly related to an increase in takeover defenses, many of them are; these indices are therefore good measures of the obstacles faced by a firm interested in acquiring a company *without the approval of target management* (see Bebchuck et al. 2009).[18]

Because data on the indices are available only for S&P 1500 companies and only every two or three years starting in 1990, we are only able to study this issue for a subset of our sample. We gather data on the G- and E-indices in the last available year before the takeover threat and in the first available year after its completion or withdrawal. We compute the change in the raw indices as well as the economy-adjusted indices, computed as the level of the index minus the average level of all firms on the database. This adjustment controls for any time trends in the overall adoption of takeover defenses.

Table 4 contains the results. The unadjusted G-index increases by 0.34, on average, over the period of the control threat, from 9.31 to 9.65. The median change is zero, but the G-index increases for 236 firms, whereas it decreases for only 65 firms. Thus, the sign test rejects the null that the median change in the G-index is zero. Studying the E-index yields similar insights: both the mean and median E-index increase significantly. The results are also similar when we focus on the indices adjusted for economy-wide changes; in fact, the changes in the adjusted G-index are somewhat larger.[19] These changes suggest that peer companies attempt to make it more difficult to be taken over. Note, however, that the increase in takeover defenses is relatively small economically, probably because increasing takeover defenses often requires shareholder approval, which may be difficult to obtain. Thus, although managers wanting to remain in control may prefer insulating themselves from disciplinary

[17] As we mentioned previously, we do not study the peers that receive a takeover attempt over the two year period after the original takeover threat because we have little or no post-threat data available for most of these firms.

[18] Several articles have studied the relationship between various elements of the G-index and the incidence of, and returns associated with, takeovers and find a weak relation at best (see, e.g., Core et al. 2006, Bates et al. 2008). However, these articles focus on all takeover activity rather than disciplinary takeovers.

[19] We have also investigated whether the peer firms are more likely to adopt a classified board, which is considered to be a particularly powerful takeover defense (see, e.g., Bebchuk et al. 2009), but find no evidence that this is the case.

Table 4 Adoption of Takeover Defenses by Peer Firms

	Last available year before the control threat	Change after takeover attempt (p-value)	Number increase	Number unchanged	Number decrease	Total
G-index	9.31	0.34 (0.00)	236	434	65	735
	9.00	0.00 (0.00)				
E-index	2.01	0.20 (0.00)	161	538	36	735
	2.00	0.00 (0.00)				
Adjusted G-index	0.14	0.54 (0.00)	479	0	256	735
	0.06	0.52 (0.00)				
Adjusted E-index	−0.05	0.17 (0.00)	402	0	333	735
	−0.03	0.03 (0.00)				

Notes. The G-index is based on Gompers et al. (2003), who gathered data from IRRC on 24 specific corporate governance provisions. The adjusted G-index is the index adjusted each year by the average for all firms on the IRRC database. The E-index is based on Bebchuk et al. (2009). The adjusted E-index is adjusted each year by the average for all firms on the IRRC database. The first number is the mean, followed by the median. The p-value refers to a t-test of significance for changes in means and a sign test of significance for changes in medians. The p-value for the t-test is adjusted to reflect the lack of independence of observations associated with the same takeover threat.

takeovers altogether, this outcome may not be feasible. As a result, they are forced to make the changes in financing and investment decisions documented previously.

We have also studied whether the responses documented in Table 2 are related to the level and change in takeover protection documented in Table 4. We find evidence that both measures of investment decline substantially less when firms have a higher E-index before the bid (not reported in a table), but this result does not hold when we replace the E-index by the broader G-index. The other variables are not affected by prebid takeover defenses. This evidence suggests that takeover defenses have some—but limited—impact on the peers' response to takeover threats.[20] In §5.1, we specifically study whether the response is different for firms with dual-class shares outstanding.

4.3. Event-Study Evidence

As discussed in §2, the agency cost hypothesis also has implications for the stock price reaction of the targets' peers at the announcement of the control threat. We expect the stock price reaction for the peers to be positive, and more so for the peers with the highest levels of overinvestment and free cash flows prior to the control threat.

We focus on the abnormal returns computed over the five-day window starting two days before the announcement date. It is important to use a short window to maximize the signal-to-noise ratio. The disadvantage is that not all relevant information with respect to the transaction may be released over this period. To compute abnormal returns, we subtract the return on the value-weighted Center for Research in Security Prices (CRSP) index from the peer returns. To avoid problems with outliers, we winsorize abnormal returns at the 1st and 99th percentiles.

Panel A of Table 5 contains the results. Summary statistics are displayed in panel A. Returns for peer firms are 0.50%, on average, with a median of 0.28%. In the second row of panel A, we aggregate abnormal returns by control threat and report that peer returns increase to 0.73%, on average, with a median of 0.41%. These returns are quite substantial, given that they accrue to a large number of firms. They are also consistent with our predictions.

In panel B of Table 5, we study whether the abnormal returns depend on the peers' investment and free cash flow levels prior to the takeover announcements. We split the firms into two groups depending on whether investment levels or free cash flows are high or low. For free cash flows, the split-up is based on the median raw level of free cash flow for the firms in our sample (7.46%). For investment levels, we adjust for investment opportunities, based on the explanatory variables described in Appendix B. In particular, we use the following procedure. First, we estimate models of investment for all firms on Compustat, excluding our sample firms, in the two years prior to the takeover announcement. Second, using the coefficients from these regressions, we predict investment for our sample firms in those two years. Third, we compute excess investment as the difference between actual and predicted investment for these years and set investment equal to high (low) if this difference is positive (negative).

For each variable we first report the mean abnormal return and then the median (p-values are reported in parentheses). Average and median abnormal returns are always positive and significant for firms with high levels of excess investment and free cash flows. For example, firms with high levels of (over)investment have average (median) abnormal

[20] We have also studied whether the changes we document are related to blockholder ownership (as in Denis and Serrano 1996) for those firms in our sample that overlap with the blockholder database constructed by Dlugosz et al. (2006), but we do not find that this is the case.

Table 5 Peer Firm Abnormal Returns Around the Control Threat Announcement

Panel A: Summary statistics			
	Mean (*p*-value)	Median (*p*-value)	*N*
Individual observations	0.50% (0.00)	0.28% (0.00)	2,450
Aggregated by control threat	0.73% (0.00)	0.41% (0.00)	202

Panel B: Cross-sectional analysis of abnormal returns			
	High	Low	Difference
Capital expenditures over total assets	0.67% (0.00)	0.32% (0.01)	0.35% (0.07)
	0.46% (0.00)	0.09% (0.24)	0.37% (0.10)
Adjusted investment ratio	0.59% (0.00)	0.30% (0.05)	0.29% (0.20)
	0.45% (0.01)	0.01% (0.94)	0.44% (0.16)
Free cash flow	0.70% (0.00)	0.24% (0.07)	0.46% (0.01)
	0.48% (0.00)	−0.03% (0.78)	0.51% (0.01)

Notes. Abnormal returns are computed as market-adjusted returns over the five-day period starting two days before the announcement of the takeover attempt. In panel A, the *p*-value after the mean refers to a *t*-test of equality of this abnormal return to zero. The *t*-test is based on standard errors adjusted for the lack of independence of observations related to the same control threat. The *p*-value after the median refers to a sign test of equality of the median to zero. Panel B contains averages according to several subdivisions of the sample. We split the firms into two groups depending on whether investment levels or free cash flows are high or low. For free cash flows, the split-up is based on the median raw level of free cash flow for the firms in our sample (7.46%). For investment levels, we adjust for investment opportunities, based on the explanatory variables described in Appendix B using the following procedure: (i) we estimate models of investment for all firms on Compustat, excluding our sample firms, in the two years prior to the takeover announcement; (ii) using the coefficients from these regressions, we predict investment for our sample firms in those two years; (iii) we compute excess investment as the difference between actual and predicted investment for these years and set investment equal to high (low) if this difference is positive (negative).

returns of 0.67% (0.46%). In contrast, the abnormal returns are lower and often insignificant for firms with low levels of investment and free cash flows. Moreover, the difference between the two is statistically significant for the majority of comparisons.

Overall, the event-study evidence is consistent with our predictions: the peer firms gain when the takeover is announced, and the extent of the gain depends on their investment policies before the takeover threat.[21]

4.4. Changes in Performance

Up to this point, our emphasis has been on documenting changes in firm policies caused by the takeover attempt. Next, we study whether these changes translate into improved performance. We employ two metrics of performance, one based on stock returns, and one based on firm valuation. To compute stock market performance, we employ monthly returns for the three year period before and the three year period after the takeover announcement. We then estimate the following panel regression:

$$R_{it} - Rf_{it} = \alpha + \alpha_{after} \times After_{it} + \beta \times Factor_{it} + \varepsilon_{it}, \quad (2)$$

where R_{it} is stock i's return in month t, $Factor_{it}$ is a (3×1) vector of the Fama–French three-factor portfolio returns (excess market return, small minus big (SMB), and high minus low book-to-market (HML)) in month t, Rf_{it} is the risk-free rate in month t, and $After_{it}$ is an indicator variable equal to 1 when month t is after the takeover announcement or equal to 0 otherwise. The risk-free rate, factor returns, and *After* dummy variable are all indexed by i and t because they pair up with security i's return in month t, where $t = [-36, +36]$. The intercept in this regression (α) captures the average abnormal performance of our sample firms before the takeover attempt, whereas α_{after}, the coefficient on the *After* dummy, captures the change in abnormal stock price performance after the attempt. We estimate this model with standard errors clustered by calendar time.

The results are reported in panel A of Table 6. There is some evidence suggestive of poor abnormal stock price performance (−0.16% per month) in the three years prior to the takeover announcement. After the takeover attempt, abnormal stock returns improve by 0.26% per month for the following three years. This translates into more than 9% over three years, which is quite substantial. We also examine whether the firms' factors loadings change around the takeover threat and find a small increase in their market beta,

[21] We have also studied whether the stock price response depends on the peer firms' takeover defenses. Abnormal returns are lower for peer firms with more takeover defenses in place, but the effect is only significant for firms with a classified board. The lack of significance may be due to two counteracting effects. Firms with fewer takeover defenses in place may experience a higher stock price response because they are less insulated from takeover threats. On the other hand, because they were less insulated from a takeover attempt before the control threats, they were also less able to engage in non-value-maximizing behavior to begin with.

Table 6 Post-Takeover Performance of Peer Firms

Panel A. Calendar time regression of peer firm returns

	Coefficient (*p*-value)
Intercept	−0.16 (0.13)
After takeover attempt	0.26 (0.05)
Rm–Rf	1.08 (0.00)
SMB	0.39 (0.00)
HML	0.35 (0.00)
Adjusted R^2	0.19
N	200,079

Panel B. Tobin's q

	(i)	(ii)
Intercept	3.66 (0.00)	3.31 (0.00)
Target industry dummy	−0.15 (0.00)	−0.07 (0.00)
Target industry dummy ∗ After takeover attempt	0.13 (0.00)	0.11 (0.00)
Log age	−0.61 (0.00)	−0.47 (0.00)
Industry dummies	No	Yes
Adjusted R^2	0.05	0.10
N	227,665	227,651

Notes. Panel A contains an analysis of changes in abnormal returns, based on the following panel regression:

$$R_{it} - Rf_{it} = \alpha + \alpha_{After} \times After_{it} + \beta \times Factor_{it} + \varepsilon_{it},$$

where R_{it} is stock i's return in month t, $Factor_{it}$ is a (3×1) vector of the Fama–French three-factor portfolio returns (excess market return, SMB, and HML) in month t, Rf_{it} is the risk-free rate in month t, and $After_{it}$ is an indicator variable equal to 1 when month t is after the takeover announcement or equal to 0 otherwise. The risk-free rate, factor returns, and *After* dummy variable are all indexed by i and t because they pair up with security i's return in month t, where $t = [-36, +36]$. The intercept in this regression (α) captures the average abnormal performance of our sample firms before the takeover attempt, whereas α_{After}, the coefficient on the *After* dummy, captures the change in abnormal stock price performance after the attempt. Standard errors are clustered in calendar time, and the associated *p*-values are reported in parentheses.

Panel B contains an analysis of changes in valuation, proxied by Tobin's q using the following panel regression:

$$Tobin's\ q_{it} = \alpha + \beta_1(Target\ Industry)_{it} + \beta_2(Target\ Industry\ After)_{it} + \beta_3(\text{Log } Firm\ Age)_{it} + \varepsilon_{it},$$

where $Target\ Industry_{it}$ is a dummy variable set equal to 1 if the firm is in an industry that will experience a hostile takeover within the next three years or has experienced a hostile takeover over the previous three years; $Target\ Industry\ After_{it}$ is a dummy variable set equal to 1 if the firm is in an industry that has experienced a hostile takeover attempt over the previous three years; *Firm Age* is measured as the number of years since the firm has been listed on CRSP or Compustat, whichever is earlier. Industry dummies are based on the 48 Fama–French industries. Standard errors are clustered at the firm level, and the associated *p*-values are reported in parentheses.

but this change does not affect our inferences (not reported in the table).[22]

In panel B, we study the evolution of the peers' q ratios around the takeover attempt. The q ratio is computed as (*book value of assets − book value of equity − deferred taxes + market value of equity*)/*book value of assets*. We employ all firms on Compustat and estimate the following panel regression:

$$Tobin's\ q_{it} = \alpha + \beta_1(Target\ Industry)_{it} + \beta_2(Target\ Industry\ After)_{it} + \beta_3(\text{Log } Firm\ Age)_{it} + \varepsilon_{it}, \quad (3)$$

where $Target\ Industry_{it}$ is a dummy variable set equal to 1 if the firm is in an industry that will experience a hostile takeover attempt within the next three years or has experienced a hostile takeover attempt over the previous three years; $Target\ Industry\ After_{it}$ is a dummy variable set equal to 1 if the firm is in an industry that has experienced a hostile takeover attempt over the previous three years; *Firm Age* is measured as the number of years since the firm has been listed on CRSP or Compustat, whichever is earlier. We control for age because q and age are negatively related (Loderer and Waelchli 2010). Standard errors in this analysis are clustered at the firm level.

The results are reported in column (i) of panel B of Table 6. The average q ratio of firms in industries with hostile takeover attempts is 0.15 below that of other Compustat firms. This evidence confirms the original work by Morck et al. (1988, 1989). After the hostile takeover, however, this effect reverses; q ratios increase by 0.13, and they are no longer below those of other firms in the economy. In model (ii), we confirm that these results still hold even when controlling for the 48 Fama–French industries. Thus, even after removing the differences in performance due to membership of broad industry groups, we continue to find performance improvements for the firms in our sample.

Overall, the evidence reported in Table 6 indicates that the firms in our sample perform poorly in the years running up to the hostile takeover; after the takeover attempt, performance improves significantly, which indicates that the changes in investment and financing decisions documented previously are value increasing.

The evidence on poor returns and low valuations of the peers prior to the control threat also supports recent work by Edmans et al. (2012), who suggest that low valuations increase the likelihood of acquisitions. Their work supports our conjecture that peer firms face a credible increase in the probability of

[22] We have also estimated abnormal returns using an alternative approach (as in Grullon and Michaely 2004) in which we first estimate Equation (2) separately for each firm (requiring at least 24 observations per firm), then compute the average of the regression coefficients across firms, and, finally, test whether the average is significantly different from zero, taking into account the lack of independence of observations related to the same control threat. Using this approach, we find improvements in performance after the acquisition of 0.28% per month (p-value = 0.01).

being acquired unless they take actions to improve their valuations. We document such actions (Table 2) and show that valuations and stock returns improve as a result (Table 6). Edmans et al. (2012) do point out a countervailing feedback effect: if the increased likelihood of a takeover is anticipated by financial markets, this would increase valuations, which could, in turn, reduce the likelihood of a takeover. However, they suggest that this "anticipation effect" is economically modest. As discussed in §4.3, we find a stock price increase of 0.50% for peer firms around the announcement of the control threat, consistent with both the expectation of a higher takeover likelihood and/or a reduction in non-value-maximizing behavior. Consistent with Edmans et al. (2012), however, we do not believe that this stock price increase alone will deter many potential bidders. The subsequent improvements in stock returns (9% over three years) and valuations (increase in q ratio by 0.13) documented in Table 6, on the other hand, will likely deter future takeovers, which is what our sample firms are aiming for.

5. Alternative Explanations

In this section, we consider three alternative explanations for our findings and conduct a number of tests to see whether these explanations are supported by the data.

5.1. Are the Firms in the Industry Responding to Changes in Industry Conditions?

In the previous section, we documented significant changes in financing and investment policies surrounding the takeover attempt. In doing so, we made the implicit assumption that the takeover attempt was indeed the trigger for those changes and that these changes would not have occurred at that point without it.

In this section, we examine an alternative possibility, which is that the industry is simply evolving toward a new equilibrium and that the changes we document would have occurred at that time, even without the control threat taking place (*industry equilibrium hypothesis*). For example, industry shocks may change the optimal investment and financing policies for all firms (e.g., Mitchell and Mulherin 1996, Harford 2005). Although a valid concern, we believe that this hypothesis is unlikely to explain our findings because we already control for changes in the financial characteristics of the firms in our sample in some specifications (column (iii) of panels A and B of Table 2). To allay any remaining concerns, we conduct two sets of tests.

First, we examine whether the peers in our sample were acting optimally to start with, which is what the industry equilibrium hypothesis would predict, or whether they behaved suboptimally, as predicted by the agency costs hypothesis. It is in fact possible that firms acted optimally before the takeover attempt, but became inefficient afterward, perhaps because the takeover attempt led to more short-termism.

To investigate this possibility, we examine the levels of debt and capital expenditures of the target firms' peers before the takeover attempt. If most firms in the industry suffered from free cash flow agency problems, we would expect the firms in our sample to have less debt and higher capital expenditures, on average, than optimal. As in our study of Tobin's q, we employ all firms on Compustat and estimate the following panel regressions:

$$\begin{aligned} Ratio_{it} &= \alpha + \beta_1(Target\ Industry)_{it} + \beta_2(Target\ Industry\ After)_{it} \\ &\quad + \gamma(Control\ variables)_{it} + \varepsilon_{it}, \end{aligned} \tag{4}$$

where $Ratio_{it}$ is either a measure of investment or a measure leverage (the ratios are the same as those studied in Table 2), the sets of control variables employed depend on the ratio and are described in Appendix B, γ is the vector of coefficients on the control variables, and $Target\ Industry_{it}$ and $Target\ Industry\ After_{it}$ have been defined previously.

The results for our two investment measures are reported in panel A of Table 7. The results are striking. Both measures suggest that the peer firms were overinvesting before the takeover attempt. Excess investment is 0.63% for the regular capital expenditures measure and 0.52% for the adjusted measure. After the takeover attempt, firms cut investment and both effects reverse (by 0.76% for regular capital expenditures and 0.30% for adjustment investment); as a result, we cannot reject that the peers in our sample behave optimally after the control threat (the sum of both effects is not significantly different from zero).[23]

In panel B of Table 7, we study leverage. These regressions also point to suboptimal behavior before the control threat: long-term debt is more than two percentage points below the optimal and total debt is almost three percentage points lower. As was the case for investment, these effects reverse after the control threat is announced, and any evidence of suboptimal behavior disappears.

The results reported in Table 7 support the agency cost view and appear to be inconsistent with the industry equilibrium hypothesis. Nevertheless, it could still be the case that firms take time to adjust to new

[23] If we control for free cash flows in these models, then excess investment is 0.58% for regular capital expenditures and 0.75% for the adjusted measure, whereas the cut after the control threat is 0.72% for regular capital expenditures and 0.41% for adjusted investment.

Table 7 Investment and Leverage Regressions Around Hostile Takeover Attempts

Panel A: Capital expenditure regressions

	Capital expenditures/assets	Adjusted investment ratio
Intercept	0.0680 (0.00)	0.0112 (0.00)
Target industry dummy	0.0063 (0.00)	0.0052 (0.00)
Target industry dummy ∗ After takeover attempt	−0.0076 (0.00)	−0.0030 (0.06)
q_{t-1}	0.0009 (0.00)	
Value assets in place/ market value equity$_{t-1}$		−0.0030 (0.00)
Leverage$_{t-1}$		−0.0079 (0.00)
Cash$_{t-1}$		0.1413 (0.00)
Age$_{t-1}$		−0.0006 (0.37)
Size$_{t-1}$		0.0031 (0.00)
Stock returns$_{t-1}$		0.0096 (0.00)
Adjusted investment ratio$_{t-1}$		0.5018 (0.00)
Year dummies	No	Yes
Industry dummies	No	Yes
Adjusted R^2	0.01	0.40
N	202,418	122,046

Panel B: Leverage regressions

	Long-term debt to assets	Total debt to assets
Intercept	0.0649 (0.00)	0.1799 (0.00)
Target industry dummy	−0.0247 (0.00)	−0.0297 (0.00)
Target industry dummy ∗ After takeover attempt	0.0217 (0.00)	0.0296 (0.00)
Operating return on assets	−0.0904 (0.00)	−0.1844 (0.00)
Investment tax credits over assets	0.1867 (0.13)	−0.2152 (0.11)
PP&E over assets	0.1961 (0.00)	0.1980 (0.00)
Log assets	0.0152 (0.00)	0.0089 (0.00)
R&D expenses over assets	−0.3298 (0.00)	−0.5500 (0.00)
SG&A expenses over assets	−0.0008 (0.14)	−0.0040 (0.00)
Adjusted R^2	0.17	0.14
N	233,919	231,750

Notes. Using all firms on Compustat, we estimate the following panel regression:

$$Ratio_{it} = \alpha + \beta_1(Target\ Industry)_{it} + \beta_2(Target\ Industry\ After)_{it} + \gamma(Control\ variables)_{it} + \varepsilon_{it},$$

where $Ratio_{it}$ is either a measure of investment (panel A) or a measure leverage (panel B). The sets of control variables employed depend on the ratio and are described in Appendix B; γ is the vector of coefficients on the control variables; $Target\ Industry_{it}$ and $Target\ Industry\ After_{it}$ have been defined in Table 6. Industry dummies are based on the 48 Fama–French industries. Standard errors are clustered at the firm level, and the associated p-values are listed in parentheses.

industry conditions, leading to the suboptimal policies we document. However, such policies would correct themselves even without a takeover threat in the industry. The second set of tests addresses this issue. We identify the peer firms in our sample with a dual-class share structure and compare their response to that of firms with a single class of shares outstanding.[24] Dual-class firms often concentrate the voting rights in the hands of insiders, making such firms virtually immune to hostile takeovers (Gompers et al. 2010). Thus, they are expected to be less responsive to control threats in the industry compared to single-class firms.[25]

To obtain a sample of dual-class firms, we combine various data sources: (a) the data set on dual-class firms employed by Gompers et al. (2010) (provided to us by Andrew Metrick), which contains a comprehensive list of all dual-class firms in the United States over the period 1995–2002; (b) the IRRC database of takeover defenses, which we discussed previously; and (c) the list of dual-class initial public offerings obtained from Jay Ritter's website (http://bear.warrington.ufl.edu/ritter/dual-class-ipo.htm). Firms with Class A, Class B, or Class C in their name on the Compustat database are also classified as dual-class firms. This leads to a sample of 223 dual-class peers with at least one year of data available after the control threat. To compare the two sets of firms, we modify regression model (1) as follows:

$$Ratio_{it} = bX_{it} + c_1 After_{it} + c_2 Single_i + c_3 Single_i * After_{it} + e_{it}, \quad (5)$$

where $Single_i$ is a dummy set equal to 1 if firm i is a single-class firm and 0 otherwise, and $Single_i * After_{it}$ is a dummy variable that takes on the value of 1 for single-class firms in the years after the completion or withdrawal of the hostile takeover in the industry and 0 otherwise. The other variables have been defined previously.

We estimate model (5) using ordinary least squares with standard errors clustered at the takeover threat level. Since less than 10% of the peer firms have dual-class shares outstanding, the change in policies for these firms is likely to be estimated with more noise, which makes it more difficult to uncover significant differences between dual-class and single-class firms. The findings are reported in Table 8. We report the coefficient on the *After* dummy (c_1), which measures the effect for dual-class firms; the sum of the coefficients on the *After* dummy and the *Single* ∗ *After* interaction ($c_1 + c_3$), which measures the effect for single-class firms; and the coefficient on the *Single* ∗ *After* dummy (c_3), which measures the difference in response between single-class and dual-class firms. Our results are generally consistent with our predictions. Peers with one class of stock cut investment, cash holdings, and free cash flows, and they increase leverage and distributions to shareholders. All of these effects are highly significant.

[24] We are grateful to an anonymous referee for suggesting this test.

[25] It is still possible that these firms respond if the hostile takeover in the industry affects the pressure imposed by other governance mechanisms such as the board.

Table 8 Response for Single-Class and Dual-Class Firms

	Single-class firms $c_1 + c_3$ (i)	Dual-class firms c_1 (ii)	Difference c_3 (iii)
Capital expenditures over total assets	−0.0080 (0.00)	−0.0060 (0.02)	−0.0020 (0.42)
Adjusted investment ratio	−0.0035 (0.00)	−0.0034 (0.12)	−0.0001 (0.96)
Long-term debt over total assets	0.0216 (0.00)	0.0160 (0.01)	0.0057 (0.42)
Total debt over total assets	0.0268 (0.00)	0.0087 (0.16)	0.0181 (0.01)
Cash over total assets	−0.0049 (0.00)	0.0028 (0.19)	−0.0077 (0.00)
Free cash flow over total assets	−0.0094 (0.00)	0.0001 (0.96)	−0.0095 (0.00)
Dividends + repurchases/net income	0.0662 (0.00)	−0.0082 (0.83)	0.0744 (0.09)

Notes. This table reports the change in financial characteristics for single-class and dual-class peer firms, after controlling for firm characteristics. We estimate the following regression:

$$Ratio_{it} = bX_{it} + c_1\, After_{it} + c_2\, Single_i + c_3\, Single_i * After_{it} + e_{it},$$

where $Ratio_{it}$ is the ratio being studied for each firm i at time t, X_{it} is a vector of control variables, $After_{it}$ is a dummy variable that takes on the value of 1 in the years after the completion or withdrawal of the hostile takeover and 0 otherwise, $Single_i$ is a dummy set equal to 1 if firm i is a single-class firm and 0 otherwise, and $Single_i * After_{it}$ is a dummy variable that takes on the value of 1 for single-class firms in the years after the completion or withdrawal of the hostile takeover in the industry and 0 otherwise. We estimate the above model for the three years prior and three years after the takeover attempt. Standard errors are clustered at the takeover threat level, and the associated p-values are reported in parentheses. We report the effect for single-class firms ($c_1 + c_3$), dual-class firms (c_1), and the difference between the two (c_3). Appendix B contains a list of the control variables employed.

The changes in policies of dual-class firms are much less pronounced. There is some weak evidence of investment cuts and leverage increases, but the effect is always smaller than for single-class firms. Free cash flows, cash holdings, and distributions to shareholder do not change. As illustrated in column (iii), except for our measures of investment, the differences between single- and dual-class firms are statistically significant. We have also studied abnormal returns surrounding the announcement of the hostile takeover (not reported in the table). Single-class firms experience a positive stock price response of 0.53% (p-value = 0.00), whereas the abnormal return for dual-class firms is small (0.11%) and not statistically significant (p-value = 0.77).

The combined evidence reported in this section does not support the view that the peer firms in our sample are simply adjusting to changes in industry conditions.

5.2. Are the Changes the Actions of Entrenched Managers?

Another alternative to the agency cost hypothesis is that the takeover attempt provides new information to the target's peers about how to better employ the firm's assets (*asset redeployment hypothesis*). This information leads the peers to adopt the changes we document, not because they fear a takeover themselves, but because it is in the best interest of their shareholders to do so. Our evidence on single- and dual-class shares is inconsistent with this hypothesis; the changes we document should extend to dual-class firms as well.

In addition, the asset redeployment hypothesis does not distinguish between hostile and friendly takeovers; we should therefore find the same results for both types of acquisitions. To examine whether this is the case, we repeat our tests for a sample of friendly takeovers that occur over our sample period in industries with no concurrent hostile takeover attempts. In particular, all industries (based on the Earnings Supplement of the S&P Industry Surveys) with hostile takeovers in the three years before and three years after the friendly takeover are removed from our analysis. Out of the remaining industries, we sample two friendly takeovers each time a hostile takeover occurs in our sample. This procedure ensures that the underlying economic environment around these acquisitions is similar to that of our sample firms. Note, however, that for some of the early years of the sample period, in which many hostile takeovers took place, two friendly industry matches are not always available. The resulting sample contains 313 friendly acquisitions for which we have data on 2,081 peer firms.

Table 9 contains the results. We report two sets of findings. First, in column (i) we report, at the individual firm level, the changes in financing and investment decisions after taking into account changes in their determinants (see Equation (1)). This procedure mimics the analyses for the peers of hostile targets reported in column (iii) of panel A of Table 2. We find no evidence of a decline in investment and cash holdings or of an increase in payouts. The peers of friendly targets increase their leverage, however, and they experience a decline in free cash flows, but the magnitude of these effects is considerably smaller than for the peers of hostile targets. In column (ii) we repeat this analysis, but we first average peer firm characteristics by control threat before estimating the regression models (equivalent to the analyses for the peers of hostile targets reported in column (iii) of

Table 9 Changes in Characteristics of Peers of Firms Receiving a Friendly Takeover Bid

	Adjusted change after takeover attempt—individual observations (i)	*N*	*Adjusted change after takeover attempt—averaged by takeover attempt* (ii)	*N*
Capital expenditures over total assets	−0.0022 (0.26)	2,036	−0.0032 (0.13)	313
Adjusted investment ratio	−0.0005 (0.85)	1,451	—	
Long-term debt over total assets	0.0119 (0.02)	2,061	0.0156 (0.01)	313
Total debt over total assets	0.0157 (0.01)	2,052	0.0191 (0.00)	313
Cash over total assets	0.0009 (0.73)	2,081	−0.0004 (0.89)	313
Free cash flow over total assets	−0.0046 (0.08)	1,881	−0.0064 (0.01)	313
Dividends + repurchases/net income	−0.0031 (0.86)	1,826	−0.0030 (0.92)	313

Notes. Adjusted change after takeover attempt—individual observations is computed as the coefficient on the *After* dummy variable in the following panel regression:

$$Ratio_{it} = bX_{it} + c\,After_{it} + e_{it},$$

where $Ratio_{it}$ is the ratio being studied for each firm i at time t, X_{it} is a vector of control variables, b is a vector of regression coefficients on the control variables, and $After_{it}$ is a dummy variable that takes on the value of 1 in the years after the completion or withdrawal of the friendly takeover and 0 otherwise, and c is the coefficient on the *After* dummy. We estimate the above model for the three years prior and three years after the takeover attempt. Appendix B contains a list of the control variables employed. Standard errors are clustered at the transaction level, and the associated p-values are reported in parentheses. To compute the *Adjusted change after takeover attempt—averaged by takeover attempt*, we first average all observations by control threat before estimating the regressions.

panel B of Table 2). The findings are similar to those of column (i): investment, cash holdings, and payouts do not change, but leverage increases, and free cash flows decline. We have also investigated whether the peers of friendly targets invest more than predicted by our empirical model of investment or borrow less than predicted by our empirical model of leverage in the years prior to the control threat, but do not find this to be the case (not reported in a table for the sake of brevity).[26]

These findings indicate that the peers of friendly targets do not respond in a similar manner to the peers of hostile targets, which is inconsistent with the asset redeployment hypothesis.

5.3. Are the Firms in the Industry Undervalued?

Another alternative is that the takeover attempt signals that the firms in the industry are undervalued (*asset undervaluation hypothesis*). We do not believe that undervaluation can explain *all* of our results. Undervaluation is consistent with the positive stock price reaction upon announcement of the control threat, and could also explain why firms increase borrowing, if firms set their leverage targets based on market values. Given the magnitude of the announcement effect, however, the expected increase in borrowing would be much smaller than the change we document. If the undervaluation is completely resolved upon the announcement of the takeover threat, we do not expect other firm policies to change.

On the other hand, if the undervaluation is not completely resolved at the time of the announcement, then peer firms may undertake actions to correct the undervaluation and avoid being acquired themselves. This could explain the increase in takeover defenses and the change in payouts, assuming the increased payout signals undervaluation (although the evidence on market timing through payouts is not very strong; see Dittmar and Dittmar 2008). To fund the increased payouts, firms would increase leverage and decrease cash holdings. This hypothesis cannot explain, however, why these firms would not have enough debt (according to an empirical model of optimal leverage) before the takeover threat, and would restore debt to the optimal level afterward. Similarly it cannot explain why these firms would overinvest before the takeover threat and cut capital spending afterward to optimal levels (according to an empirical model of optimal capital spending). The q theory of investment suggests that undervalued firms invest less; in contrast, we find that firms cut investment after the control threat, exactly when valuations increase.

The evidence on friendly acquisitions discussed earlier is also inconsistent with undervaluation, given that we find few changes in policies for the peers of these firms. Of course, it could be that undervaluation applies only to firms in industries that experience a hostile takeover attempt.

As an additional test of the undervaluation hypothesis, we remove takeover threats in industries with below median q ratios (in the two years before the takeover threat). These should be the industries where undervaluation is more prominent (see, e.g., Rhodes-Kropf et al. 2005).[27] If undervaluation is driving our findings, then they should weaken substantially when the low q industries are removed. We find

[26] We have also studied the announcement effect of the peers of firms targeted in a friendly takeover. The mean is positive (0.18%), but not statistically significant (p-value = 0.39), and much smaller than for the peers of hostile targets. It is also unrelated to prior levels of (excess) investment or free cash flow.

[27] Note that we do not claim that undervaluation is not possible in high q industries, just that it is less likely.

no evidence that this is the case (not reported in a table). In general, the changes in financing and investment policies are similar for high q and low q industries, suggesting that undervaluation is less likely to be an explanation for these phenomena.

Finally, recent evidence by Fos (2013), showing that firms change their policies in similar ways to the peers in our sample when responding to an increased threat of a proxy contest, also suggests that undervaluation is not the main cause of these policies changes. Fos (2013) identifies changes in the threat of proxy contests using a measure of stock liquidity.

Overall, these findings do not support the undervaluation hypothesis. Of course, undervaluation may be relevant for a subset of the transactions in our sample, but their weight in the overall sample is not strong enough to be detected by our tests.

6. Conclusion

This paper studies how hostile takeover attempts affect the behavior of the target firms' industry peers. This research is motivated by Jensen's (1986, 1993) and Shleifer and Vishny's (1988) argument that entire industries may suffer from agency problems. If one firm in the industry receives a takeover attempt because of agency problems, then the managers of other firms who want to remain in control realize that they need to change their policies or face similar control threats.

Our results are consistent with Jensen's (1986, 1993) arguments: after the control threat, the peer firms cut capital expenditures, reduce their cash balances and free cash flows, increase debt, and increase their payouts to shareholders. The peers with the highest level of industry-adjusted investment before the control threat have the largest cuts in capital expenditures. We also find that the peers increase their adoption of takeover defenses.

Event-study results provide further evidence in support of agency costs. The industry peers gain 0.50%, on average, when a control threat is announced, with larger returns accruing to firms with higher capital expenditures and free cash flows prior to the bid announcement. Finally, we find that valuations and returns of the peer firms improve after the takeover attempt, indicating that the changes made by the peers are value enhancing.

The facts presented in this paper provide strong support for Jensen's view (1986, 1993) that agency costs manifest themselves at the industry level and that takeover threats affect other firms as well. Although some pieces of our evidence are consistent with other explanations, the combined evidence supports the view that the industry as a whole suffers from agency problems and that the takeover attempt leads to a reduction in these problems for other firms in the industry. Overall, our results indicate that the benefits of takeover attempts are larger than previously documented, since they also affect the policies of industry peers.

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Appendix A. Number of Hostile Acquisitions in Sample by 48 Fama–French Industries and Year

	Years																							
Industry	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	Total
Food products	1	0	3	1	0	7	0	0	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0	16
Beer and liquor	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Tobacco products	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Recreation	0	0	0	2	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4
Entertainment	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	5
Printing and publ.	0	1	0	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6
Consumer goods	1	0	2	2	1	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	9
Apparel	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Healthcare	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Pharmaceuticals	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Chemicals	0	0	2	1	1	2	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	10

Appendix A (Continued)

	Years																						
Industry	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	Total
Rubber and plastics	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Textiles	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Construction materials	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Construction	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
Steel	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	4
Fabricated products	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Machinery	0	0	1	1	0	0	1	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	6
Electrical equipment	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Automobiles and trucks	0	0	0	2	1	2	0	0	0	0	0	0	1	0	0	2	0	0	0	1	1	0	0	10
Aircraft	0	0	0	0	0	1	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	4
Precious metals	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
Petroleum and natural gas	0	2	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	6
Utilities	1	1	1	1	0	0	2	1	0	0	0	0	1	3	1	0	1	0	0	0	0	0	0	13
Communication	1	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	5
Business services	0	0	0	0	0	2	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0	0	0	7
Computers	0	1	0	0	1	1	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	7
Computer software	0	0	0	1	2	5	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	12
Measuring and control equipment	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	1	0	0	0	0	0	0	4
Shipping containers	0	0	1	5	4	2	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	15
Transportation	0	0	1	1	1	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	6
Wholesale	0	2	0	7	2	4	2	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	21
Retail	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2
Trading	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
Total	4	9	19	31	23	40	11	4	0	0	1	2	12	14	11	6	3	2	2	4	2	2	0	202

Appendix B. Control Variables

Dependent variable	Control variables
Capital expenditures/assets	Lagged Tobin's *q*, measured as (*book value of assets − book value of equity − deferred taxes + market value of equity*)/*book value of assets*
Adjusted investment ratio: (*capital expenditures + R&D + cash acquisitions − sale of PP&E − depreciation*)/*assets*	(i) lagged value of assets in place/market value of equity (ii) lagged total debt/assets (iii) lagged cash/assets (iv) lagged firm age (number of years since listing on Compustat or CRSP, whichever is higher) (v) lagged log assets (vi) lagged one-year stock returns (vii) lagged adjusted investment ratio (viii) industry dummies (using 48 Fama–French industries) (ix) year dummies (Richardson 2006)
Long-term debt/assets *Total debt/assets*	(i) operating income/assets (ii) investment tax credits/assets (iii) net property, plant, and equipment/assets (iv) log assets (v) R&D/assets (vi) selling, general and administrative expenses (SG&A)/assets (Titman and Wessels 1988, Berger et al. 1997, Hovakimian et al. 2001)

Appendix B (Continued)

Dependent variable	Control variables
Cash/total assets	(i) net working capital/assets (ii) R&D/assets (iii) cash acquisitions/assets (iv) capital expenditures/assets (v) Tobin's q (vi) log assets (vii) total debt/assets (viii) a dummy equal to 1 if the firm pays dividends (ix) operating income/assets (Opler et al. 1999)
Free cash flow/assets	Log assets
(*Dividends* + *repurchases*)/*net income*	(i) Tobin's q (ii) retained earnings/equity (iii) $(\text{sales}/\text{sales}_{t-1}) - 1$ (iv) operating income/assets (v) equity/assets (vi) log assets (vii) cash/assets (DeAngelo et al. 2006)

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