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ESSAYS IN CORPORATE FINANCE

By

Tilan Tang

A DISSERTATION

Submitted to
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ABSTRACT

ESSAYS IN CORPORATE FINANCE

By

Tilan Tang

Over the past two decades, concerns with endogeneity in empirical finance research have attracted a great deal of academic attention. Numerous papers have proposed various approaches to control for the biases caused by endogeneity issues. Inspired by previous studies, this dissertation aims to explore special identification strategies to answer the important questions in corporate finance.

The first essay attempts to get around some well-known endogeneity issues in evaluating bidder gains in mergers and acquisitions. The use of announcement returns to assess the gains to acquiring-firm shareholders is problematic as the announcement of a bid usually conveys more information than the synergy from combination. Using a unique, hand-collected dataset on failed takeovers, we investigate termination returns in deals canceled for reasons unrelated to the bidder's valuation. This methodology addresses biases in conventional techniques and permits a cleaner assessment of value improvements from acquisitions. We find that bidder gains vary significantly with the type of target acquired: on average bidder returns are positive when acquiring private targets or subsidiaries, while negative when acquiring public targets. In addition, we also find no difference in returns for stock financed versus cash financed deals, helping to confirm that the method-of-payment effect is likely due to the revelation of adverse information about the bidder. Further evidence also suggests that the lack of liquidity in private sellers contributes to the positive gains to bidders in transactions.

The second essay explores the role of access of internal cash in product market competition dynamics. We exploit an exogenous shock to the finances of tobacco firms arising from an excise tax in the early 1990s. Using the event as a natural experiment, we find significant positive returns to rivals who compete with non-tobacco segments in tobacco firms and a significant change in output behavior of those non-tobacco segments after the shock. This suggests that access to cash is an important determinant of a firm's aggressiveness and success in the product market. The effects are even robust to a number of estimation issues and identification choices. Since the shock is exogenous to the investment opportunities of non-tobacco industries, our evidence supports the hypothesis that there is a causal relation between a firm's cash flow and its product market behavior. Moreover, we consider the determinants of the cross-sectional variation in competitor abnormal returns and find that the connection between cash flow and competitive performance is magnified in competitive industries and when cash-constrained firms only have a small market share.

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CHAPTER 1

A Re-examination of Bidder Gains in Acquisitions: Evidence from Termination Announcements

1.1 Introduction

Mergers and acquisitions are economically important events that have attracted a great deal of attention from financial economists. Despite the importance of these events, however, our understanding of the causes and consequences of corporate control activity is still far from complete. Part of the problem arises from the fact that much of the prior research on such activity focuses on studying market returns at the time of acquisition announcements.¹ While this evidence is informative, announcement returns can be difficult to interpret because many different pieces of information may be revealed by the announcement, and some of this information may have little to do with the value created by the merger itself.² For example, the decision to undertake a bid may convey to the market that a firm's internal growth prospects are poor, and the decision to use stock in an acquisition may convey that the firm's stock is overvalued.

Several researchers have attempted to overcome these interpretation problems. Hietala, Kaplan, and Robinson (2003) and Bhagat, Dong, Hirshleifer, and Noah (2005) use information relating to competing bids to extract information on the market's

¹ Tremendous variation in bidder announcement returns is recorded in previous studies (see Jensen and Ruback (1983)). To date, however, researchers are unable to fully explain this variation.

² Grinblatt and Titman (2002) state that the stock return at the time of announcement reflects not just the expected effect of the acquisition on firm profitability but also information regarding the stand-alone value of the firm. Furthermore, Hietala, Kaplan, and Robinson (2003) suggest that announcements contain information about the potential synergies from the combination, the bidder's stand-alone value, and possible bidder overpayment.

assessment of the value of the merger to the original bidder. Taking a different approach, Fuller, Netter and Stegemoller (2002) use repeated bids by the same acquirer to attempt to remove the role of bidder-specific characteristics in announcement returns. While these approaches offer additional insights on bidder gains in merger activity, some interpretation issues remain. In particular, studies that exploit the presence of competing bids assume the occurrence of a competing bid to be independent of the value of the original bidder, while studies that consider repeat bidders cannot adjust for the possibility of time-varying changes in underlying bidder characteristics.

In this paper we attempt to more cleanly identify the gains that accrue to bidders as a result of acquisition activity by examining bidder returns at the time that a previously announced acquisition is canceled for exogenous reasons. This approach depends critically on identifying cancellations that have nothing to do with the value of the bidder or the merged entity, that is, cancellations that arise due to factors such as regulatory intervention, unexpected lawsuits, or the presence of competing bids.³ We therefore begin with a comprehensive sample of canceled deals and select from this set only the transactions for which we can determine that this exogeneity condition holds. The final sample includes 272 failed takeover bids occurring between 1990 and 2006.

For the sample as a whole, we find that bidder returns upon announcement of deal cancellation are on average insignificantly different from zero. However, this finding masks considerable variation in the market reaction to different types of deals. In particular, we find that bidder returns are significantly negative when a deal is canceled

³ While the sample that we use includes deals canceled because of the presence of competing bids, the assumptions on these events are much weaker than the aforementioned studies that consider returns at the time of the announcement of the competing bid. As a robustness check we also examine the sample after excluding all deals canceled because of competing bids and the results still hold.

and the target is a private firm or a subsidiary of either a public or private firm. This indicates that the market believes that these types of deals create value for bidders and that this value is lost upon recognition that the deal will not be consummated. The fact that these deals appear to create value for bidders is consistent with prior evidence that bidders fare well when acquiring relatively illiquid assets (e.g., Officer (2007)). When we further compare acquisitions of public firm subsidiaries to acquisitions of private firm subsidiaries, we find that cancellation returns are relatively smaller in magnitude (still negative in sign) for acquisitions of public firm subsidiaries, which suggests that private sellers may be willing to sell at a lower price because of elevated financial constraints associated with not having easy access to public equity markets.

In contrast, for acquisitions of entire public firms, we find that cancellation announcement returns are on average significantly positive. This suggests that the market believes that these deals harm bidders on average and thus that deal cancellation is viewed as positive news for bidder shareholders. Note that while many prior studies suggest that bidders fare poorly when purchasing public firms, these studies are clouded by the interpretation issues discussed above. The fact that we find evidence of value destruction for this large class of deals suggests that agency problems at the firm level can generate a bias towards unprofitable growth, at least in the merger arena.

The experimental design discussed above also allows us to revisit some prominent issues in the prior literature on bidder returns. In particular, an important finding in the literature is that bidder returns tend to be more negative when the bidder uses equity as the method of payment. The common interpretation of this result is that the choice of stock financing conveys a negative signal regarding the value of the bidder. However, an

alternative possibility is simply that stock deals are systematically poorer deals for bidders. In our sample, we find no difference between cash and stock deals in terms of announcement returns at the time of deal cancellation. This suggests that this alternative possibility is unlikely to hold, strengthening confidence in the more commonly held interpretation of the role of stock financing in bidder returns.

Finally, we examine the role of target size in bidder returns. Specifically, the larger the target is relative to the bidder, the more positive is the announcement return at the time of deal cancellation. This suggests that large targets are able to extract more value from bidders, driving downwards bidder gains from merger activity, a finding that is consistent with recent concerns raised in the business press about mergers of equals.⁴

Taken as a whole, this paper adds to our understanding of the value that accrues to bidders when making acquisitions by introducing a cleaner approach to measuring the market's assessment of value creation in mergers. In particular, the approach of considering bidder returns when deals are canceled allows one to estimate value improvement in mergers without the confounding effect of contaminating information that may have little to do with the proposed deal. Given this methodological improvement, the results uncovered here add substantially to our confidence in some prominent results regarding bidder returns. In particular, the paper's main results confirm prior evidence that bidders often do not benefit when they acquire public firms, while they appear to fare well when they purchase other types of entities including private firms and subsidiaries of both public and private firms. In addition, this paper extends previous research by providing additional evidence suggesting that the liquidity needs of owners of non-public

⁴ It has been argued that similarity of size may give the target more bargaining power in merger contests. An article in *The Economist* (1999) also suggests that mergers of equals may be difficult to consummate successfully because of leadership issues.

assets help explain the higher gains to bidders of private firms or subsidiaries. This paper also lends support to the interpretation that the previously documented method-of-payment effect in bidder returns merely reflects a pure negative signal regarding the underlying value of the bidder's assets in place.

The remainder of the paper proceeds as follows. Section 1.2 describes the data and sample selection process. In Section 1.3, we present findings on announcement returns at the time of deal cancellation for the sample as a whole and for a variety of selected subsamples. Section 1.3 also presents robustness tests. In Section 1.4, we examine possible explanations for the differences in bidder returns. Section 1.5 concludes the paper.

1.2 Data and Sample Selection

1.2.1 Sample Selection

To construct a sample of proposed mergers that end unsuccessfully, we begin with all transactions posted in the Securities Data Company's (SDC) Merger and Acquisition database. This database includes information on 590,238 merger bids for U.S. and non-U.S. companies made between January 1962 and July 2007. Since there were important changes in the corporate control environment beginning in the early 1990s, we limit attention to all transactions occurring between January 1, 1990 and December 31, 2006. This sample period includes the large merger wave of the late 1990s and early 2000s.⁵ For inclusion in the sample, we require that the acquirer controls less than 50% of

⁵ Several previous M&A studies investigate this time period and document the trends and characteristics of mergers over the last century. See, e.g., Andrade, Mitchell, and Stafford (2001) and Moeller, Schlingemann, and Stulz (2005).

the shares of the target as of the merger announcement date and seeks to obtain control of all shares of the target. Moreover, we exclude all block purchases, exercises of previously acquired options, leveraged buyouts, self tenders, and exchange offers, since these types of transactions are economically distinct from the traditional mergers that we seek to understand in this paper.

From the remaining transactions, we consider for further study all deals that were ultimately canceled or withdrawn. We then impose the following sampling criteria, which are fairly standard in studies of acquisition activities:

- The acquirer is a U.S. public firm traded on the NYSE, AMEX, or NASDAQ and is listed on the Center for Research in Security Prices (CRSP) file with at least three days of return data available around the deal termination date.
- The target is an independent public or private firm or, alternatively, a subsidiary of a public or private firm.
- The deal's value is greater than or equal to \$1 million, with value defined by SDC as the total value of consideration paid by the acquiring firm, excluding fees and expenses.⁶ In addition, the deal's value is more than 1% of the market value of the bidder's assets, which is defined as book value of assets minus book value of equity plus market value of equity. These criteria ensure that the deal has material value implications for the bidder.
- Neither the acquirer nor the target is a utility or a financial institution.⁷
- Revised or repeated bids are excluded since these bids may reveal more information about the acquirers and these deals are likely to yield

⁶ The dollar value would include the amount paid for all common stock, preferred stock, debt, options, assets, warrants, and any stake purchased within six months of the announcement date.

⁷ Industry classification follows Fama and French (1997).

systematically different gains to bidders than contests with only a single bid from the acquirer.⁸

- The deal status is recorded by SDC as withdrawn and the acquirer makes no announcements about further merger or acquisition in the seven-day window around the initial acquisition termination date.⁹

The above requirements yield a sample of 1,486 failed mergers. However, because the success of this paper's research approach hinges on identifying a group of deals that are canceled due to reasons unrelated to the valuation of the acquirer, not all of these deals are eligible for inclusion in the analysis. To identify such deals, for every transaction in the failed deal sample, we search all available reports in Factiva and attempt to investigate why the merger did not go through. This manual search requires extensive attention since news often includes a reporter's speculations or personal opinions. Moreover, news headlines sometimes exaggerate the causes of deal failure or understate other confounding events about the acquirer. Thus, the real causes of merger termination are often obscure in news reports or even sometimes unspecified.

Based on the information collected from Factiva, we find that merger deals can fail for various reasons. For example, an acquirer may terminate a deal due to bad market reception (e.g., a decrease in the acquirer's stock price), or a target may cancel the merger after discovering severe financial problems of the acquirer during the due diligence review process. Such failures certainly convey some information related to the acquirer's stand-alone value and thus should be excluded from the sample. In addition, for a number

⁸ For example, cancellations of revised bids are more likely to be anticipated.

⁹ When we manually search the failed deals in Factiva, we find that some transactions are misclassified as withdrawn. These misclassified deals are ultimately completed as strategic alliances or as mergers at a later date. We exclude such deals. Furthermore, two deals in the failed sample actually take the form of a traditional Dutch auction in the bidding process. We exclude these transactions too.

of failed bids, multiple reasons are cited for deal failure, with at least one reason related to the value of the acquiring firm. In order to control for the problem of multiple information release at announcement, these controversial bids should also be excluded from the failed deal sample.¹⁰

The first set of excluded deals consists of those acquisitions that fail because the acquirer experiences financial problems or structural changes subsequent to the merger announcement. Such causes of deal failure, which are explicitly or implicitly stated in the termination announcement, mainly include significant decreases in the acquirer's stock price, negative financial performance of the acquirer, the inability of the acquirer to obtain required financing, or acquisitions of the bidder. We exclude these deals because it is highly possible that for these deals the bidder's abnormal return at termination would reflect, at least in part, the change in the valuation of the acquirer, in which case inclusion of these deals would significantly bias the results. There are other cases in which a deal fails when the acquirer receives strong opposition to the merger from its shareholders or the market. This type of opposition may potentially signal poor growth opportunities for the acquirer. Again, in such cases the cause of deal failure would be, if only indirectly, related to the acquirer's valuation, and thus we exclude these deals.

The second set of excluded deals consists of mergers that are terminated by the acquirer due to worsening conditions at the target. For instance, the prospective acquirer may discover problems at the target during the due diligence review process and call the deal off. In this case, deal termination might seem to be unrelated to the acquirer's

¹⁰ Dong, Hirshleifer, Richardson, and Teoh (2006) find that the acquirer's valuation has no effect on the probability of deal success. This evidence may suggest that the deal termination decision would not be affected by the bidder's valuation. However, observing that a good portion of sample deals fail after a decrease in stock price, we decide to apply this screen to exclude deals that fail due to reasons related to the valuation of the acquirer.

valuation. However, worsening target performance during the merging process can negatively impact the potential synergy from combination and in turn reduce shareholder gains from the acquisition. To ensure the termination return proxies for the bidder's gains from the original merger deal, these failed acquisitions are excluded.

Another significant portion of deals fail because of either active rejection or lack of response from the target. There are two ways to view these deals. One perspective holds that in such cases the target is simply not satisfied with the merger offer or managers are worried about job loss following combination. Given this interpretation, failure of these bids is not related to the valuation of the acquirer or the deal and hence these failures should be considered in the analysis. However, the other argument cautions against inclusion. It is possible that the target refuses to accept the offer because it discovers or foresees problems at the acquirer during the due diligence process. In this case, the termination would correspond to negative information about the acquirer. The same arguments apply to the group of deals that fail due to the two merging companies' inability to reach agreement or conclude negotiation. To avoid potential bias, we eliminate all these deals from the final analysis.

Next, we exclude the failed bids that terminate due to changes in the form of agreement. This includes a revision in merger agreement terms, a switch to an alliance structure, a change of target, and an adjustment due to the resignation or death of key managers. Because these changes could be, if indirectly, related to the acquirer's valuation, we exclude these from the analysis.

Furthermore, because market conditions usually have a material impact on a firm's growth options, we exclude deals that fail because of a changing (usually more

unfavorable) industry environment. To minimize the possibility of market anticipation of deal failure, we also drop those deals that analysts might expect to fail right after the deal is announced publicly.

Finally, we exclude those deals for which the real causes of termination are not identified.

Table A.1 summarizes the sample selection process. After excluding any deal whose failure is potentially related to the acquirer's valuation or the synergy value of combination, the final failed sample contains 272 terminated deals, 81% of which are domestic mergers. As can be seen from the table, exclusion of failed deals based on reasons of deal termination dramatically reduces the size of the sample. The Exogenous Failed Sample includes only those bids that fail because of disapproval by regulatory agencies, occurrence of competing offers, or unexpected lawsuits or court rulings.

Regulatory objections can come from U.S. or foreign regulatory bodies and often take the form of immediate or pending antitrust charges. The rejections included in the sample come from the Federal Trade Commission, Department of Justice, Department of insurance, European Union Commission, Food and Drug Administration, Department of Transportation, British government, German regulatory authority, and state governors.¹¹ Most sample deals fail due to potential antitrust concerns, delays of regulatory approval, or threats from unnamed regulatory agencies, with 67% of the final deals categorized under "regulatory rejection."

Competing bids often emerge subsequent to the initial acquirer's first offer and may ultimately win the bidding war. Slightly less than 30% of the exogenous deals'

¹¹ One exception is the deal terminated by the Securities and Exchange Commission because of accounting issues.

failure is listed as due to “competing bids.” Note that the occurrence of competing offers sometimes may be predicted, especially when the target is actively seeking a “white knight.” The final sample therefore excludes deals associated with reports of active contact between the target and a white knight company, even if the deals did not close in the end due to competing offers. Some concern remains about the inclusion of deals that fail as an occurrence of competing bids. We discuss some treatments of this issue in the robustness checks included below.

Unexpected legal actions include actual or potential lawsuits posed by rival firms or local governments. Most of those threats contain possible antitrust charges claimed in federal or state court. The exceptions are eight deals that were stopped by bankruptcy court rulings, which stated concerns about an insufficient offer or about the market power of the combination.

The main analysis of this paper relies on the accuracy of the acquirer’s abnormal returns at termination announcement as a proxy for the bidder’s gain from the acquisition. There are two assumptions underpinning this approach. First, acquisition expenses, such as advisory or legal fees and the expense of information exchange, opportunity costs, and management effort, are not substantial enough to impact the acquirer’s valuation, that is, these expenses are assumed to be relatively small compared to the acquirer’s market value. In analyzing acquirer reports around acquisition termination, we note that very few companies record merger-related expenses as a loss in financial statements. This suggests that the first assumption is well founded. Second, the acquirer is not anticipated to participate in future mergers. Given that the sample requires no announcement about future mergers in a seven-day window around deal termination, this assumption seems

reasonable. For those deals that fail due to exogenous reasons, we also find that less than 7% of acquirers make acquisition offers to a different target within three years of the failed bid, which provides additional support for the second assumption.

1.2.2 Summary Statistics

Table A.2 provides summary statistics on deal and firm characteristics for the exogenous failed deals. Panel A shows that exclusion of failed deals based on reasons of deal termination sharply increases the mean and median deal value of the sample acquisitions: for the exogenous failed deals, the mean (median) deal value is 1.73 billion (190.28 million), while the average (median) for all failed deals is 1.53 billion (170.54 million).¹² Further, the deal value as a fraction of the acquirer's market value of equity (MVE) or market value of assets (MVA) at the end of the fiscal year of the acquisition announcement is larger for exogenous failed deals than for all failed deals. For example, the average ratio of deal value to MVE is 0.6645, much higher than the average ratio of 0.2181 for all failed deals. This indicates that the target firms are economically significant to sample acquirers. This conjecture finds further support when we examine the relative size of target to acquirer. The ratio of target to acquirer market value is much larger for the exogenous failed deals. Moreover, acquisitions in the exogenous failed sample are more likely to have multiple bidders than those in the failed sample (0.2935 vs. 0.1398). In sum, these results show that the sample of exogenous failed deals contains large targets and that the sample acquisitions are economically significant to the acquirers.

Panel A of Table A.2 also reports evidence on a deal's method of payment and

¹² Because the main analysis of this paper focuses on the exogenous failed sample, the summary statistics for all failed deals are not reported in the tables.

other deal characteristics. Following Martin (1996), we sort method of payment into three categories: 1) cash financing, which includes cash, debt, or the combination of cash, debt, and liabilities; 2) equity financing, which comprises payments with common stock, ordinary shares, or a combination of stock, options, or warrants; and 3) combination financing, which includes a combination of common stock, cash, debt, preferred stock, convertible security, and others forms of payment listed by SDC. We use “equity (cash) in payment,” defined as the percentage of equity (cash) in consideration, and “Pure equity (cash) deals,” defined as the percentage of pure equity (cash) financed deals, to measure how much and how often stock (cash) financing is employed by the acquirer. The panel shows that the exogenous failed deals are less likely to be financed with stock and more likely to be financed with cash. The exogenous failed deals are also more likely to be acquisitions of public firms than private firms.

Turning to acquiring firm characteristics, Panel B further shows that acquirers in the exogenous failed deals are large. Whether measured by book value of assets, market value of assets, or market value of equity, acquirers in the exogenous failed sample are much larger than those in the failed sample. Moreover, approximately 80% of the sample acquisitions are proposed by large firms, which we define as those with a market capitalization above the 25th percentile of NYSE firms (downloaded from Kenneth French’s data library) in the month prior to the acquisition announcement.¹³ Given that most deals in the exogenous sample fail due to regulatory concerns that the acquisition may decrease market competition, it is not surprising to find the existence of large targets and acquirers and highly valued acquisitions.

In addition, Panel B also shows that sample acquirers are high-growth firms, as

¹³ This evidence is not tabulated but available upon request.

can be seen from the high Tobin's q , which is proxied by the market-to-book ratio.¹⁴ There is also evidence that acquirers in the exogenous failed sample do not have very strong shareholder rights (as measured by the governance index), significant operating income, or higher leverage.¹⁵ These factors examined as standard may help explain much of the variation in bidder gains from acquisitions.

Panel C of Table A.2 presents, by industry, the number of the bidders and targets in the exogenous failed sample. Industry data are organized using the four-digit classification codes in Fama and French (1997). The last column reports data on the number of bids originating in the bidder's own industry. It is evident that the takeover activities cluster strongly by industry, and that the percent of own-industry bids is high for some industries such as telecommunications and transportation. This finding is in line with previous research on the distribution of mergers by industry and may further suggest that regulatory control on market competition in certain industries is active.¹⁶

Note that the distribution of the exogenous sample over calendar years is also

¹⁴ The market-to-book ratio is defined as the market value of equity plus the book value of debt and preferred stock divided by the sum of book value of equity, debt, and preferred stock one year prior to the bid. Book value of equity is computed as stated in Cohen, Polk, and Vuolteenaho (2003). Book equity is defined as stockholders' equity, plus balance sheet deferred taxes (data item 74) and investment tax credit (data item 208; if available), plus post-retirement benefit liabilities (data item 330; if available), minus the book value of preferred stock. Depending on availability, we use redemption (data item 56) for the book value of preferred stock. Stockholders' equity used in the above formula is calculated as follows. If available, we use the stockholders' equity number in COMPUSTAT (data item 216). If this figure is not available, we measure stockholders' equity as the book value of common equity (data item 60), plus the par value of preferred stock. If common equity is not available, we compute stockholders' equity as the book value of assets (data item 6) minus total liabilities (data item 181). All data items are available in COMPUSTAT.

¹⁵ The governance index data is from Gompers et al (2003). Operating cash flow is defined as sales minus the cost of goods sold, sales and general administrative costs, and the change in working capital, normalized by MVA. As suggested in Bhandari (1988), the debt-to-equity ratio is computed as the book value of assets minus the book value of equity divided by the market value of equity of the acquirer at the end of the fiscal year prior to the acquisition announcement.

¹⁶ Previous research shows that deregulation became a dominant factor in takeover activities after the late 1980s and accounts for nearly half of the mergers since then. Due to the significant regulatory changes for the Transportation and Telecommunications industry since the 1980s, the cluster of mergers in these industries in our sample is not surprising.

investigated but not reported.¹⁷ There is clear evidence that the acquisitions included in the exogenous failed deal sample fluctuate over time. The number of transactions peaks in the period between the late of 1990s and 2001. Approximately 68% of the exogenous failed transactions occur during 1995-2001, as compared with 32% distributed over the remaining years. This is consistent with the survey paper by Andrade, Mitchell, and Stafford (2001) that also records similar fluctuations in aggregate merger activities in the 1990s. This suggests that restricting the sample to only exogenous failed deals does not induce selection bias with respect to the distribution of deals, although acquirers/targets in the exogenous sample are, on average, large firms.

1.3 Gains to Acquiring-firm Shareholders

1.3.1 Cumulative Abnormal Returns upon Termination Announcements

We use standard event study methods to estimate the abnormal percentage returns of acquirers in the exogenous failed deal sample when deal termination is announced (e.g., Brown and Warner (1985)). Daily return data for the sample of acquirers and the data for market index returns are mainly collected from CRSP. We estimate acquirer abnormal returns over the three-day event window (-1, +1) surrounding deal termination announcements using market model benchmark returns with the CRSP value-weighted index returns.¹⁸ The parameters for the market model are estimated over a period from 250 to 50 days before the initial merger attempt announcement for the target. T-statistics

¹⁷ The part of result is available upon request.

¹⁸ We also calculate the abnormal returns of acquirers included in the sample using the equally-weighted CRSP market returns in estimation of the market model. The results are almost the same. Further, when we estimate the abnormal returns by subtracting the value-weighted market return from the acquiring firm's return in the three-day event window around termination announcement, the results become even more significant.

are based on tests that standardized prediction errors are equal to zero, as in Campbell, Lo, and MacKinlay (1997).

Table A.3 presents the three-day cumulative abnormal returns upon termination announcements of acquirers associated with exogenous deal failures.¹⁹ The value-weighted abnormal termination return for the sample of exogenous failed deals is 0.22% and insignificantly different from zero.²⁰ On average, therefore, shareholders of acquiring firms do not benefit from acquisitions. However, after differentiating returns on the basis of target status and payment type, we find that the termination returns are quite different across deals. The mean termination return of acquirers is significantly positive (2.19%) for public targets, but significantly negative (-4.16%) for private targets, and is significantly negative (-2.60%) for subsidiary targets. Moreover, the mean termination return of acquirers of public targets is roughly 500 basis points higher than the average termination return for private targets and the difference is statistically significant at the 1% level. However, there is no significant difference between the termination returns for acquirers of private targets and acquirers of subsidiaries.

Under the assumption that the exogenous failed sample effectively controls for information about the acquirer's valuation at deal termination, any fluctuation in the bidder's stock price should reflect the effect of the proposed merger for the acquirer shareholders. Since the termination returns above are measured upon recognition that the deal will not be consummated and the synergy value will be lost, the results above indicate that the acquirer shareholders gain on average 3.21% when purchasing private or

¹⁹ Hereafter, we abbreviate "cumulative abnormal returns upon termination announcements" to "termination returns."

²⁰ In previous literature, research investigating bidder announcement returns also finds similar results. For example, Andrade et al. (2001) report insignificant negative abnormal returns from 1973 through 1998.

subsidiary targets while lose -2.19% when purchasing a public firm.²¹ These results are consistent with prior theoretical and empirical research that implies bidder gains from acquisitions vary with the type of assets acquired.²² In particular, these results are in line with the literature on asset sales that suggests owners of private firms and subsidiaries may be more likely to accept a discounted deal for liquidity needs or restructuring reasons.²³

Next we analyze the relation between termination returns and method of payment.²⁴ Table A.3 also presents the termination returns of acquires by method of payment. Evidence shows that regardless of payment method, the mean termination returns of acquirers of private or subsidiary targets are always significantly negative while the termination returns of acquirers of public firms are all significantly positive. This result suggests that the observed positive wealth effect in takeovers of non-public targets cannot be fully explained by the payment effect. Moreover, it is evident that for all deals, cash offers generally do not correspond to higher returns than equity offers. One exception is that when the target is a subsidiary, the bidder's termination return is significantly higher when the bid is financed with cash versus stock. This suggests that

²¹ There is some concern about whether deal termination is anticipated before the public announcement. Specifically, since acquisitions of public targets usually receive more news coverage, termination announcements might be more anticipated for acquisitions of public targets than for those of private targets. As a result, the termination returns of acquirers of public targets would be pulled toward to zero compared to those of acquirers of private firms. If this were to be the case, the termination returns for acquirers of public targets would be even more negative.

²² Related papers include Grossman and Hart (1980), Zingales (1995), Hansen and Lott (1996), Chang (2004), Fuller, Netter, and Stegemoller (2002), Moeller, Schlingemann, and Stulz (2004). However, different from these prior papers, the methodology in this study addresses biases in conventional techniques and permits a cleaner measure of the market assessment of value improvements from acquisitions. Thus, our results are more statistically significant and economically important.

²³ See, e.g., Maksimovic and Phillips (2001), Poulsen and Stegemoller (2008), Warusawitharana (2008) and Yang (forthcoming).

²⁴ Earlier research suggests that the method of payment plays an important role in explaining the abnormal returns of acquirers. See, for example, Travlos (1987), Chang (1998), and Fuller, Netter, and Stegemoller (2002).

equity offers may yield higher gains to bidders when acquiring subsidiaries. Moreover, the difference in termination returns of acquirers of various types of targets becomes even larger when the deal is financed with equity. For example, termination returns for acquirers of public targets are roughly 400 basis points higher than those for acquirers of non-public targets in cash offers, but the difference rises to approximately 800 basis points when equity is used.

1.3.2 Concerns on Returns upon Merger Announcements

Table A.3 above shows how acquirer termination returns vary by the type of target acquired and the method of payment. There is some concern, however, about whether the same patterns would be obtained upon acquisition announcements for the exogenous failed deals. Examination of cumulative abnormal returns upon acquisition announcements for the sample acquisitions could offer additional insights on the effectiveness of the methodology employed in this paper.²⁵

Table A.4 shows the acquirer announcement returns by target type and form of payment. We find that the value-weighted abnormal announcement returns for the sample of exogenous failed deals is insignificantly negative. On average, therefore, shareholders of acquiring firms do not benefit from acquisitions. Consistent with previous studies, we find that acquirers of public targets generally do not gain, but lose significantly when using stock as payment. The mean announcement return for acquirers of private targets is generally positive and significant. However, for acquisitions of subsidiaries, no significant positive announcement return is found regardless of payment method. Also

²⁵ Hereafter, we abbreviate “cumulative abnormal returns upon acquisition announcements” to “announcement returns.”

consistent with prior literature, we find that acquirers in stock deals experience more negative returns than those in cash deals. Based on this table alone, one might conclude that stock deals are systematically poorer deals for bidders. However, combined with the evidence presented in Table A.3, these results actually show a different story, that is, the previously documented lower returns to equity offers merely reflect the negative revelation of the bidder's stand-alone value, not the gains from combination. Moreover, different from the evidence in Table A.4, there is no significant variation in acquirer announcement returns by different types of target. This shows the problems in conventional techniques that focus on examining announcement returns only.

As discussed above, acquisition announcements usually release more information about the stand-alone value of the acquiring firm than the synergy of combination. This may cause the unexplained variation in bidder announcement returns recorded in previous research. However, the methodology introduced in this paper to examining the termination returns for a specified failed sample permits a cleaner assessment of bidder gains from acquisitions. We attribute this improvement to the research design that controls for biases due to multiple information release.

1.3.3 Effect of Firm and Deal Characteristics on Bidder Gains

Univariate evidence on the effects of target type and payment form on bidder gains is presented above in Table A.3. However, as documented in prior research, various firm and deal characteristics help contribute to bidder gains. In order to further explore the relation between bidder gains in acquisitions and various firm and deal characteristics, we first examine how those characteristics vary across different types of targets and then

discuss possible impacts of various characteristics on acquirer termination returns in multivariate regressions.

Table A.5 reports firm and deal characteristics for sample acquirers sorted by target type. Panel A shows that the transaction value is much larger for acquisitions of public targets than acquisitions of private targets or subsidiaries. This is not surprising since private targets are, on average, much smaller than public targets. Moreover, relative to bidders' market value of assets (equity), public targets are much larger. The relative size of the target to the bidder is also significantly different between deals with public targets and those with non-public targets. The effect of relative size is documented by prior work, though there is tremendous variation in this effect. For example, Asquith, Bruner, and Mullins (1983) find that bidder returns increase with the relative size of target market capitalization to bidder market capitalization. However, using a different sample, Moeller, Schlingemann, and Stulz (2004) report that relative size is unrelated to the returns of bidders acquiring public firms. Thus, further investigation in the paper may help shed light on this debate.

Turning to additional results on deal characteristics, Panel A of Table A.5 also shows that deals with multiple bids are more frequent for acquisitions of public firms than for those of private firms.²⁶ Equity is used more frequently in the acquisitions of public firms, especially compared to takeovers of subsidiaries. Further, we find that offers for public targets are twice as likely to be hostile as those for non-public targets (though few offers are hostile in our sample), and acquirers are more likely to make

²⁶ However, this measure may suffer from the possibility that many potential bidders are not included, especially when private auctions take place (see, e.g., Boone and Mulherin (2007)). Thus, the number of actual bidders for the target may be understated.

tender offers when purchasing public targets.²⁷ Finally, we find that acquisitions of public or subsidiary targets, compared to offers for private targets, are half likely to be conglomerate deals.²⁸ Prior work has documented that the variation in deal characteristics may help explain the differences in bidder gains, therefore the further multivariate examination is necessary.²⁹

Panel B of Table A.5 indicates that, for the exogenous failed sample, acquirers of public targets are much larger than other bidders in terms of book value of assets or market value of equity. Even when compared to the lower 25th percentile of NYSE firms in the same year, acquirers of public firms are half as likely to be small. Moreover, the ratio of operating cash flow to market value of assets is higher for acquirers of public targets. Free cash flow theory predicts that firms with poor investment opportunities and excess cash are more likely to make poor acquisitions. For this reason, we also compare the acquirer's Tobin's q , defined as the market value of total assets divided by the book value of assets. Existing evidence argues that firms with higher q values make better acquisitions. The panel shows that acquirers of public targets have lower Tobin's q values. As mentioned above, the differences in these characteristics for acquirers of different targets may help explain the variation in abnormal returns of acquirers in our sample.

The comparisons in Table A.3 only consider how bidders' abnormal returns vary with method of payment and target status. To take into account other determinants of acquirers' abnormal returns, we estimate cross-sectional regressions on a set of control variables for firm and deal characteristics.

²⁷ Prior work suggests that acquirers achieve lower returns when financing acquisitions with stock and that the hostile offers have lower bidder's returns (e.g., Schwert (2000)).

²⁸ Conglomerate deals are defined as acquisitions involving a target with a different two-digit SIC code from that of the bidder.

²⁹ Other related papers include Morck, Shleifer and Vishny (1990), Maquieria, Magginson, and Nail (1998).

Table A.6 presents the results of multivariate regressions. The dependent variable in all regressions is negative one times the acquirer's 3-day percentage abnormal returns upon termination announcement. Since the termination return measures the bidder's value change around the deal cancellation, the positive (negative) abnormal return to the termination announcement implies that acquiring-firm shareholders actually lose (gain) from the proposed merger if the deal goes through. Thus, using the negative of the termination return as the dependent variable, we can examine the relation between gains to acquiring firms and various firm and deal characteristics that are known to affect the bidder returns from acquisitions. All regressions also use year and industry fixed effects at the two-digit SIC code level.

Regressions (1)-(3) use all the acquisitions in the exogenous failed sample, regardless of the status of target acquired, and control for both acquiring-firm and deal characteristics. To capture the size effect, we use a dummy variable that equals one when the acquirer is smaller than the 25th percentile of NYSE firms in same year, the natural logarithm of the acquiring firm's market value of equity, and the natural logarithm of the acquirer's book value of assets. All else equal, acquirers of private firms and subsidiaries have significantly larger gains than acquirers of public targets. Controlling for firm and deal characteristics, we find that bidder returns in acquisitions increase by roughly 6% when firms choose to buy private firms or subsidiaries as opposed to public firms. This finding is consistent with results in previous studies that also show significant differences in gains to acquirers when purchasing public targets versus private targets or subsidiaries. Whether an acquisition is paid for with equity or how much equity financing is used in consideration is not correlated with the bidder's gains from acquisitions when the entire

exogenous sample is examined.

To adjust for the impact of an acquisition on the market capitalization of the acquirer, regressions of bidder returns generally control for the relative size of the target to the acquirer. In existing literature the relative size is often significant, but the sign of the coefficient varies across studies. Asquith et al. (1983), for example, show that the bidder's gains increase with the relative size of the target to the bidder, while Travlos (1987) finds the opposite. Here we define the relative size as the transaction value of the target divided by the market capitalization of the acquirer as of one month prior to the acquisition announcement. The coefficient on this variable is significantly negative (-0.58) and is not sensitive to the alternative specifications of the acquirer's size. This result suggests that acquisitions of small targets by large bidders will tend to generate greater gains per dollar spent on acquisitions than combinations of similar-sized firms. One plausible explanation for this is that so-called "mergers of equals" are hard to implement successfully.³⁰

Though the signs of the coefficients on the other control variables are similar to those of earlier studies, with some exceptions, none of these coefficients turns out to be significant. Evidence from conventional studies that are centered on acquisition announcement returns generally shows that equity offers, hostile offers, or diversifying offers are associated with lower bidder returns. However, our results indicate that these effects merely reflect differences in signals about the bidder's stand-alone value, not differences in the gains from acquisitions. For example, cash offers on average are associated with higher bidder returns than equity offers or mixed-payment offers. In

³⁰ On January 9, 1999, *The Economist* mentions that ".....mergers of equals seem to be especially tricky, perhaps because they disrupt two strong corporate cultures, and they often throw up intractable problems of leadership."

contrast, based on the new methodology used in this paper, which effectively controls for the biases caused by the release of information on the acquirer's valuation, equity offers do not lead to lower gains to bidders than cash or mixed offers. This finding suggests that the apparent superiority of cash offers in creating shareholder value is an illusory consequence of a more negative revelation effect for equity or mixed offers.

The proxy for Tobin's q has a negative and insignificant coefficient, which is a little surprising since earlier studies (e.g., Lang et al. (1989)) show higher returns to bidders with higher q values. However, the effect as shown is economically trivial. The coefficient on leverage, defined as the firm's total debt over the firm's market value of equity at the end of the fiscal year prior to the acquisition announcement, is insignificant for all deals in the exogenous sample, although the coefficient becomes significantly positive when only acquisitions of public firms are examined. The governance index has a negative coefficient, which suggests that strong shareholder rights (lower governance index) are linked with higher bidder gains from acquisitions, but the effect is insignificant.

We further estimate the regression for samples sorted by the organizational form of the target acquired. The relative size effect still prevails in acquisitions of public or private firms but is very weak in acquisitions of subsidiaries. The coefficients on the other variables remain the same as in the regressions for all deals in the sample. However, the coefficient on equity in consideration, defined as the percentage of equity in consideration, becomes significantly positive for acquisitions of subsidiaries only. This is consistent with Hansen (1987), who shows that the bidder should use stock financing for better returns when there is greater uncertainty about the target's valuation.

1.3.4 Robustness

Using a methodology that effectively controls for the biases caused by multiple information release, we find that the gain to acquiring firms is related to the organizational form of targets. The main finding is that acquirers gain significantly when purchasing private firms or subsidiaries and lose significantly when acquiring public firms, after controlling for variables that are known to predict bidder returns.

In this subsection we consider a few tests designed to verify the robustness of this finding. To conserve space, the robustness test results are not tabulated but are available from the author upon request.

The exogenous failed sample contains all the deals that fail because of disapproval by regulatory agencies, occurrences of competing offers, or unexpected lawsuits or court rulings. There is some concern about including deals that fail because of competing bids in the analysis. One may argue that the occurrence of a competing bid reveals negative information about the initial bidder. If the market is efficient, information about the initial acquirer should be fully incorporated by the market at the time of the release of the originally proposed merger, in which case the exit of the initial bidder following a higher bid from a rival firm may merely reflect the acquirer's unwillingness to overpay for the target. Under this interpretation, such deals should be considered in the analysis.³¹ However, if market is not fully efficient and there is a slight chance that an emerging competing bid causes the termination of the initially proposed merger, revealing negative information about the first acquirer, our results may understate the shareholder's returns from acquisition. To check for this, we estimate all

³¹ By searching the statements made by acquirers at the time of deal termination, most firms explicitly express that their unwillingness to overpay is the main reason for calling off the deal.

the regressions after excluding those deals that fail due to competing bids. We find that the results are not sensitive to the inclusion of such deals, although the statistical significance drops somewhat due to decreased sample size.

Another potential concern with respect to sample selection bias is that a deal failure might signal an adverse industry shock, which in turn could negatively affect the abnormal return of the acquirer. We attempt to investigate the merger and acquisition activities in the acquirer's industry after the failure of the sample deals. The evidence shows that there is no significant drop in the number of announced merger offers in the same industry two years following the deal failure.

As shown above, the coefficient on relative size is significantly negative, which implies that the greater the target's market capitalization is relative to the acquirer's market size, the less the gain to bidders from acquisitions. There is also a possibility that the relation between bidder gains and relative size of targets to acquirers may not be linear.

In order to better capture the relative size effect, we first add to the regressions a variable measuring the square of relative target size and find that the coefficient on the variable is significantly negative while the coefficient on the relative size variable continues to remain negative. This result suggests that the relation between bidder returns from acquisitions and the relative size of the target probably follows an inverse U-shape.

Next, we estimate the regressions including a dummy variable that equals one if the relative size of the target is above the sample median. We find that the coefficient on this relative size dummy is statistically negative and the coefficients on the other variables are similar to those above. This result is consistent with the previous finding

that combinations of similarly sized firms generate less gain to acquiring-firm shareholders.

1.4 Discussions on Gains to Acquirers of Non-public Targets

1.4.1 Existing Alternative Explanations

The results above show that the bidders gain significantly in takeovers of private targets or subsidiaries, which echo previous findings.³² However, we still know little about why there are fundamental differences in bidder gains between acquisitions involving public and private targets. The two main possible explanations for the significant gains to bidders when acquiring non-public firms are as follows.

The first plausible explanation is that managers of private firms or subsidiaries are willing to trade at a discounted price for access to liquidity. Private firms and subsidiaries are not as easily bought or sold as are publicly traded firms. The lack of liquidity makes investments in those non-public assets less attractive and thus less valuable than similar, more liquid investments. According to this argument, private target managers might want to sell at a discounted price due to a desire to cash out quickly or a desire to facilitate the firm's transition from private to public. Officer (2007) shows that non-public targets are acquired at a 15% to 30% discount relative to the average acquisition multiple paid for comparable publicly held targets. The liquidity discount is caused by the need for, and the availability of, the liquidity provided by the acquirer. The bidder's significant gain from acquisitions of non-public firms, therefore, is the return on offering liquidity service.

Related to this argument, while sales of public targets are typically auction-like in

³² See, e.g., Chang (1998), Fuller, Netter, and Stegemoller (2002), and Faccio, McConnell, and Stolin (2006).

nature, with full disclosure required by the SEC, the sales process can vary substantially for private targets or subsidiaries. Most likely, the sales of private targets or subsidiaries often go through limited auctions or with few interested bidders. In this case bidders are likely to have a bargaining advantage in the acquisitions of non-public targets, which enable them to gain more from the transactions.

The other explanation comes from the literature on assets sales. One reason suggested for why a firm sells a subsidiary is the gain from increased focus. This implies that diversified firms might accept a relatively lower price for an asset sale than a non-diversified firm. The diversification discount, therefore, can help explain the bidder's gains from acquisitions of subsidiaries.

1.4.2 Gains to Acquirers and Characteristics of Target Parents

As discussed above, liquidity needs or the bargaining power of targets may have a significant impact on the gains to acquirers of non-public targets. To investigate the effect of liquidity on the gains to acquirers of non-public targets, while we note that it is hard to find an accurate quantitative measure of liquidity needs or the bargaining power of targets, in this paper we use the public status of selling parent firms as a proxy for their needs for liquidity. This analysis requires information on parents of non-public acquisition targets.

We first use a dummy variable that equals one if the parent of the target is private. The liquidity discount is caused by the need for, and the availability of, the liquidity provided by the acquirer. Private parents are less liquid compared to public parents, so that in sales of targets, keeping everything else the same, private parents are likely to

accept a greater discount for access to liquidity offered by acquirers. Thus, the private parent dummy can help explain the effect of the liquidity discount on bidder gains. Since parents of private firms are always private, the deals studied here include only those offers for subsidiaries. The public status of parents of subsidiaries comes from SDC. To avoid possible data error in SDC reports, we also manually check the organizational forms of parents of subsidiaries.

Next, we construct a dummy variable that equals one if the parent of the target subsidiary hires financial advisors in the process of the merger deal. If the subsidiaries hire financial advisors, they may be able to more readily promote an auction-like transaction, with participation by a large number of qualified bidders. The bargaining power of subsidiaries increases with the participation of more acquirers and therefore decreases bidder gains from acquisitions of subsidiaries.

Finally, we use a third dummy that indicates whether the parent of the target subsidiary is diversified or not. A diversified parent is defined as a parent whose two-digit SIC code is different from that of the subsidiary. As mentioned above, diversified firms might accept a relatively lower price for an asset sale than a non-diversified firm. If this is the case, the bidder's gain should be higher when buying a subsidiary from a diversified firm than when buying a subsidiary from a non-diversified firm.

Table A.7 shows the acquirer's abnormal returns at termination announcements for acquisitions of subsidiaries, sorted by the target-parent characteristics above and the method of payment. The results show that the bidder's abnormal return upon termination announcement is more negative and significant when the subsidiary target has a private parent. When parents of subsidiaries hire no financial advisors to promote the deal, the

acquirer's termination return is more negative and significant. However, there is no significant difference in acquirer termination returns based upon whether parents of targets are diversified or not.

Table A.8 presents the cross-sectional regression results. The dependent variable is negative one times the acquirer's 3-day percentage abnormal return upon termination announcement, which is a proxy for acquiring-firm gains from takeovers. The results show that after controlling for firm and deal characteristics, the bidder's gain from acquisitions of subsidiaries is higher when the assets acquired are owned by a private firm. This suggests that private parents might tend to sell at a more discounted price so that the bidders benefit more from takeovers of those discounted assets. Under the assumption that private parents are generally less liquid compared to public parents, this finding supports the hypothesis that the liquidity need of non-public targets could be the reason underlying higher bidder gains from acquisitions of non-public firms.

1.5 Conclusion

Over the past three decades, takeover activity has attracted a great deal of academic attention. A fundamental debate among researchers and practitioners concerns the impact of takeovers on the wealth of acquiring-firm shareholders. To date the literature has offered inconclusive results about bidders' value improvement from takeovers and researchers have been unable to successfully explain the tremendous variation observed in bidder returns around takeover announcements. The main goal of this paper is to re-examine whether acquisitions create value for acquiring-firm shareholders.

The conventional approach, which is centered on the abnormal acquisition announcement returns in mergers, is complicated by the fact that the announcement of a takeover reveals more information than the potential synergy from the transaction. It is therefore difficult to interpret the announcement return for acquiring firms and to achieve unbiased estimates of the value gains of bidders from takeover activities. To avoid the problem of multiple information release at the time of announcement, we introduce a methodology that employs a sample of takeovers that fail due to exogenous reasons and uses termination returns as a proxy for bidder gains. Since the sample construction excludes deals whose termination is related to the valuation of the acquirer, the abnormal return of an acquiring firm at the time of deal termination reflects the bidder's potential gain from the acquisition if it goes through. Using the termination return as a proxy for bidder gains from acquisitions, we can also examine the relation between acquiring-firm gains and various firm and deal characteristics.

Specifically, we use a hand-collected sample of 272 takeovers that failed due to exogenous reasons, and find that the bidder's shareholders gain from acquisitions when purchasing a private firm or a subsidiary, while they lose when the acquisition involves a public target, even after controlling for firm and deal characteristics. Bidders acquiring private or subsidiary targets perform significantly better than those acquiring public targets. This result is robust to a variety of specification choices and sample selection criteria. In addition, bidder gains are not significantly lower when stock is offered. This evidence suggests that the previously recorded lower announcement returns in stock offers are merely a reflection of market adjustment to bidders' over-valued stock. We also find that the relative size of the target to the bidder is a significant determinant of

bidder gains: the greater is the relative size of the target, the less gain to bidders from acquisition activity. This finding offers support to recent concerns about so-called “mergers of equals.”

This paper also addresses possible explanations for the considerably positive gain of bidders when buying non-public targets and analyzes bidder gains in several cases in which the characteristics of the targets’ owners are different. The evidence shows that bidder gains are significantly higher when bidders acquire assets from private owners than when they acquire assets from public owners. This supports the idea that the liquidity discounts are the price paid by private owners or corporations for the liquidity provided by acquirers. The acquirers, therefore, benefit from providing this liquidity service to the owners of non-public targets.

In summary, the current paper adds to the existing literature on bidder returns from acquisitions by providing a new methodology to control for the problem of multiple information release at the time of announcement. The evidence we present extends the important findings of Fuller, Netter, and Stegemoller (2002) and Faccio, McConnell, and Stolin (2006) by showing that bidder gains vary with the status of targets acquired in takeovers. This paper also offers some evidence that bidder gains are greater when the relative size of the target to the bidder is smaller. In addition, the findings add to the body of evidence indicating that the price paid to access liquidity by selling a part, or the whole, of a firm is reflected in the discounted sale price, and potentially in the higher gains accruing to the acquirer.

CHAPTER 2

Cash Flow and Product Market Competition: An Empirical Analysis

2.1 Introduction

The nature and extent of the interaction between financial markets and product markets is of great importance to corporate finance research. Numerous theoretical works, starting with Titman (1984) and Brander and Lewis (1986), have been devoted to analyzing how financial choices affect output market behavior. While a large part of finance research has considerably enriched our understanding of the link between debt financing and firms' competitive strategies, existing empirical research offers little evidence on the potential effect of firms' cash on product market competition. This paper attempts to bridge part of that gap.

From an intuitive as well as a theoretical viewpoint, cash may influence a firm's product market choices and that of its competition. Several studies, starting from Bolton and Scharfstein (1990), have argued that cash-rich firms may take actions to decrease the output price and drive their financially constrained competitors out of business. More generally, rich cash enables a firm to employ a number of alternative competitive policies other than pricing against rivals such as active advertising, commercial promotions, large distribution networks, or productive staffs. Accordingly, cash is important for product market competition. In addition, recent evidence shows that cash and debt are not equivalent with existing financial frictions. The imperfect substitutability implies that

cash may play a distinct role in influencing a firm's competitive outcomes.¹

Previous empirical assessments on cash flows are often trapped by the fact that a firm's cash flow is correlated with profitability. A common approach to addressing this methodological problem is to identify variations in cash flow that are independent of investment opportunities. For example, Blanchard, Lopez-de-Silanes, and Shleifer (1994) and Rauh (2006) take advantage of exogenous shocks from unique events or institutional features that change the cash position of firms. Alternatively, Lamont (1997) exploits the presence of the internal capital market and assumes that a cash flow shock to one division of a firm may be exogenous to the investment opportunities in other divisions.

Inspired by the latter approach, we start the investigation on the effect of cash on competition by identifying a unique negative shock to cash flows in the tobacco industry due to the potentially higher federal excise tax. This event can be used as an ideal natural experiment for three reasons. First, tax changes are generally regulated and released by federal or state authorities and hence are unambiguously exogenous to any individual firm's actions. Second, excise tax on tobacco products should have no effect on the profitability of investments in other industries, while expected cash flows in tobacco firms would be decreased. This promises that the cash flow shock is exogenous to firms' non-tobacco segments. Last, tax events usually have a significant impact on the firms' performance, which allows for a powerful test.

To examine the connection between cash and product market competition, we first examine the share price response of industry rivals that compete with non-tobacco divisions of tobacco firms that experience a negative cash shock. After properly controlling for investment opportunities in non-tobacco industries, if a decrease in cash

¹ See, for example, Stein (2003).

has no causal effect on product market competition, we would expect to observe no abnormal returns to the industry rivals. In a sample of 436 industry rivals that compete in non-tobacco industries with tobacco firms, we find that on average those rivals experience positive and significant abnormal returns. This indicates that the market believes a negative cash shock to one firm is good news for its rivals. The result suggests that internal funds may affect a firm's product market behavior significantly and that a decrease in cash may "soften" the product market competition. Since the cash shock is exogenous to the investment opportunities of non-tobacco industries, our evidence supports the hypothesis that there is a causal relation between a firm's cash flow and its product market competition.

To reinforce the strength of our results, we then proceed to employ a number of robustness checks and explain the abnormal returns of rivals as a function of firm and industry characteristics. The results are robust to a variety of estimation issues and identification concerns. In addition, we find that the competitive effect of cash is magnified in competitive industries and when cash-constrained firms only take a small market share. These findings provide evidence on whether and how industry competition characteristics affect cash-competition sensitivity.

Next, we study how output behavior varies with the exogenous shock to cash that can be contributed to finance its production. In particular, we examine the raw and industry-adjusted variations in the output level of the non-tobacco segments in tobacco firms that were affected by the negative cash shock between the year prior to the shock and each of the five years following the shock. we observe that the industry-adjusted sales and cash flows of the non-tobacco segments in tobacco firms drop significantly over

the five years after the shock. This is consistent with the idea that a decrease in internal funds may increase the probability of liquidation for any given level of production and hence causes the firm to produce less. Moreover, it is evident that the number of non-tobacco segments that tobacco firms operate decreases following the cash flow shock. This suggests that when facing tightening financial constraints, firms may produce less and even exit certain business markets.

Lastly, we examine the abnormal customer returns to those industry rivals that compete with non-tobacco divisions of tobacco firms. This step may help to better understand how firms change their competitive strategies after a negative shock to cash. On average, customers of rival firms experience positive average returns at the announcement of cash shock to the tobacco industry. This is inconsistent with the idea that overall product price increases after the cash shock affects the competition. Actually, it suggests the possibility that some customers may benefit from the new market equilibrium.

Overall, this paper contributes in two dimensions. First, this study complements the existing evidence relating financial decisions and corporate strategy. A group of theoretical literature, notably Titman (1984) and Brander and Lewis (1986), examines the interactions among firms in output markets and their finance choices. However, a large portion of empirical research in this area focuses on the association between debt and product market strategy (e.g., Chevalier (1995a, 1995b), Phillips (1995), Zingales (1998), etc). Certainly, by demonstrating that cash flow of firms affects product market actions, the present work points out a more complex relation between firms' financial and operating decisions.

Second, this paper extends our understanding of the implications of corporate cash. The observed stockpiles of cash in U.S. firms draw academic attentions to rationales for such cash-rich status. The earliest explanations offered by academic research were based on trade-offs motivated by transaction costs. In particular, Baumol (1952) and Meltzer (1963) suggest that firms hold cash to avoid the cost of a potential short in liquid assets. Furthermore, Opler, Pinkowitz, Stulz, and Williamson (1999) and Almeida, Campello, and Weisbach (2004) argue that the recent stockpiles of cash are results of increases in precautionary motives to hold cash. Different from these previous studies, our findings highlight the substantial impact of corporate cash on competitive outcomes, and suggest that firms can hold cash for the incentives created by their needs in product market competition. Thus, the strategic effect of cash can also be a determining factor for managers in assessing the optimal level of cash holdings for firms.

The remainder of this paper is organized as follows. Section 2 reviews the related literature and develops the main hypothesis. Section 3 describes empirical testing methods, data, and sample selection. The main analysis results are presented in Section 4. Finally, conclusions and possible extensions are discussed in Section 5.

2.2 Related Literature and Hypotheses Development

2.2.1 Financial Constraints, Internal Funds and Product Market Competition

A large portion of the literature in corporate finance and economics is devoted to understanding how financial constraints affect a firm's output market behavior and that of its competitors (see Maksimovic (1995); Parson and Titman (2007)). Two ideas play a

central role. First, financial constraints alter a firm's incentive to compete in the product market. As discussed in Gale and Hellwig (1985) and Bolton and Scharfstein (1990), a financially constrained firm has a limited access to funds, and hence may have an incentive to behave more cautiously in its output market. In contrast, Brander and Lewis (1986) and Hendel (1996) suggest that a firm incurring debt has an incentive to mitigate the risk of bankruptcy and thus may adopt, *ex post*, more aggressive output market behavior in the form of high output or low prices.

Second, financial constraints affect a firm's interaction with its competitors. Tesler (1966) and later Bolton and Scharfstein (1990) argue that cash-rich firms may take actions to decrease the output price, and drive their financially constrained competitors out of business by reducing their rivals' cash flow. Consequently, liquidity constraints of a cash-poor firm may prompt cash-rich rivals to adopt "predation" behavior and compete more aggressively in the product market. Moreover, in a similar vein, a firm's liquidity situation may signal the possibility of future competitive behavior, and thus has an indirect influence on competitors' strategy. For example, consistent with the predation theory, Benoit (1984) argues that cash-rich incumbents may be capable of deterring entry if potential entrants face financial constraints. Contrary to the traditional view, in a recent paper, Hege and Henessy (2007) suggest that unleveled incumbents may actually prompt entry since they prefer to acquire entrant assets instead of practicing predation. Regardless of the different arguments, these papers imply that a firm's financial constraints may have a causal impact on the competition behavior of its own and of its industry rivals.

Surprisingly, given the broad theoretical interest in the relationship between firm

liquidity and product market competition, most prior empirical work solely concentrates on linking a firm's output and pricing behavior to its debt financing. Highly indebted firms are assumed to have a constrained capacity of raising additional funds, which in turn distorts their competitive strategy, especially against unlevered rivals. In such a context, some research documents that high leverage leads to poor performance in the product market, such as sales and market share decline, lower product price, or exit from a previous market (see Chevalier (1995a, 1995b), Zingales (1998), Khanna and Tice (2000) and Campello (2003)), while other studies find that indebtedness increases firms' aggressiveness in the output market competition (see Lyandres (2006) and Campello (2006)).

In these studies, most rely on natural experiments involving shocks to either a firm's leverage ratio or its product market environment. For instance, Phillips (1995) and Chevalier (1995a, 1995b) empirically investigate firms' competitive responses to sharp increases in leverage. Subsequently, Chevalier and Scharfstein (1996), Zingales (1998), Kanna and Tice (2000), and Campello (2003) analyze shocks to competitive environments, examining how differences in *ex ante* capital structure are associated with differential responses and competitive outcomes. Unfortunately, while those papers document the interaction between a firm's debt and its competitive outcomes, the causal connection between the two is hard to establish, since leverage is usually chosen in advance and the shocks examined just ameliorate to some extent the endogeneity problem.

Given the existing empirical evidence, our understanding of the relationship between financial constraints and product market competition is far from complete. There is very little work that examines whether or how cash (whether measured as a flow or a

stock) affects firms' output behavior. It is surprising given the surging interest in the role of firms' cash. In particular, recent evidence from several perspectives calls for indispensable attention on the role of cash in explaining product market performance and actions. This observation motivates the empirical tests in this paper.

First and most importantly, internal and external funds are different. If there are no various agency and information problems, Modigliani and Miller (1958) predict no differential costs of internal and external finance. Nonetheless, as Stein (2003) discusses, a cost wedge between internal and external funds may often come from information asymmetry as discussed in Myers and Majluf (1984) and Greenwald, Stiglitz, and Weiss (1984), or incentive and agency problems as in Jensen and Meckling (1976), Stulz (1990), and Hart and Moore (1995). Those frictions can result in an outcome that internal and external funds are not perfect substitutes.² Furthermore, Acharya, Almeida, and Campello (2007) show evidence from a hedging perspective that cash is not equivalent to debt in presence of financing frictions. Consequently, it is likely that cash and debt may play distinct roles in influencing a firm's output behavior, and hence the supply of internal funds may have a significant impact on firms' competitive outcomes. However, if one believes on a priori ground that cash and debt are valid substitutes (at least to some extent), research on the effect of cash on output behavior can also add our understanding of the literature on the relationship between debt and product market competition.

Second, it is recorded that U.S. corporations hold significant amounts of cash on their balance sheets and the holdings have been recently increasing. Despite a growing literature focusing on corporate liquidity, our understanding of the causes and

² Other related papers include Grossman and Hart (1986), Gertner, Scharfstein, and Stein (1994), and Stein (1997).

consequences of corporate cash holdings is still far from complete. The existing empirical investigation has attempted to explain cash by agency considerations (Jensen (1986) and Blanchard, Lopez-de-Silanes, and Shleifer (1994)), transaction costs (Mulligan (1997)), precautionary motives (Opler, Pinkowitz, Stulz, and Williamson (1999) and Bates, Kahle, and Stulz (2008)), or tax costs (Foley, Hartzell, Titman, and Twite (2007)). However, little attention has been paid to the incentive created by the potential impact of a firm's cash on product market competition.³ As suggested by Campello (2006), firms can implement a number of competitive strategies besides pricing to improve their market performance, such as research and development spending, plant or store location, distribution network, advertisement, or mergers of business competitors. Firms' cash, other than debt, is a great source for funding these strategic policies. Thus, a better understanding on the relation between cash and product market competition would help us explain the recent increase in firms' cash from a whole new perspective.

Moreover, from an intuitive viewpoint, the linkage between cash and output market outcomes is possible. Recent studies show that business risk is empirically correlated with corporate cash level (Bates, Kahle, and Stulz (2008)). Generally, as competitive interaction in the product market is a key determinant for industry risk, the recent evidence suggests a plausible connection between cash and product market competition.⁴ More directly, Chevalier and Scharfstein (1996) argue in their model that "deep-pocketed" firms may decrease products' prices to secure long-term market share at

³ A few papers present evidence on the implication of firms' cash in other areas. For instance, Harford (1999) studies acquisitions by firms with unusual cash holdings and documents that managers with weaker incentives tend to spend cash inefficiently. In a similar spirit, Dittmar and Mahrt-Smith (2006) and Harford, Mansi, and Maxwell (2006) find that poorly-governed firms tend to dissipate their cash in ways that destroy firm value. In contrast, Kim, Mauer, and Sherman (1998) and Opler, Pinkowitz, Stulz, and Williamson (1999) document that persistent cash holdings do not hinder profitability.

⁴ Other related papers include Kim, Mauer, and Sherman (1998), Mikkelson and Partch (2003), and Faulkender and Wang (2006).

the expense of short-term profits. By and large, such investment in market share building would affect cash-poor rivals' decisions to stay and compete and hence alter market outcomes. Recently, Schroth and Szalay (2007) and Fresard (2008) show empirical evidence that confirms to a certain extent a strong connection between cash and product market success, while the nature of the linkage remains unclear. Further investigation may help unveil the causal relation between the two.

Like most research that attempts to shed light on the influence of debt on product market competition, the existing studies on cash effects are directly or indirectly trapped by the fact that both cash flow and market performance are endogenously driven by underlying shocks to profitability.⁵ One can never be certain that it is a firm's cash that causes the change in the firm's output strategy or promises the firm's success in product market competition. It may be that a common factor, such as a change of investment opportunities, leads the firm to both alter its cash holdings and change its competitive behavior. Financial economists have explored various solutions to mitigate the potential endogeneity problem. In most cases, researchers take advantage of a plausibly exogenous shock that is unlikely to correlate with investment opportunities, although the identification of the exogenous variation in cash flow is not easy. Blanchard, Lopez-de-Silanes, and Shleifer (1994) focus their study on a small sample of firms that receive cash windfalls from lawsuits that do not change the investment opportunity sets. More recently, Rauh (2006) identifies, in a large sample, the exogenous variation in internal financial resources arising from mandatory contributions to pension plans. Alternatively, Lamont (1997) exploits the presence of internal capital market in industrially diversified firms

⁵ The survey paper by Parsons and Titman (2007) highlights the endogeneity problems encountered in corporate finance study and discusses approaches researchers have taken to address those particular problems.

and identifies a cash flow shock that affects one sector of a firm and is exogenous to the performance of other sectors of the firm.⁶ The latter study suggests a good approach to finding an exogenous instrument for cash. we adopt this approach here to identify variations in cash flows of firms that are not correlated with their investment opportunities.

2.2.2 Internal Capital Market in Diversified Firms

An important part of the capital allocation process takes place in internal capital markets in which corporate headquarters allocate capital to their diversified business segments. Different from external finance, internal funds are self-provided and do not need to be secured by specific assets as collateral. Without many of the frictions arising in the governance of firms financed with external capital, internal funds are less costly and hence are largely used by corporations to finance most of their capital outlays.

Under the hypothesis that the internal market plays a non-trivial role in allocating capital among various business segments within one firm, all segments of the firm are financially interdependent. In such a context, a financial shock to one segment can tighten financial constraints in another segment.⁷ Thus, like the role of banks or other external capital markets in transmission of business cycles, internal capital markets in diversified firms can work as another channel to transmit a financial shock from one sector of a firm to others, even if the investment opportunities of other sectors of the firm

⁶ To define exogenous cash flow shocks to some parts of a firm, Lamont (1997) requires that shocks to cash are not correlated (at least not positively correlated) with the profitability of investments in those parts of the firm.

⁷ The financial constraints can be tightened for two reasons. First, the available cash flow may be decreased due to the financial shock. Second, the value of assets used as collaterals may decrease after the shock that may increase the cost of finance.

are not affected by the shock.

As suggested by Lamont (1997), the presence of internal capital markets offers a reliable way to find an exogenous instrument for cash. By focusing on a group of diversified firms, one needs to unambiguously identify a certain cash shock that affects one part of the firm. Through the internal capital market, such a cash flow shock may be transmitted to other parts of the firm, even if the investment opportunity sets of other parts of the firm are not affected by the shock at all. If the market performance or competitive behavior of the other parts of the firm changes in response to the shock, then a causal connection between cash and product market competition can be established with certain confidence, since the cash shock is exogenous to the profitability of investment in the other parts of the firm.

Correspondingly, the alternative hypothesis assumes that there is no internal capital market and all corporate segments function as stand-alone units. On such a ground, a shock to the cash in one sector of a firm would not affect cash in other sectors of the firm if the investment opportunities in the other sectors are not changed by the cash shock. Hence, if no responses are observed in product market behavior of the other sectors following the cash shock, one can conclude that either the internal capital market does not exist or there is no relation between cash and product market competition.

In order to exploit the presence of internal capital markets to identify exogenous cash shocks, this paper relies on the corporate segment-level data. In the U.S., public firms are required, pursuant to the various accounting standards, to disclose certain financial information for any industry segment that comprised more than 10% of its

consolidated yearly sales, assets, or profits.⁸ Although the segment-level data has its own econometric and conceptual weakness, it offers a valid way to systematically detect the various business segments of a firm and trace their performance, and hence is used by a growing number of academic papers.

2.2.3 Hypotheses Development and Empirical Design

The central empirical strategy in this paper is to examine the product market responses of firms to exogenous shocks in cash. The success of the strategy relies on the identification of a type of cash shock for which the investment opportunities of a firm should be exogenous. Cash shocks due to certain industry-specific tax increase seem to fit this description well. The industry-specific tax event can be used as a natural experiment for identifying an exogenous cash shock for three reasons. First, tax rate changes are generally regulated and released by federal or state authorities and hence are unambiguously exogenous to any individual firm's actions.⁹ Second, a specific industry tax event should affect expected cash flows to all the firms that operate business segments in that industry. A shock like that would promise a decent number of firms for study. Moreover, an industry-specific tax change should not affect the profitability of investment in other industries, which promises that the cash flow shock is exogenous to firms' segments operating in those unaffected industries. Third, tax events usually have a significant impact on firms' performance and expected cash flows, which allows a powerful test for the effect of cash on competition.

⁸ Segment report requirement was initially established by Statement of Financial Accounting Standards No.14 (FAS 14) issued by the Financial Accounting Standards Board in 1976. The requirement was amended in 1979 by FAS 30 and both FAS 14 and FAS 30 were superseded by FAS 131 in 1997.

⁹ Large corporations may hire lobbyists to influence the congress in making policies for their own sake. However, it is difficult to imagine that any certain tax policy is passed for a single firm's benefit.

To examine the connection between cash and product market competition, this paper first examines the market response of industry rivals to the business segments that experience an exogenous cash shock. Absent changes in the investment opportunities of the industries in which business segments operate, there is no reason to believe that the market performance of industry rivals would change if the cash shock has no effect on competition behavior of the segments. However, if the exogenous cash shortfall severs financial constraints of the business segments and hence in turn changes their competitive behavior in the product market, then the performance of industry rivals may be affected, which will be reflected in the change of their stock prices. Thus, under the assumption of an efficient market, abnormal returns to industry rivals can be used as meaningful indicator of the effect of cash on product market competition.

Two strands of models suggest how the industry rivals may be affected by the change in product market competition. One class of models, notably Chevalier and Scharfstein (1996), predicts that a tightening financial constraint may induce business units to “soften” the competition by decreasing output.¹⁰ This may in turn benefit the industry rivals of those units. Moreover, Chevalier (1995b) suggests the incentive for industry rivals to actively prey on financially weak ones and drive them out of the market. Under the rational hypothesis that industry rivals will only prey on those firms if the long-term benefits exceed the short-run costs, returns to industry rivals may be increased as a result of predatory actions. An alternative class of models, often associated with Brander and Lewis (1986), suggests the possibility that a decrease in cash may make the business unit more aggressive in competition, such as to increase output. This may

¹⁰ In Cournot competition, financially constrained units will decrease the output in competition with others, which pushes up the industry price in equilibrium. Thus the performance of the industry rivals can simply improve from the high output price.

consequently “toughen” product market competition and hence drag down the performance of industry rivals. In addition, literature on the benefits of internal markets implies that when one unit of a firm suffers poor performance, the corporate headquarter may have strong incentive to efficiently redeploy assets and put more effort and resources into competition in units in which investment opportunities are not negatively affected. This also suggests that competition with financially constrained firms in certain markets may become more intense, which may hurt the industry rivals’ performance in the product market.

In tests to investigate market response of industry rivals to business units that are affected by exogenous cash shock, we examine the abnormal returns of industry rivals as a whole and in some sub-samples specified by industry characteristics. Abnormal returns to portfolios of rivals are also examined to control for the potential correlations of stocks in the same industry. All of these tests would provide the main evidence of this paper on the nature and extent of how cash affects the product market competition.

Next, this paper turns to studies on how output behavior varies with the exogenous shock to cash. There are two theorized effects that may drive the potential change in output after the decrease in cash. First, the “cost effect” predicts that a decrease in internal funds may increase the probability of liquidation for any given level of production because the firm must borrow more. Thus the cash shortfall may increase the marginal cost of output expansion, which induces the firm to produce less. The second is the “revenue effect,” which suggests that producing a high output may allow the firm to generate revenue that it needs to repay the loan. Consequently, the firm may have the incentive to increase the output when facing a negative shock to cash.

In the tests that follow, we examine both the raw and industry-adjusted variations in the output level of business segments affected by an exogenous cash shock between the year prior to the shock and each of the five years following the shock. Industry adjustment is necessary to control for industry-wide changes in the profitability of investment. The tests also control for time effect, since all dollar values are deflated by average inflation index in that year. These tests would offer more direct evidence on the effect of cash on competition.

To provide further support for the results, we then proceed to examine the robustness of the findings to a number of estimation issues and identification choices. To better understand the determinants of abnormal returns to industry rivals, we further estimate models explaining the abnormal returns as a function of firm and industry competition characteristics. This provides some evidence on how the industry competition level may affect the cash-competition sensitivity.

After presenting the evidence that establishes a connection between cash and product market competition, we consider how the competition change caused by the cash shock affects customers. As discussed before, the severity of financial constraints may induce firms to decrease output in the product market. Consequently, product price may be increased, which causes customers to suffer from negative returns. This suggests that a decrease of cash may “soften” product market competition and rivals will benefit at the expense of their customers. Alternatively, a decrease of internal funds may make firms produce high output, which in turn drives down the product price. In this case, industry output increases after firms’ cash decreases and customers experience positive returns at the cash shock to firms. Hence, this examination on customers’ returns may provide us

more evidence on how firms change their competitive strategies after a negative shock to cash. No paper has attempted to exploit the customers' returns to show the change in competitive behavior of firms constrained by a decrease of cash.¹¹

The empirical design to identify an exogenous instrument for cash is closely related to research by Lamont (1997). However, the analysis in this study is quite distinct from his in that this paper takes a step forward to investigate how firms' cash affects product market competition rather than the relation between cash flow and investment, and that the exogenous cash shock is identified based on certain policy changes rather than an economic event. Moreover, to our knowledge, this paper is the first to empirically examine the causal impact of cash flow on firms' competitive outcomes and produce results that provide insight into a more complete picture of the relationship between financial constraints and product market competition.

2.3 Sample Selection and Data Description

2.3.1 Sample Selection

The selection process that leads to find the industry-specific tax events examined in this paper is as follows: we start by searching three main news sources; The Wall Street Journal, the New York Times and the Reuters News, under the key words "higher taxes" from January 1, 1980 to December 31, 1997 through the search engine "Factiva."¹² We end the sample in 1997 to avoid segment definitions inconsistent over the sample

¹¹ Some previous studies have relied on pricing data to examine the changes in rival firms' competitive behavior. Thus, these papers are often limited to specific industries or special settings for which price data can be available.

¹² Segment data from COMPUSTAT is available from 1979. In order to match previous research, we require the sample period starting from 1980.

period as there is a change in segment reporting requirements effective in 1998. In order to obtain the most relevant reports in the search, we limit the subject of reports to be in the “corporate\industrial” category with a concentration on firms’ performance. Republished news is also excluded to determine more accurately the release dates of tax events to the public. Those initial search steps turn out a sample with 1639 reports which contain information directly or indirectly related to tax increases during the selected period.¹³

After carefully reviewing each report, we then narrow the initial sample using the following criteria. First, we exclude reports that reveal no real information about tax events, as Factiva works to retrieve all reports that contain the words “higher” and “taxes” separately. A large number of reports are excluded by this step. Next, we exclude those reports that claim or imply certain tax-increase events effective for all the U.S. corporations or for firms in a large group of industries.¹⁴ Tax events effective in certain geographic areas (e.g., city taxes) are excluded too as they influence a limited number of firms or business units within the same industries. Events related to tax changes in financial and regulated industries are also excluded as standard. After these steps, only seven reports containing information about tax increases in the specific industry remains. Finally and most importantly, we require that the impact of the certain tax event be quantitatively large in the specific industry so that it can cause a significant negative shock to the cash flow of all business units in that industry. While the amount of cash loss is hard to estimate, the abnormal returns of those business units at the release date of the

¹³ We only search for events related to tax increases since in this paper we are interested in studying the tightening of financial constraints.

¹⁴ A great deal of news on tax changes is ambiguous regarding the definitions of affected industries. For instance, a potential tax raise in transportation industry was reported briefly while the news released no information about which specific transportation industry it was.

shock are reliable proxy for the significance of the tax event. In addition, significant stock reactions also indicate that certain tax event was not previously predicted by the market. This makes *ex ante* anticipation of such a negative shock unlikely for those affected firms. To select the significant tax event(s), we require that equally-weighted abnormal returns for portfolios of all firms in the same specific industry are less than -10%. Firms' four-digit SIC codes are used for industry classification and industry definitions are from Fama and French (1997). All firms examined are publicly traded U.S. firms with sufficient data from CRSP to calculate abnormal returns at the release date of events.

These selection steps in the end leave one report that claims a significant shortfall of expected cash flow in the tobacco industry due to worries of potential increases in federal excise tax.¹⁵ The event took place on April 2, 1993, the day that Philip Morris (P.M.), the leading company in the tobacco industry, warned the market that "operating earnings from its U.S. tobacco business could be down as much as 40 percent." The company blamed the disappointing net on the expected higher excise tax and an inability to raise cigarette prices. Analysts and asset managers followed Philip Morris' statement and commented that "lingering fears of higher excise taxes" could result in the "rout" in the tobacco industry. The market generally worried that by increasing the federal excise tax the governance may be attacking "the most profitable industry." As a result, tobacco

¹⁵ The tax rate on tobacco products remains unchanged from 1951 to 1982. The rate was first increased as part of the Tax Equity and Fiscal Responsibility Act of 1982 and then increased in two stages under the Revenue Reconciliation Act of 1990. One half of the increase took effect on January 1, 1991 with second half in effect as of January 1, 1993. The most recent increase in tax rate on tobacco products occurred in the Balanced Budget Act of 1997 and took effect on January 1, 2000 and 2002, respectively. To our surprise, the tobacco stocks did not experience significant changes (more than 5%) on any of these dates. One main reason is that the formation process of those acts is time-consuming and the market gradually adjusted for the expected change in tax rates. Another reason may be that the tobacco companies can always lessen the effect of tax on performance by charging higher product prices. However, in early 1993, the tobacco companies feared both the threats of higher taxes and price pressures. Thus the market responded significantly.

stocks dropped significantly on the event day.

Although there was no public announcement from authorities on the same day about the definite tax increase, the market always anticipates the movement of policies and reflects the information in the stock prices. This event can be used a natural experiment to identify negative shock to cash flow of firms in the specific industry due to tax changes. Since all the tobacco companies traded in U.S. markets experienced significant drops in stock prices, it is difficult to imagine P.M.-specific news that would affect the whole industry and would arouse market worries on the effect of higher taxes.

To gather a sample of firms likely to be affected by the negative shock in the tobacco industry identified above, we extract every diversified firm that operates a segment with primary business in the tobacco-related industry in 1992-1993 period and had at least 10 percent of its sales from the segment's business. The primary business of each segment is identified either by the segment name or the primary 4-digit SIC industry code. A tobacco-related industry is defined as any industry that was involved in the farming of tobacco or in the production, refining, transportation or sale of tobacco products, in the service of the tobacco industry, or in the production of substitutes for tobaccos. The line of business descriptions of each segment are collected from the COMPUSTAT segment database. We then select those firms that had at least one segment in the non-tobacco-related industry. This process selects a sample of twelve diversified firms operating in tobacco business, specified as tobacco-dependent firms.¹⁶

¹⁶ The non-tobacco-related industries are defined as those in which the investment opportunities would not be affected by the negative cash shock in the tobacco industry. Financial and utility industries are excluded, since these industries have complex accounting variables or are often regulated by special requirements. The judgment of those non-tobacco-related industries depends on the examination of their SIC codes or the line-of-business descriptions.

2.3.2 Summary Statistics

Table B.1 describes characteristics of those tobacco-dependent firms. Most of these firms were quite large measured by sales of 1992. Their average annual sales were around \$11 billion, far larger than a typical COMPUSTAT firm. Although those firms operate in multiple divisions, on average more than half of their sales were from the tobacco-related business. Thus, on the day when the threat of higher tax caused a negative shock to the tobacco industry, all the firms in the sample experienced significantly negative daily returns with a mean of -12%, and the *ex post* change in cash flow from the tobacco business between 1992 and 1993 reaches to nearly -6%. All these results confirm the significance of the identified shock to cash flow in the tobacco industry.

Table B.2 follows to present detailed segment data for those tobacco-dependent firms. Segments included for analysis in this paper are those which operate in non-tobacco-related industries and generate no less than \$50 million in sales in 1992. We also exclude segments with incomplete information and segments that are involved in utility and financial service industries.¹⁷ It is shown that those non-tobacco segments are on average large in size, with a mean dollar value of \$2,311 million, and that they generally take an important percent of the whole firm sales. In addition, the *ex post* change in the segment cash flow to sales ratio between 1992 and 1993, expressed as percentage point, turns out positive (nearly 3%). It is possible that the investment opportunities of the industries in which those segments operate may improve after the negative shock to cash in the tobacco industry. Another possibility is that tobacco-dependent firms may change

¹⁷ Hereafter, those segments selected are referred to as “non-tobacco segments” in this paper.

their product market competition behavior in those non-tobacco business units and hence bring up the profitability in assets which are not affected by the negative shock. We will examine this possibility below.

2.3.3 Industry Rivals and Customers

As discussed, the analysis of this paper requires identifying the rivals and customers to the segments that are not affected by the negative cash shock. Industry rivals to those non-tobacco segments, specified above, are identified as any firm with a segment that has the same four-digit SIC industry code as the non-tobacco segments of tobacco-dependent firms. All the segment data are available in the COMPUSTAT database. The rivals are also required to be publicly-traded firms with sufficient data from CRSP to calculate the abnormal returns on the day of negative cash shock to the tobacco industry.

In total, 436 industry rivals to non-tobacco segments are identified. Table B.3 classifies those industry rivals to non-tobacco segments by industries. Compared to those industries listed in Table B.2, non-tobacco-related industries in Table B.3 exclude few in which no rivals are identified or information for rivals is incomplete. On average the industry rivals are much smaller than the tobacco-dependent firms in size. However, compared to the competing segment of the tobacco-dependent firms in the same industry, the industry rivals are not much different in size. It suggests that those identified rivals may be strong competitors in the same industry. There is also some concern about the selection of the rivals in the sample. Due to differences in sales channels, targeted consumers or product specialties, it is possible that two firms share the same industry

code but compete remotely. Below we will discuss this possibility and examine a group of more closely competing rivals.

Table B.3 also includes the summary statistics for the industry rivals to non-tobacco segments in tobacco-dependent firms. Among different industries, we find no heterogeneity in leverage, Tobin's q or operating cash flow of those industry rivals. Nevertheless, some industries are clustered with lots of competitors while most industries have less than ten rivals identified.

Although various financial accounting standards require firms to disclose the identity of any customer representing more than 10% of the total sales of the firm, data on the customers of firms is not publicly available. Segment files contain some disclosures from firms about their customers. However, these files only list an abbreviation for customers' names. By employing a text-matching procedure to link the customer abbreviations with company identities, Fee and Thomas (2004) successfully identify a group of customers and suppliers to disclosed firms. Under the authors' permission, we use their customer data and identify 101 customers to those industry rivals included in Table B.3. Those customers selected do not include those operating in the tobacco-related industry. This allows that the market performance of those customers is not affected by the change of investment opportunities in the tobacco industry. Unfortunately, we can not link any meaningful customer to those non-tobacco segments in tobacco-dependent firms since the few customers available for tobacco firms operate at least some tobacco-related business.

2.4 Empirical Results

2.4.1 Abnormal Returns to Industry Rivals

The main interest in this paper is to address how a firm's cash affects its product market behavior. Previous models (e.g., Chevalier and Scharfstein (1996)) predict that cash-poor firms may be less likely to invest in market share building by decreasing the price. This suggests that a decrease of internal funds may induce a firm not engaged in a price war. As a result, industry rivals benefit from the "soft" product market competition. Moreover, the possibility of predation (Chevalier (1995b)) may threaten the financially weak firms to exit a certain market, which helps the industry rivals to earn more in competition. Alternatively, other models (Brander and Lewis (1986)) predict more aggressive competitive behavior from financially constrained firms, such as lower price or higher output, which in turn hurts the rivals in the same market. Although pricing data is not generally available, the investigation of abnormal performance of industry rivals sheds some light on the effect of cash on product market competition, and offers another part of the major results of this paper.

In this section, we examine the share price response of industry rivals to those non-tobacco segments in tobacco firms that experience a negative cash shock. Abnormal returns to industry rivals are calculated using a standard market model. The market model is estimated over the 200 trading days from 240 to 41 days before the announcement day of cash shock to the tobacco industry. Abnormal returns are calculated over the event window centered on the announcement day of the shock and all tests of significance are performed when standardized abnormal returns are equal to zero.

Table B.4 reports the abnormal returns to industry rivals of non-tobacco segments of tobacco firms on the announcement of the negative cash shock to the tobacco industry.

For the entire sample of 436 industry rivals, on average they earn positive abnormal returns (1.02%) on the day of announcement.¹⁸ This is significant at the 1% confidence level. Moreover, a sign test indicates that significantly more industry rival firms show positive (230) than negative (158) abnormal returns. This finding of positive average returns is consistent with the idea that internal funds may affect a firm's product market behavior significantly, and that a decrease in cash may "soften" the product market competition.

Campbell, Lo, and MacKinlay (1997) discuss the "clustering" problems in calculating abnormal returns as returns to the firms in same industry may be correlated, at least to some extent. To further investigate the statistical significance of the observed positive returns to industry rivals, we regress the return of the rival against a constant, and adjust the White standard error estimates for clustering by industry. The coefficient on this regression naturally equals the mean return of 1.02%, and the adjusted *t*-statistic is 2.40. Thus the univariate finding of positive abnormal returns for industry rivals is robust to potential correlations within returns for same-industry firms.

Table B.4 also reports further results for several subsamples of industry rivals for which the competitive effect of cash is expected to be prominent. First, to gauge the cash-competition effect in highly competitive industries, we identify a subsample of industry rivals that compete in industries with the pre-announcement industry Herfindahl index

¹⁸ While those tobacco firms included in the paper are larger companies compared to a typical COMPUSTAT firm, their stocks take less than 6% weight in the S&P 500 index according to the report of "Index Component Weights of Stocks in the S&P 500" offered by www.indexarb.com. Specifically, the largest tobacco firm, Philip Morris International, takes only 0.91% weight in the index. Thus, these tobacco firms' stocks take a small percentage in the benchmark and would not bias the abnormal returns estimated using the market model. Actually on the announcement day of the cash shock to the tobacco industry, the value index of S&P 500 drops only around 2%. The following robustness check shows that the results are not affected by the choice of benchmark.

larger than 2000.¹⁹ The Herfindahl index is a measure for market concentration and is calculated as the sum of the squared market share of all firms operating a segment in the industry.²⁰ A higher Herfindahl index indicates greater market concentration in the industry. The subsample of industry rivals in concentrated industries shows significantly positive abnormal returns (0.73%) but the returns are lower than what other rivals in competitive industries receive. This result suggests that the competitive effect of cash may be magnified in highly competitive industries, as high business risk due to severe product market competition may increase the possibility of bankruptcy in competitive industries, which in turn induces financially constrained firms to decrease output more.

Next, we identify a subset of industry rivals that compete in industries where the segments in tobacco firms take less than 10% market share. The abnormal returns to this group of rivals are significantly positive and much higher than the average returns to all rival as a whole. Moreover, the difference test between rivals in market with non-tobacco segment market share less than 10% and more than 10% shows that the size of the segment that suffers from negative cash shock has a significant effect on the rivals' return. This shows that industry rivals benefit more from competition when a smaller market participant experiences a decrease in internal funds. It is consistent with the idea that smaller firms may be more financially constrained and hence a decrease of internal funds affects those firms more. However, it is also possible that financially constrained firms are more likely to exit certain minor business markets at the threat of possible predation from rivals.

¹⁹ Following the literature, we choose the Herfindahl of 2000 as a benchmark. Generally, an industry in which there are five market competitors each with an equal market share has an industry Herfindahl of 2000.

²⁰ In this paper, the Herfindahl is calculated on the segment lever basis using four-digit SIC codes for industry classifications.

As a further test, we examine the abnormal returns to rivals' portfolios on the announcement of negative shock. Equal-weighted portfolios are formed here for analysis. The effect of cash shock on industry rivals may be difficult to detect if rivals operate in multiple lines of business. Thus, we perform the analysis on both the overall group of rivals (single- and multi-segment rivals) and on those rivals that operate business in only one four-digit SIC code industry. Table B.4 presents results for rival portfolios comprised of single-segment rivals only, as well as rivals' portfolios comprised of single- and multi-segment rivals. For portfolios of the entire sample, industry rivals exhibit positive and significant abnormal returns. In the two subsamples, rival portfolios also show significant stock price increases. Moreover, we find that the size and statistical significance of the abnormal returns to rivals are greater in the tests using portfolios of single-segment rivals. In addition, abnormal returns to small rivals may be large. We find that for rival portfolios comprised of only small rivals (market share less than 5%), abnormal returns are also positive and larger than the portfolios of all rivals, although the significance level drops. These results strengthen the idea that a decrease of cash strategically influences product market competition, which in turn benefits the rivals.

2.4.2 Output Changes of Non-tobacco Segments

In this section, we examine how the output behavior changes for those non-tobacco segments when they experienced an exogenous negative cash shock. Although the shock was not correlated with the investment opportunities in non-tobacco industries, through the internal capital market, the cash shock may be transmitted to the non-tobacco segments. The decrease in internal funds may sever the financial constraints of those

segments, thus affects their output behavior in product market competition.

Our investigation builds on and ties into previously documented hypotheses how a firm's output varies with the internal funds that are used to finance investment projects. First, there is "cost effect": a decrease in internal funds requires more borrowing from the outside and hence increases the probability of bankruptcy at any given level of production. This increases the marginal cost of output expansion, which induces a firm to produce less. The second is "revenue effect": a high output allows a firm to generate revenue that it needs to repay the loan. Thus this provides the firm an incentive to increase output when facing a tightening financial condition.

To trace the changes in output of those non-tobacco segments before and after the negative cash shock to the tobacco industry in 1993, we calculate the change in sales and cash flow for every non-tobacco segment between the year prior to the cash shock and each of the five years following the shock. Although the true output data is not available, we believe that sales or cash flow generated from a segment are closely (positively) related to its output level. It is important to control for time effect, because the investment opportunities of industries may change over time. Thus, in the tests that follow, the dollar value of the sales and cash flow for each non-tobacco segment is deflated by the average consumer price index in that year.

Table B.5 presents raw and industry-adjusted changes in sales and cash flow of non-tobacco segments, and displays some of the major results of this paper. Industry-adjustment is necessary to control for industry-wide changes in the investment opportunities. The method used is fairly standard in the corporate finance literature. For each observation of ΔS (ΔCF), we subtract the mean value of ΔS (ΔCF) from the group of

all segments that were in the same industry.²¹ The changes, both raw and industry-adjusted are economically and statistically significant. In five years after the negative cash shock, sales (cash flow) of those non-tobacco segments were increasing. Based on this result alone, one might conclude that those segments increase their output after the decrease of internal funds. The close examination of industry-adjusted changes, however, tells a different story. Those non-tobacco segments performed much lower than the industry mean and the difference was increasing over time. One possible explanation for these results is that the profitability of investment in those non-tobacco industries increased after 1993 while those non-tobacco segments in tobacco firms had to produce much less than the rivals due to the constraints of their internal funds. The underperformance of output can be explained for two reasons. The first is “cost effect,” which induces firms to produce less. The second is the possible predation behavior of industry rivals after seeing the non-tobacco segments financially constrained. In addition, the number of the segments that tobacco firms operated was decreasing after the negative cash shock, which suggests that tobacco firms may pull out of certain markets. This result corresponds to the explanation above that firms tend to decrease output with a decrease of internal funds. Of course, the exit from certain markets can be caused by a voluntary drop in output or forced leave by rivals’ predation actions.

2.4.3 Robustness

The main finding above is that cash flow is significantly related with the product

²¹ In a previous version of this paper, we use a different method of industry-adjustment (such as to use the median value instead of the mean, or to use the mean (median) value from the group of the segments that are in the same industry, but were owned by firms that were not affected by the negative cash shock) and the results are not changed.

market competition: a decrease of cash can influence a firm's output behavior and affect the competition outcomes that benefit the industry rivals. In this section, we consider a number of robustness checks concerning the results.

In estimating the abnormal returns to industry rivals, we include the normal value-weighted market returns as a benchmark in the standard market model. This choice of benchmark may be problematic, considering the fact that tobacco firms are generally large corporations and represent a certain percent of the whole market value. If the tobacco stocks were down sharply on one day, the dramatic drop may bring down the market slightly, which may explain why the rivals over-performed the market even if the cash shock did nothing to affect the competition in a way to benefit the rivals.

To get around this benchmark concern, we construct two value-weighted market portfolios with all the tobacco stocks excluded. First, we retrieve the historic constituents of the S&P 500 index every month within the time period of two years before the shock event to one year after. From those constituents, we exclude all the tobacco-dependent firms identified above. The rest of the firms will form as the S&P market portfolio without the tobacco stocks. Second, for every day included in the time period, we select the largest 500 publicly-traded firms from CRSP with all tobacco firms excluded and form the CRSP value-weighted portfolio. Using these two new benchmarks in the estimation of the market model, we can assure that the previous results are not just driven by an artificially low benchmark on the event day.

Table B.6 reports the main results using the two specified benchmarks in estimating the abnormal returns to industry rivals. It is shown that on average rivals do exhibit positive and significant abnormal returns and the size of the abnormal returns to

rivals are greater for the subsamples of rivals. Notably, the difference test between rivals in the market with the non-tobacco segment market share less than 10% and rivals in the market with that share more than 10% shows that there is significant difference in the rivals' abnormal returns. All the results are consistent with what is reported above. Thus, it appears that the findings above are not sensitive to the choice of benchmarks. The results are consistent with the idea that a decrease of cash "softens" the competition in the product market and the event is actually good news for the rivals.

As discussed above, P.M. was the first to warn the market about the negative shock to expected cash flow in the tobacco industry and predicted that the shock from the potential increase in federal excise tax could be significant in decreasing the cash flow. External parties comment on its statements and agreed that lingering fears of higher tax would affect the tobacco industry more than what the market anticipated previously. Thus, all the tobacco stocks dropped significantly on the announcement day.

Yet the estimation of value effect from special events is always challenged by the revelation bias, since the abnormal returns on the announcement date possibly reflect not only the value from the event but also news about the firm itself. It is often observed in market that firms may make certain announcements to shift attention away from other less favorable development. Based on market responses, it is difficult to imagine that the drop in cash flow was not, to some extent, caused by the shock to the tobacco industry. It is possible that the decrease in its expected cash flow was not solely from the shock, since P.M. may just have revealed the shock to divert the attention from its problems in other segments, thus the inclusion of P.M. other segments into the sample may bias the results.

To assure that this sample selection issue has no substantial effect on the findings, we recheck the segments' output behavior and abnormal returns to rivals after excluding the other segments in the P.M. firm. The results are presented in Table B.7. As reported, output from those non-tobacco segments increases slightly after the shock but is still much less than what the rivals produce. Abnormal returns of rivals to non-tobacco segments in other tobacco firms are also positive and significant. Thus, the findings do not appear to be sensitive to this sample selection concern.

The identification process employed above to find industry rivals to those non-tobacco segments relies heavily on the four-digit SIC industry code. Thus all the firms with business units operating in same industry as tobacco firms do are treated equally as rivals. However, firms classified under the same industry code are not always directly competing with each other due to variations in market locations or product differentiation. For example, it is difficult to believe that all firms in the food industry produce the same product and face the same customer markets. The previous selection of industry rivals may include some firms that are not meaningful market competitors. In addition, the previous empirical investigation treats all rivals equally. Yet it seems like that the closer the competitor, the larger should be the effect if the connection between cash and product market competition is valid. Hence, the identification of close rivals seems necessary.

The measure of how closely rivals compete with tobacco firms is not easy to establish. In this section, we assume that the correlation of segment sales between a tobacco firm and its rival that compete in the same industry is larger if they are close competitors. By examining the correlation of sales between rivals and competing tobacco firms in five years before the cash shock, we identify "closely-related rivals" as those

with at least one segment's sales strongly correlated with sales in non-tobacco segment that operates in the same industry.²² For this group of close rivals, we find that they exhibit slightly higher returns than the others at the announcement date of negative cash shock to the tobacco industry, although the difference test between two groups shows no significant difference. The result suggests, at least to certain extent, that the effect of cash on product market competition may be larger for close competitors. To conserve space, these abnormal returns are not reported in tables but are available upon request.

2.4.4 Cross-section Analysis

Table B.8 presents multivariate regressions that explain abnormal returns to industry rivals as a function of firm and industry characteristics. Given the strength of product market competition on the performance of firms, most of the multivariate analysis focuses on linking the abnormal returns to rivals with variables that describe the industry competition characteristics. In column 1, we include as an independent variable the industry market share of the non-tobacco segments that suffered from the negative cash shock. The estimated coefficient of this variable is negative and significant. As in the univariate tests, the result suggests that the rivals benefit more from competition change when a small market participant is affected by a cash shock. It is consistent with the idea that small firms may be more financially constrained and hence may be more likely to pull out of the market when suffering a decrease in cash.

In Column 2, we add the industry Herfindahl as another independent variable to test the effect of competition on the cash-competition sensitivity. The coefficient on the

²² Strong correlation is defined when the correlation coefficient is larger than 0.5.

Herfindahl index variable is negative and weakly significant. This suggests that high industry competition may amplify the cash-competition effect. Column 3 adds the market share of the rival firm into the regression to account for the size of the rival. Column 4 also adds a number of commonly used variables to control for firm-specific characteristics. In these two regressions, the size and significance of coefficients on the Herfindahl index and market share of non-tobacco segments are almost unchanged.

2.4.5 Abnormal Returns to Customers of Industry Rivals

As outlined above, the examination of abnormal customer returns to industry rivals would help to better understand how firms change their competitive strategies after a negative shock to cash. Table B.9 presents results for the abnormal returns of customers to industry rivals as identified above. For the entire sample of customers, we find that customers of rival firms experience positive average returns at the announcement of cash shock to the tobacco industry. This is inconsistent with idea that overall product price increases after the change of competition due to cash shock. Actually, it suggests the possibility that some customers may benefit from the new market equilibrium. Combined with the evidence of positive rival returns at the time of announcement, this result is also inconsistent with the hypothesis that industry rivals may gain from the change of market competition at the expense of their customers.

The full sample is then divided into four subsamples based on whether the industry rivals are in industries with a Herfindahl value less than 2000 or greater than 2000, and whether the industry rivals are in industries with a non-tobacco segment market share less than 10% or greater than 10%. Abnormal customer returns show a

distinct pattern in those subsamples. For rivals in industries with a lower market concentration (higher competition), their customers experience significant positive returns. Alternatively, significant negative returns are observed for customers of rivals that are in industries with a higher market concentration (lower competition). This result suggests that firms in various industries may respond to cash shocks with different pricing and output behavior and in turn affect their customers differently. Unfortunately, without further examination on the price and output level in the new industry equilibrium, it is hard to conclude how rivals change their competitive strategies and then affect customers in aggregate. It opens up a puzzle for future research.

2.5 Conclusion

In this paper, we empirically investigate the connection between cash flow and product market competition. Using a tax-induced negative shock to expected cash flows in the tobacco industry as a natural experiment, we uncover that industry rivals to non-tobacco segments in tobacco firms experience positive and significant abnormal returns at the announcement of the cash flow shock. In addition, we find a significant change in output behavior of those non-tobacco segments following the shock. This suggests that a firm's cash flow plays an important role in influencing its competitive outcomes in the product market. Moreover, the effect of cash flow on competitive performance is magnified in competitive industries and when cash-constrained firms only have a small market share. These results are robust to a number of estimation issues and identification choices. Since the shock is exogenous to the investment opportunities in non-tobacco industries, our findings support the hypothesis that there is a causal relation between a firm's cash flow and its product market competition.

In the end, we examine the customers of industry rivals to non-tobacco segments in tobacco firms and find that on average customers experience positive and significant returns on the shock announcement date. Nonetheless, there is considerable variation in the market reactions of customers in different subsample. Customers of the firms that operate in competitive industries seem to exhibit significant stock price increases while customers of the firms that compete in concentrated industries experience negative and significant abnormal returns. This suggests that some customers may benefit while others suffer from a new industry equilibrium after the negative shock. Although it is hard to figure out the change of pricing and output in a new equilibrium, our results at least rule out the possibility of overall increases in product price.

This paper adds to the growing literature on the connections between finance choice and corporate strategy. By establishing the causal link between cash flow and product market competition, we provide a more complete picture of the relationship between firms' financial and operating decisions beyond mostly studied association between debt financing and competitive strategy. This paper also complements the literature on corporate liquidity by suggesting the substantial effect of cash on product market outcomes. The evidence we present helps to shed some light on the implication of corporate cash. Lastly, our results add to the body of evidence on the interactions between firms, rivals and customers, which helps to better understand the nature and extent of linkage among firms.

While our results support the interactions between financial and strategic decisions, they do not answer the question of how the financial choices (e.g., debt and cash) interact to influence the real competitive strategy. This is an important issue for

firms to seek optimal financing package that secures the effectiveness of strategy. Further research on this topic can be insightful.

APPENDICES

APPENDIX A

Tables for Essay 1

Table A.1.
Sample Selection

This table records the steps in selecting the exogenous failed sample for the period from 1990 to 2006. The original transaction data are from the SDC M&A database and the reasons for deal termination are hand-collected from Factiva. All acquirers are publicly traded firms listed on the NYSE, Nasdaq, or AMEX. Targets are comprised of public, private, or subsidiary firms. Panel A contains the number of domestic and foreign deals after each query step. Panel B lists the number of domestic and foreign transactions that fail due to various acquirer-related or target-related matters. After screening out any deals for which the cause of termination may be, even if indirectly, related to the acquirer's valuation, the exogenous failed sample consists of 272 merger bids.

Panel A: Selection of Failed Sample

Search in SDC		
Sample Size		Query Description
Domestic	Foreign	
		SDC M&As announced between 1/1/1990 and 12/31/2006
85876	14712	Acquirer: U.S. public trading firm
		Percent of Shares Acquirer is Seeking to Own
64915	11699	after Transaction: 50% or higher
3144	434	Deal Status: first offer in cycle but uncompleted
1593	270	Deal Value is 1 million dollars or more.
1334	257	Neither Acquirers Nor Targets are utility or financial firms
1235	251	Acquirers are identified in CRSP
1235	251	Failed Sample

Panel B: Selection of Exogenous Failed Sample

Hand Collected in Factiva		
Domestic	Foreign	Reasons for Deal Failure
1235	251	All unsuccessful merger bids
-12	-2	Acquisition of bidder
-164	-28	Inability to reach agreement/Inability to conclude negotiation
-38	-10	Inability to obtain financing
-56	-7	Fall in acquirer's stock price/Financial problems in acquirer
-12	-7	Acquirer shareholders' opposition/Bad market reception
-11	-1	Management conflict/Change of managers
-101	-24	Change of merger form/Change of target
-23	-1	Difference in corporate growth strategy or culture
-142	-27	Target rejection or lack of response or delay
-74	-24	Worsening conditions in target/Due diligence revelation
-39	-9	Acquirer's or Target's failure to fulfill certain conditions
-50	-7	Changing market condition or industry environment
-293	-52	No reason given/No enough information/compounding events
220	52	Exogenous Failed Sample

Table A.2
Sample Summary Statistics

This table reports descriptive statistics for the exogenous failed sample. Panel A shows the deal characteristics. The deal value (\$ million) is from SDC and represents the total value of consideration paid by the acquirer, excluding fees and expenses. The market value of equity (\$ million) is the shares outstanding times the stock price at the fiscal year-end prior to the merger announcement. The market value of assets (\$ million) is the book value of assets minus the book value of equity plus the market value of equity. Relative size is the deal value divided by the equity market capitalization of the acquirer at the end of the month prior to the acquisition announcement. Days to termination measure the number of calendar days between announcement and termination dates. The cash (equity) in payment is the percent cash (equity) payment of the deal value. Pure cash (equity) deals are when 100% of the consideration is cash (equity). Acquisitions are defined as competed deals, hostile deals, or tender offers as reported by SDC. Conglomerate deals involve targets with a two-digit SIC code other than that of the bidder. Panel B summarizes the characteristics of acquirers. Following Bhandari (1988), debt-to-equity ratio is defined as the book value of assets minus the book value of equity divided by the market value of equity of the acquirer at the end of the fiscal year prior to the acquisition announcement. Tobin's q is defined as the market value of equity plus the book value of debt and preferred stock divided by the sum of the book value of equity, debt, and preferred stock at the end of the fiscal year before the merger. Governance index is the closest reported Governance Index Score from Gompers et al. (2003) for the acquirer. Operating cash flow is defined as sales minus the cost of goods sold, sales and general administrative costs, and the change in working capital. Small dummy is equal to one if the acquirer's market capitalization is less than the market capitalization of the 25th percentile of NYSE firms in the same year. Panel C shows the distribution of the exogenous failed sample by industry using the Fama and French (1997) industry classification. Columns 2 through 5 report the number of acquirers and targets, respectively, in a particular industry. Column 6 reports the number of bidders acquiring targets in their own industry.

Table A.2. Continued**Panel A: Deal Characteristics**

	Exogenous Failed Deals (n=272)	
	Mean	Median
Deal Value (DV)	1730.35	190.28
DV/Market Value of Assets	0.3569	0.1863
DV/Market Value of Equity	0.6645	0.5713
Relative Size	0.8176	0.2766
Days to Termination	79.46	53.15
Cash in Payment (%)	47.15	
Equity in Payment (%)	40.77	
Pure Cash Deals (%)	50.00	
Pure Equity Deals (%)	30.15	
Competed Deals (%)	29.35	
Hostile Deals (%)	11.39	
Tender Offers (%)	15.81	
Conglomerate Deals (%)	40.44	
Foreign Deals (%)	19.11	
Public Target (%)	63.60	
Private Target (%)	14.34	
Subsidiary Target (%)	22.06	

Panel B: Acquirer Characteristics

	Exogenous Failed Deals (n=272)	
	Mean	Median
Book Value of Assets	4624.35	716.31
Market Value of Assets	6224.98	742.30
Market Value of Equity	2836.64	322.50
Debt/Equity (%)	97.27	47.67
Tobin's q	3.3157	1.7058
Governance Index	9.48	10
OCF/Market Value of Assets	0.2692	0.1984
Small	0.2096	

Table A.2. Continued

Panel C: Distribution by industry

Industry	Acquire	Target	Target			Number of own industry bids
			Public	Private	Sub.	
Agriculture	1	3	2	0	1	1
Aircraft	5	0	0	0	0	0
Apparel	4	5	3	2	0	3
Automobiles	4	4	4	0	0	2
Business services	25	29	21	4	4	16
Business suppliers	4	3	3	0	0	2
Candy and soda	2	2	1	0	1	2
Chemicals	6	5	3	0	2	4
coal	0	1	0	0	1	0
Computers	10	10	8	0	2	5
Construction	1	0	0	0	0	0
Construction materials	3	5	4	0	1	1
Consumer goods	4	5	2	1	2	3
Defense	1	2	1	0	1	0
Electrical equipment	5	7	6	1	0	3
Electronic products	10	17	12	3	2	5
Entertainment	15	10	4	4	2	5
Food products	10	8	3	0	5	7
Healthcare	9	6	3	2	1	5
Insurance	10	9	4	4	1	7
Machinery	11	5	4	0	1	3
Measuring and control equipment	8	2	2	0	0	1
Medical equipment	13	14	10	4	0	9
Miscellaneous	1	1	1	0	0	0
Nonmetallic mining	2	2	2	0	0	2
Personal Service	1	2	1	1	0	1
Petroleum and natural gas	7	7	6	0	1	6
Pharmaceutical	7	7	4	2	1	4
Precious metals	3	3	2	0	1	3
Printing and publishing	1	0	0	0	0	0
Real estate	1	2	0	0	2	0
Recreational products	4	1	1	0	0	1
Restaurants, motels, hotels	10	13	9	2	2	6
Retail	13	13	9	1	3	9
Rubber and plastics	0	1	1	0	0	0
Shipbuilding, railroad	1	1	4	0	0	1
Shipping containers	1	0	0	0	0	0
Steel works	4	1	3	0	1	0
Telecommunications	29	26	14	1	8	25
Textiles	1	1	1	0	0	0
Transportation	20	21	7	2	12	19
Wholesale	5	12	7	2	3	3

Table A.3.
Cumulative Abnormal Returns upon Merger Termination

This table presents the cumulative abnormal returns around termination announcement for acquirers who did not close merger deals due to exogenous reasons. The acquirer's cumulative abnormal return upon deal termination is measured during (-1, +1) trading days around the termination date. The single-index normal market model is used to measure abnormal returns. The estimation period uses 200 daily observations from 250 days before to 50 days before the merger announcement date. Similar to Martin (1996), the method of payment is grouped into three categories. Cash financing includes cash only or a mixture of cash and debt. Stock financing includes common stock only or a combination of common stock, options, or warrants. Combination financing comprises combinations of common stock, cash debt, preferred stock, convertible securities, and methods classified as "others" by SDC. The *t*-statistics are in brackets and the number of bids is reported below the *t*-statistics. Difference tests are based on the *t*-test for equality in means.

Cumulative abnormal returns upon termination by status of targets and method of payment							
	All	Cash	Stock	Combo	Difference Tests		
		(1)	(2)	(3)	(1)-(2)	(1)-(3)	(2)-(3)
All deals	0.22%	0.08%	0.04%	0.84%	0.04%	-0.76%	-0.80%
	[0.52]	[0.15]	[0.05]	[0.83]	[0.04]	[-0.73]	[-0.58]
	272	136	82	54			
Public Targets	2.19%***	2.18%***	1.92%**	2.60%***	0.27%	-0.41%	-0.68%
	[4.68]	[3.06]	[2.25]	[3.06]	[0.24]	[-0.36]	[-0.53]
	173	69	64	40			
Private Targets	-4.16%***	-2.93%*	-6.22%**	-4.02%	3.29%	1.08%	-2.20%
	[-3.17]	[-1.81]	[-2.49]	[-1.09]	[1.16]	[0.32]	[-0.51]
	39	19	12	8			
Sub. Targets	-2.60%***	-1.77%**	-7.47%	-4.41%	5.70%*	2.64%	-3.06%
	[-3.15]	[-2.55]	[-1.70]	[-1.03]	[2.33]	[1.09]	[-0.50]
	60	48	6	6			
Priv.+Sub. Targets	-3.21%***	-2.10%***	-6.64%***	-4.19%	4.54%**	2.09%	-2.45%
	[-4.47]	[-3.12]	[-3.09]	[-1.56]	[2.67]	[1.10]	[-0.72]
	99	67	18	14			
Difference Tests							
Public vs. Priv.	6.35%***	5.12%***	8.14%***	6.62%**			
	[5.45]	[3.19]	[3.62]	[2.67]			
Public vs. Sub.	4.79%***	3.96%***	9.40%***	7.02%**			
	[5.11]	[3.82]	[3.05]	[2.59]			
Priv. vs. Sub.	-1.56%	-1.16%	1.26%	0.10%			
	[-1.06]	[-0.78]	[0.27]	[0.07]			

*** Denotes significance at the 1% level.

** Denotes significance at the 5% level.

* Denotes significance at the 10% level.

Table A.4.
Cumulative Abnormal Returns upon Merger Announcement

This table presents the cumulative abnormal returns around merger announcement for bidders who in the end have to terminate the merger due to exogenous reasons. The acquirer's cumulative abnormal return upon merger announcement is measured during (-1, +1) trading days around the merger announcement date. The single-index normal market model is used to measure abnormal returns. The estimation period uses 200 daily observations from 250 days before to 50 days before the merger attempt announcement date. Similar to Martin (1996), the method of payment is grouped into three categories. Cash financing includes cash only or a mixture of cash and debt. Stock financing includes common stock only or a combination of common stock, options, or warrants. Combination financing comprises combinations of common stock, cash debt, preferred stock, convertible securities, and methods classified as "others" by SDC. The *t*-statistics are in brackets and the number of bids is reported below the *t*-statistics. Difference tests are based on the *t*-test for equality in means.

Cumulative abnormal returns upon announcement by status of targets and method of payment							
	All	Cash	Stock	Combo	Difference Tests		
		(1)	(2)	(3)	(1)-(2)	(1)-(3)	(2)-(3)
All deals	-0.76% [-1.37] 272	-0.18% [-0.36] 136	-0.90% [-0.61] 82	-1.99%* [-1.93] 54	0.72% [0.55]	1.81%* [1.76]	1.10% [0.54]
Public Targets	-2.47% [-1.08] 173	-0.75% [-1.10] 69	-3.72%* [-1.89] 64	-3.45% [-1.24] 40	2.97%* [2.08]	2.70% [1.23]	-0.27% [-0.15]
Private Targets	4.33%* [1.87] 39	-1.04% [-0.53] 19	1.42% [1.52] 12	2.26% [0.63] 8	-2.54%* [-1.84]	-3.30% [-0.88]	-1.96% [1.58]
Sub. Targets	0.87% [1.25] 60	0.98% [1.42] 48	-1.08% [-0.29] 6	2.03% [0.75] 6	2.05%* [0.89]	-1.06% [-0.49]	-3.10% [-0.67]
Priv.+Sub. Targets	2.24% [1.20] 99	0.41% [0.55] 67	1.13% [1.14] 18	2.16% [0.95] 14	-1.81%** [-0.67]	-1.76% [-0.92]	-1.45% [-1.13]
Difference Tests							
Public vs. Priv.	-6.81% [-1.05]	0.29% [0.18]	-5.80%* [-1.71]	-5.72%* [-2.00]			
Public vs. Sub.	-3.35% [-1.02]	-1.73%* [-1.72]	-2.64% [-0.61]	-5.48%* [-1.86]			
Priv. vs. Sub.	3.53% [-1.06]	-2.07% [-0.87]	2.63% [1.40]	0.31% [0.05]			
Public vs. Priv. + Sub.	-4.71% [-1.24]	-1.16% [-1.15]	-12.85%* [1.89]	-5.62% [-1.49]			

*** Denotes significance at the 1% level,

** Denotes significance at the 5% level,

* Denotes significance at the 10% level.

Table A.5.
Firm and Deal Characteristics: Sort by Target Status

This table reports descriptive statistics for the exogenous failed sample sorted by target status. The sample contains all failed mergers and acquisitions that did not close due to exogenous reasons between 1990 and 2006 as listed by SDC where the publicly traded acquiring firm seeks to gain control of a public, private, or subsidiary target whose deal value is at least \$1 million and 1% of the acquirer's market value. Panel A and B present deal and acquirer characteristics, respectively. Variables are defined as in Table II.

Panel A: Deal Characteristics

	Public Target N=173	Priv. Target N=39	Sub. Target N=60
Deal Value (DV)	2355.68	802.38	530.51
DV/Market Value of Assets	0.5985	0.3189	0.3284
DV/Market Value of Equity	0.8368	0.5169	0.3355
Relative Size	0.9628	0.6644	0.4986
Days to Termination	78.69	78.97	82.02
Cash in Payment (%)	41.16	52.24	45.00
Equity in Payment (%)	50.15	38.12	15.46
Pure Cash Deals (%)	34.68	48.72	80.00
Pure Equity Deals (%)	36.99	30.77	10.00
Competed Deals (%)	36.99	15.38	30.00
Hostile Deals (%)	15.03	2.56	6.67
Tender Offers (%)	21.97	7.69	3.33
Conglomerate Deals (%)	38.15	61.54	33.33
Foreign Deals (%)	19.07	20.51	18.33

Panel B: Acquirer Characteristics

	Public Target (N=173)	Priv. Target (N=39)	Sub. Target (N=60)
Book Value of Assets	5068.61	3597.26	3661.01
Market Value of Assets	6469.72	6461.10	4650.84
Market Value of Equity	4452.25	2675.31	2719.75
Debt/Equity (%)	88.81	72.37	137.85
Tobin's q	3.28	4.89	1.88
Governance Index	9.64	8.87	9.40
OCF/Market Value of Assets	0.2988	0.1829	0.2399
Small Dummy	0.1792	0.4872	0.1167

Table A.6.
Cross-sectional Regression Analysis of Bidder Gains

This table presents the results of cross-sectional regressions where the dependent variable is negative one times acquirer's 3-day percentage abnormal return at the time of announcement of merger termination. The sample contains all failed mergers that did not close due to exogenous reasons between 1990 and 2006 as listed by SDC, where a publicly traded acquiring firm seeks to gain control of a public, private, or subsidiary target whose deal value is at least \$1 million and 1% of the acquirer's market value. Private, subsidiary, small, conglomerate, tender offer, foreign, hostile, and competed are all dummy variables that take the value of one for acquisitions of private firms, of subsidiaries, by firms whose market capitalization is below the 25th percentile of NYSE firms that year, of firms in a two-digit SIC code other than that of the acquirer, that is a tender offer, that is hostile according to SDC, and in which there is more than one bidder, respectively. Equity in consideration is the percentage of stock used in consideration. The relative size is the transaction value divided by the market capitalization of the acquirer as of one month prior to the merger announcement. Tobin's q is defined as the market value of the acquirer's equity plus the book value of debt and preferred stock divided by the sum of book value of equity, debt, and preferred stock from the most recent financial statement prior to the merger announcement. Leverage is defined as the book value of total assets minus the book value of common equity divided by the market value of equity. Operating cash flow is calculated as sales minus the costs of good sold, sales and general administrative costs, and change in working capital. Governance index score is from Gompers et al (2003). Year and industry fixed effects are included in every regression. The t -statistics are reported in brackets.

Table A.6. Continued

Independent variables	Dependent variable = $(-1) \times$ the acquirer's CAR upon termination announcement					
	All (1)	All (2)	All (3)	Public (4)	Priv. (5)	Sub. (6)
Private	6.87[5.09]***	7.04[5.32]***	6.57[4.89]***			
Subsidiary	6.32[5.27]***	6.25[5.24]***	6.38[5.47]***			
Small	0.63[0.57]					
Ln equity (market)		-0.01[-0.10]		-0.10[-1.14]	-0.11[-0.23]	-0.10[-0.35]
Ln asset (book)			-0.21[-1.00]			
Conglomerate	-0.35[-0.41]	-0.37[-0.42]	-0.30[-0.34]	-0.33[-0.34]	-1.09[-1.29]	-2.83[-1.16]
Tender offer	1.57[1.22]	1.49[1.17]	1.49[1.20]	0.95[0.71]	-0.56[-0.05]	1.58[1.12]
Foreign	-1.23[-1.16]	-1.22[-1.13]	-1.10[-1.05]	-1.32[-1.00]	-1.32[-0.13]	-2.69[-0.90]
Hostile	-0.51[-0.35]	-0.55[-0.38]	-0.58[-0.40]	-0.55[-0.37]	0.51[0.48]	-0.48[-1.02]
Competed Deals	-1.14[-1.20]	-1.19[-1.22]	-1.15[-1.24]	-1.16[-1.03]	-3.51[-0.27]	-1.47[-0.50]
Equity in consideration	0.02[1.43]	0.01[1.40]	0.01[1.31]	0.01[0.43]	0.01[0.07]	0.06[1.95]*
Relative size	-0.58[-3.03]***	-0.57[-2.97]***	-0.53[-2.70]***	-0.68[-3.20]***	-0.18[-1.88]*	-0.50[-0.99]
Tobin's q	-0.01[-0.83]	-0.01[-0.86]	-0.00[-1.02]	-0.10[-1.28]	-0.00[-0.31]	-0.04[-0.44]
Leverage	0.25[0.89]	0.24[0.85]	0.20[0.71]	1.14[2.44]**	-1.82[-1.01]	0.31[0.58]
OCF/Assets (market)	0.57[0.74]	0.53[0.70]	0.62[0.84]	0.44[0.84]	0.44[0.84]	0.61[0.11]
Governance index	-0.13[-1.00]	-0.14[-1.11]	-0.11[-0.83]	-0.07[-0.47]	-0.07[-0.47]	-0.32[-0.79]
Sample Size	272	272	272	173	39	60
Adjusted R ²	20.44%	20.42%	20.22%	17.23%	16.96%	28.57%
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes

*** Denotes significance at the 1% level,

** Denotes significance at the 5% level,

* Denotes significance at the 10% level.

Table A.7.
Termination Returns for Acquirers of Subsidiaries

This table shows the cumulative abnormal returns upon merger termination announcement for acquirers of subsidiary targets, sorted by characteristics of targets' parents and methods of payment. A diversified parent is defined as a subsidiary's parent whose primary two-digit SIC is not same as that of the subsidiary. Industry classification codes are obtained from Fama and French (1997). The t -statistics are reported in brackets and the number of mergers is below the t -statistics.

	All	Cash	Stock	Combo
When sub. target has a public parent	-1.14% [-1.44] 39	-1.13% [-1.40] 35	-2.63% NA 1	-1.81% [-0.72] 3
When sub. target has a private parent	-5.32%*** [-3.09] 21	-3.48%** [-2.76] 13	-6.92% [-1.30] 5	-10.64% [-1.55] 3
when sub. target has a diversified parent	-3.10%* [-2.03] 27	-1.52% [-1.37] 20	-8.36% [-1.26] 4	-6.66% [-0.76] 3
When sub. target has a nondiversified parent	-2.19%** [-2.60] 33	-1.94%** [-2.15] 28	-5.69% [-1.26] 2	-2.17% [-0.66] 3
When sub. target hires advisors	-3.11%* [-1.99] 27	-1.53% [-1.25] 19	-14.27% [-1.09] 2	-4.41% [-1.03] 6
When sub. target hires no advisors	-2.18%** [-2.72] 33	-1.92%** [-2.30] 29	-4.07% [-1.43] 4	0 NA 0

*** Denotes significance at the 1% level,
 ** Denotes significance at the 5% level.
 * Denotes significance at the 10% level.

Table A.8.
Cross-section Analysis of Gains to Acquirers of Subsidiaries

This table reports the results of multivariate regressions for acquisitions of subsidiaries in the exogenous failed sample. The dependent variable is negative one times the acquirer's 3-day percentage abnormal returns upon merger termination. Private parent, diversified parent, and use of advisors are dummy variables that take the value of one if the target subsidiary's parent is private, if the target subsidiary's parent is diversified, and if the parent of the target subsidiary hires financial advisors, respectively. The public status of parents of subsidiary firms and information on financial advisors come from SDC. A diversified parent is defined as a parent whose primary two-digit SIC is not same as that of the subsidiary. Industry classification codes are obtained from Fama and French (1997). The *t*-statistics are reported in brackets.

Independent variables	Dependent variable			
	= (-1) × the acquirer's CAR upon termination announcement			
Private Parent	2.40[1.83]*	2.83[1.81]*		
Diversified Parent	3.15[1.26]		3.13[1.30]	
Use of Advisors	1.02[0.40]			0.75[0.30]
ln Equity (market)	-0.06[-0.21]	-0.12[-0.43]	-0.01[-0.05]	-0.13[-0.42]
Conglomerate	1.26[0.47]	2.26[0.90]	1.95[0.78]	2.69[1.06]
Tender Offers	2.29[1.32]	2.13[1.03]	3.14[1.64]	2.83[1.36]
Foreign	-3.22[-0.88]	-1.32[-0.40]	-4.28[-1.34]	-2.75[-0.90]
Hostile	-4.48[-0.91]	-3.95[-0.81]	-5.22[-1.10]	-4.93[-1.01]
Competed Deals	-1.89[-0.62]	-1.33[-0.45]	-2.04[-0.68]	-1.45[-0.48]
Equity in Consideration	0.05[1.25]	0.06[1.60]	0.05[1.48]	0.07[1.91]
Relative Size	0.64[1.20]	0.46[0.90]	0.66[1.28]	0.51[1.00]
Tobin's q	0.88[0.83]	0.53[0.53]	0.72[0.71]	0.50[0.48]
Leverage	0.64[1.02]	0.41[0.74]	0.45[0.82]	0.39[0.64]
OCF/Assets (market)	-1.09[-0.17]	-2.10[-0.37]	-0.81[-0.15]	0.09[0.01]
Governance Index	-0.56[-1.27]	-0.35[-0.87]	-0.52[-1.21]	-0.33[-0.79]
Sample Size	60	60	60	60
Adjusted R ²	31.42%	32.72%	28.91%	29.29%
Time Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes

*** Denotes significance at the 1% level,

** Denotes significance at the 5% level,

* Denotes significance at the 10% level.

APPENDIX B

Tables for Essay 2

Table B.1.
Tobacco-dependent Firm Data

This table records firm data for the diversified tobacco-dependent firms in 1992-1993. Firms are selected if at least 10 percent of their sales in 1992 were from the tobacco-related industry and they had at least a segment in non-tobacco-related industries. The line of business descriptions of each segment of firms are from COMPUSTAT segment database. "1992 Sales" denotes the sum of net sales (\$mil) of all segments of selected firms in 1992. Percent of Sales for the tobacco-related business is computed by dividing the tobacco-related segments' sales (assets) by the sum of the sales of all firm segments. "AR" denotes the abnormal returns on the announcement of negative cash shock to tobacco industry due to fears of higher exercise tax. Ex-post changes in sales and cash flow from 1992 to 1993 are the dollar changes in tobacco-related segments' sales and cash flow, normalized by tobacco-related segments' sales in 1992. Those changes are expressed as percentage points. All 1993 dollar figures are deflated by the average CPI in that fiscal year to account for time effect.

Company	Firm Size		Tobacco Business			Announcement Day		Ex-post change in	
	1992 Sales (mil \$)	Num of segments	Percent of Sales	Percent of Cash Flow	Percent of Sales	1993/04/02		Tobacco Business	ΔCF
						Daily Ret	AR		
Alliance One Intl Inc	1,081	2	67	85		-9%	-7%	-7	-1
Altria Group Inc	59,139	4	43	66		-23%	-21%	-2	-8
American Maize-Prods	542	2	28	28		-2%	-1%	1	-3
British Amern Tob Plc	18,611	3	42	76		-10%	-8%	0	-3
Fortune Brands Inc	8,840	6	33	56		-11%	-9%	-16	-16
Hanson Plc	11,557	10	11	26		-3%	-1%	-18	-3
Loews Corp	12,991	7	14	35		-15%	-14%	-19	-18
Nabisco Group Holdings	15,734	2	57	71		-16%	-15%	-13	-10
Standard Commercial Co	1,239	3	70	87		-11%	-10%	-25	-7
Universal Corp	2,989	3	74	83		-14%	-12%	-1	0
UST Inc	1,047	3	84	96		-11%	-8%	4	NA
Vector Group Ltd	720	3	84	58		-22%	-19%	-24	-9
Average	11,209	4	51	64		-12%	-10%	-10	-6

Table B.2.
Segment Data for Tobacco-dependent Firms

This table shows data for the non-tobacco segments in tobacco-dependent firms. Firms are classified as being tobacco-dependent if at least 10 percent of their sales in 1992 were from the tobacco-related industry and they had at least a segment in non-tobacco-related industries. Segments shown here are restricted to those operating in non-tobacco-related industries. Segments that operate in utility or financial services industries are deleted. I also exclude segments with incomplete information and segments that 1992 sales were less than \$50 mil. SIC code is the primary segment industry code according to Standard Industrial Classification reported by COMPUSTAT segment database. Percent of Sales is computed by dividing the segment's sale by the sum of the sales of all segments in the firm. $\Delta CF/S$ is the change in the ratio of segment cash flow to sales between 1992 and 1993, expressed as percentage points. Cash flow equals pretax operating profit plus depreciation. All 1993 dollar figures are deflated by the average CPI in that year.

Company	Segment Industry	SIC Code	1992 Size (mil \$)	Percent of Sales	$\Delta CF/S$
Alliance One Intl Inc	Flowers	5193	360	33	-0.65
Altria Group Inc	Food Products	2000	29,048	49	0.26
Altria Group Inc	Beer	2082	3,976	7	1.87
American Maize	Corn Processing	2046	392	72	-2.78
Fortune Brands Inc	Home Improvent	3432	1,014	11	-2.21
Fortune Brands Inc	Specialty Business	5990	2,214	25	1.13
Fortune Brands Inc	Distilled Spirits	2085	716	8	5.71
Fortune Brands Inc	Office Products	2782	1,003	11	0.60
Hanson Plc	Consumer Products	2834	1,158	10	0.31
Hanson Plc	Coal Mining	1221	1,801	16	-0.50
Hanson Plc	Lumber	2411	394	3	3.57
Hanson Plc	Industrial Products	3824	1,429	12	1.10
Hanson Plc	Chemicals	2816	967	8	2.17
Hanson Plc	Housebuilding	1531	1,963	17	1.13
Hanson Plc	Material Handling	3537	460	4	-6.33
Hanson Plc	Gold Mining	1041	189	2	NA
Loews Corp	Hotels	7011	NA	NA	NA
Loews Corp	Timing Device	5094	181	1	-4.42
Loews Corp	Drilling	1381	218	2	15.26
Nabisco Group	Foods	2052	6,707	43	-0.45
Standard Commercial	Wool	2299	349	28	0.65
Universal Corp	Building Products	5031	370	12	0.43
Universal Corp	Agri-Products	5149	384	13	-0.18
UST Inc	Wine	2084	75	7	1.67
Vector Group Ltd	Collectible Pictures	2759	87	12	55.78
Average			2,311	17	3.22

Table B.3.
Statistics for Rivals to Non-tobacco Segments

This table records statistics for rivals to non-tobacco segments in tobacco-dependent firms. Non-tobacco segments are those as shown in Table II, excluding those with no rivals available or with incomplete information. Industry rivals are identified as firms with at least one segment operating in the same four-digit SIC industry as the non-tobacco segments of the tobacco companies, as identified in the COMPUSTAT segment database. Size denotes the average market value of rival firms within the same industry. Market value of a firm in one fiscal year is share outstanding times the stock price at the fiscal year end. Leverage denotes the average debt-to-equity ratio for all rivals, calculating as the book value of total asset minus the book value of equity divided by the market value of equity. Tobin's q (OCF) is the mean market-to-book ratio (operating cash flow) for rivals within the same industry, calculated as standard. The industry Herfindahl index is calculated as the sum of the squared market shares of all firms that at least operate a business segment in that industry. The last row of the table shows the average statistics for rivals across all non-tobacco-related industries. All figures are from COMPUSTAT consolidated and segment database.

Non-Tobacco-Related Segment Industry		SIC	Rivals to Tobacco Firms					Herf. Index
			Num	Size (mil \$)	D/E	Tobin's q	OCF (mil \$)	
Gold Mining	1041	70	698	0.44	2.08	17.23	504	
Coal Mining	1221	12	2,192	1.05	1.49	18.43	2069	
Drilling	1381	29	1,094	0.66	0.37	15.92	697	
Housebuilding	1531	45	990	2.21	1.38	17.30	733	
Food Products	2000	6	8,325	0.14	2.84	20.46	2881	
Corn Processing	2046	5	1,997	0.70	1.93	18.61	3058	
Foods	2052	2	419	0.03	1.52	17.41	8495	
Beer	2082	6	4,590	0.13	1.73	18.06	3123	
Wine	2084	7	5,899	0.40	1.51	17.75	5031	
Distilled Spirits	2085	2	5,807	0.17	1.54	20.08	5899	
Wool	2299	1	122	0.30	1.58	16.88	6892	
Lumber	2411	2	774	0.44	1.54	18.72	4425	
Collectible Pictures	2759	3	165	0.55	2.10	17.03	3567	
Office Products	2782	5	1,045	0.05	2.34	27.49	3161	
Chemicals	2816	6	6,213	0.88	1.85	18.67	3558	
Consumer Products	2834	160	3,681	0.11	1.17	17.93	397	
Home Improvement	3432	4	1,298	0.29	1.06	17.75	4754	
Material Handling	3537	11	205	0.62	0.79	16.94	1774	
Industrial Products	3824	7	2,018	0.12	1.50	15.57	4802	
Building Products	5031	4	255	2.55	0.89	17.19	2658	
Timing Device	5094	4	578	0.23	2.87	17.07	6626	
Agri-Products	5149	4	1,536	2.19	1.86	18.12	8797	
Hotels	7011	41	979	2.83	1.44	16.76	2912	
Average			2,075	0.80	1.32	17.36		

Table B.4.
Abnormal Returns to Non-tobacco Rivals of Tobacco Firms

This table presents the abnormal returns of industry rivals to non-tobacco segments in tobacco-dependent firms. Industry rivals are identified as firms with at least one segment operating in the same four-digit SIC industry as the non-tobacco segments of the tobacco companies, as identified in the COMPUSTAT segment database. Single-segment rivals are those that report only one industry segment. Small rivals are those with market share less than 5%. A standard market model in event study is employed to calculate abnormal returns. The market model is estimated over the 200 trading period from 240 to 41 days before the announcement of negative cash shock to tobacco industry. Abnormal return is calculated over the one-day event window centered on the announcement date of the shock. Abnormal returns to rival portfolios are calculated for the equally-weighted portfolios of rivals in same industry. T-statistics are based on tests that standardized abnormal returns are equal to zero. The adjusted *t*-statistic is from the regression that adjusts the White standard error estimates for clustering by industry. Significance of the number of positive versus number of negative is assessed using a sign test. Difference tests are based on *t*-test for equality in means. The *t*-statistics for difference tests are shown in brackets. Subsample of the rivals are selected for those that compete in the industry with the pre-announcement Herfindahl Index larger than 2000, or those that compete with non-tobacco segments with market share less than 10%.

	All	Subsample of Rivals	
		Industry Herf. Index ≥ 2000	Non-tobacco Seg. market Share $\leq 10\%$
<i>Abnormal returns to individual rivals</i>			
Abnormal return	1.02%	1.00%	1.60%
<i>t</i> -statistics	7.60***	7.36***	5.96***
Adjusted <i>t</i> (clustering)	2.40**	2.47**	2.40**
Positive, negative	230,158***	150,113***	157,89***
Difference Test		[0.94]	[2.91***]
<i>Abnormal returns to rival portfolios: single segment only</i>			
Abnormal return	0.66%	0.23%	2.54%
<i>t</i> -statistics	2.08**	0.79	2.92**
Positive, negative	12.7	3.2	5.0**
<i>Abnormal returns to rival portfolios: small rivals</i>			
Abnormal return	0.68%	0.50%	2.53%
<i>t</i> -statistics	1.64	1.76	2.57**
Positive, negative	11.9	2.3	5.0**

*** Denotes significance at 1% level.

** Denotes significance at 5% level.

* Denotes significance at 10% level.

Table B.5.

Output Changes Following Cash Shock

This table contains raw and industry-adjusted changes in sales and cash flow of non-tobacco segments between the year prior to the exogenous negative shock to cash and each of the five years following the shock. Industry-adjustment method used is to subtract, for each observation of ΔS (ΔCF), the mean value of ΔS (ΔCF) from the group of all segments that were in the same industry. The non-tobacco segments are those that are parts of tobacco firms while operate in non-tobacco-related industries. A tobacco-related industry is any industry that was involved in the farming of tobacco, or in the production, refining, transportation or sale of tobacco products, or in the service of tobacco industry, or in the production of substitutes for tobaccos. Column (1) contains all the non-tobacco segments presented in Table II while column (2) excludes those segments that have no corresponding rivals or incomplete information. The number of non-tobacco segments in tobacco firms in each following year after the negative shock is shown in the parenthesis. All the data are available from COMPUSTAT segment database. All the dollar figures are deflated by the average CPI in that fiscal year.

Years	Sales Change (ΔS)				Cash Flow (ΔCF)			
	Raw		Adjusted		Raw		Adjusted	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
-1 to +1	8.23 (25)	21.95 (23)	-8.34 (25)	-9.24 (23)	24.66 (18)	27.86 (16)	22.30 (18)	25.14 (16)
-1 to +2	247.40 (21)	321.83 (19)	-27.46 (21)	-31.22 (19)	48.64 (15)	64.68 (13)	20.26 (15)	23.54 (13)
-1 to +3	337.37 (14)	361.48 (13)	-402.30 (14)	-431.30 (13)	67.81 (14)	73.76 (13)	2.02 (14)	2.66 (13)
-1 to +4	333.78 (14)	356.55 (13)	-951.07 (14)	-1023.17 (13)	85.27 (14)	91.73 (13)	-122.86 (14)	-132.53 (13)
-1 to +5	95.41 (16)	99.92 (15)	-1200.34 (16)	-1278.78 (15)	138.36 (14)	148.80 (13)	-135.71 (14)	-146.35 (13)

Table B.6.
Robustness under Alternative Benchmarks

This table presents the results for robustness checks on abnormal returns to industry rivals. Industry rivals are identified as firms with at least one segment operating in the same four-digit SIC industry as the non-tobacco segments of the tobacco companies, as identified in the COMPUSTAT segment database. In estimation of the standard market model, two new benchmarks are employed. First is based on the S&P 500 market portfolio with all the tobacco firms excluded and the other is based on the CRSP value-weighted market portfolio with largest 500 public non-tobacco-dependent firms. The market model is estimated over the 200 trading period from 240 to 41 days before the announcement of negative cash shock to tobacco industry. Abnormal return is calculated over the one-day event window centered on the announcement date of the shock. T-statistics are based on tests that standardized abnormal returns are equal to zero. Significance of the number of positive versus number of negative is assessed using a sign test. Difference tests are based on *t*-test for equality in means. The *t*-statistics for difference tests are shown in brackets.

	All	Subsample of Rivals	
		Industry Herf. Index $\bar{i}$ 2000	Non-tobacco Seg. market Share $\bar{j}$ 10%
<i>S&P 500 market portfolio with all tobacco firms excluded is used:</i>			
<i>Abnormal returns to individual rivals</i>			
Abnormal return	0.66%	0.65%	1.22%
<i>t</i> -statistics	4.70***	4.52***	4.04***
Positive, negative	213,175***	156,124***	143,103***
Difference Test		[0.72]	[2.82***]
<i>CRSP value-weighted market portfolio with all tobacco firms excluded is used:</i>			
<i>Abnormal returns to individual rivals</i>			
Abnormal return	0.54%	0.50%	1.10%
<i>t</i> -statistics	3.18***	3.11***	3.18***
Positive, negative	202,186*	149,131*	134,112**
Difference Test		[0.74]	[2.86***]

*** Denotes significance at 1% level,

** Denotes significance at 5% level,

* Denotes significance at 10% level.

Table B.7.

Robustness under Additional Controls

This table reports the results of robustness checks on output change of non-tobacco segments and abnormal returns of rivals to those segments under additional controls on segments. The non-tobacco segments are those that are parts of tobacco firms while operate in non-tobacco-related industries, excluding the segments in Philip Morris firm. Column (1) contains all the non-tobacco segments as defined while column (2) further excludes those segments that have no corresponding rivals or incomplete information. The number of non-tobacco segments in tobacco firms in each following year after the negative shock is shown in the parenthesis. Abnormal return is calculated over the one-day event window centered on the announcement date of the shock. T-statistics are based on tests that standardized abnormal returns are equal to zero. Significance of the number of positive versus number of negative is assessed using a sign test. Difference tests are based on t -test for equality in means. The dollar figures are deflated by the average CPI in that fiscal year.

Years	Sales Change (ΔS)				Cash Flow (ΔCF)			
	Raw		Adjusted		Raw		Adjusted	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
-1 to +1	-56.36 (23)	-47.49 (21)	-66.64 (23)	-73.18 (21)	7.62 (16)	8.84 (14)	11.40 (16)	13.10 (14)
-1 to +3	364.09 (12)	395.02 (11)	-46.36 (12)	-52.62 (11)	27.95 (12)	31.36 (11)	2.73 (12)	3.83 (11)

	Subsample of Deals			
	All	Industry	Herfindahl Index	non-tobacco segment market Share i 10%
<i>Abnormal returns to individual rivals</i>				
Abnormal return	1.03%		1.00%	1.61%
t -statistics	7.46***		7.22***	5.96***
Positive, negative	224,153***		207,145***	157,89***
Difference Test		[0.94]		[2.91***]

Table B.8.
Regressions of Abnormal Returns to Rivals

This table presents multivariate regressions that explain the abnormal returns to industry rivals. The dependent variable is the percentage abnormal returns to the industry rival. The first independent variable is industry market share of the non-tobacco segments that suffered from the negative cash shock. Herfindahl Index is calculated as the sum of the squared market share of all firms operating a segment in the industry. Market share of the rival firm is the percentage of rival firm's sale to the whole market sale. Leverage is the average debt-to-equity ratio calculated as the book value of total asset minus the book value of equity divided by the market value of equity. And Tobin's q is the mean market-to-book ratio as standard. Multi-segment dummy is a binary variable that takes value one when the rival firm operating on multiple lines of business. The *t*-statistics are reported in brackets.

Specification	(1)	(2)	(3)	(4)
Dependent variables	Rival's abnormal returns			
market share of non-tobacco seg.	-0.05 [-2.25]**	-0.06 [-2.68]**	-0.06 [-2.64]**	-0.06 [-2.28]**
Herfindahl index		-0.03 [-1.64]*	-0.03 [-1.80]*	-0.04 [-1.85]*
market share of rival			0.03 [1.19]	0.03 [1.06]
Leverage				0.00 [1.29]
Tobin's Q				0.00 [1.30]
Multi-segment dummy				-0.00 [-0.50]
Intercept	0.01 [4.45]***	0.01 [3.62]***	0.01 [3.62]***	0.01 [0.92]
Adjusted R ²	0.01	0.01	0.01	0.03
Num of Observations	436	436	435	410

*** Denotes significance at 1% level.

** Denotes significance at 5% level.

* Denotes significance at 10% level.

Table B.9.
Abnormal Returns to Customers of Industry Rivals

This table presents the abnormal customer returns for the sample of industry rivals identified in Table III. Customers are identified from COMPUSTAT industry segment file. The full sample is also divided into four subsamples based on whether the industry rivals are in industries with Herfindahl value less than 2000 or greater than 2000, and whether the industry rivals are in industries with market share of non-tobacco segments less than 10% or greater than 10%. A standard market model in event study is employed to calculate abnormal returns. The market model is estimated over the 200 trading period from 240 to 41 days before the announcement day of cash shortfall to tobacco industry. Abnormal return is calculated over the one-day event window centered on the announcement date of the shock. T-statistics are based on tests that standardized abnormal returns are equal to zero. Significance of the number of positive versus number of negative is assessed using a sign test.

	All	Subsample of Customers			
		for rivals in industries with Herf. ≤ 2000	for rivals in industries with Herf. ≤ 2000	for rivals in industries with market share of non-tobacco seg. $\leq 10\%$	for rivals in industries with market share of non-tobacco seg. $\leq 10\%$
<i>Abnormal returns to individual customers</i>					
Abnormal return	0.27%	0.33%	-1.02%	0.19%	0.00%
t-statistics	1.81*	1.99**	-2.53**	0.43	0.57
Positive, negative	65,36***	50,26***	7,9	36,20**	21,15

*** Denotes significance at 1% level.
 ** Denotes significance at 5% level.
 * Denotes significance at 10% level.

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