

INDUSTRY STRUCTURE AND HORIZONTAL TAKEOVERS:
ANALYSIS OF WEALTH EFFECTS ON RIVALS, SUPPLIERS, AND CORPORATE
CUSTOMERS
BY
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ACCEPTANCE

This dissertation was prepared under the direction of Husayn Shahrur's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Robinson College of Business of Georgia State University.

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ABSTRACT

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We examine the wealth effects of horizontal takeovers on rivals of the merging firms, and on firms in the takeover industry's supplier and customer industries as identified in the benchmark input-output accounts for the U.S economy. We find that the announcement of a horizontal takeover is associated with wealth gains to rivals and corporate customers, while suppliers experience an adverse wealth effect. Inconsistent with the collusion and buyer power motives for horizontal takeovers, we find significant positive (negative) abnormal returns to rivals, suppliers, and corporate customers for the subsample of takeovers with positive (negative) combined wealth effect to target and bidder shareholders. Overall, our results suggest that the average takeover in our sample is driven by efficiency considerations. We find evidence, however, suggesting that horizontal takeovers increase the buyer power of the merging firms if suppliers are concentrated. More generally, we find that the concentrations of the takeover, supplier, and customer industries play a role in determining abnormal returns to the merging firms, rivals, suppliers, and corporate customers.

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Chapter I

Introduction

What are the motives for the recent wave of horizontal takeovers? A growing body of research suggests that takeovers are driven by efficiency considerations in response to changes in optimal firm boundaries brought about by unexpected economic changes (see, e.g., Jensen, 1993; Comment and Schwert, 1995). Mitchell and Mulherin (1996) find evidence consistent with major economic changes shaping the takeover and restructuring markets.¹ In addition to this efficiency view, there is a long-standing proposition that horizontal takeovers are attempts by the merging firms to expropriate wealth from customers and suppliers. In particular, a horizontal takeover can increase the likelihood of collusion in the takeover industry, which will benefit the merging firms at the expense of their customers and suppliers (e.g., Stigler, 1964). Further, a horizontal takeover can help the merging firms lower their input costs by creating a larger firm with increased buyer power vis-à-vis its suppliers (e.g., Snyder, 1996).

We test the efficiency, collusion, and buyer power theories using a sample of 463 horizontal mergers and tender offers during the 1987-1999 period. The novel aspect of this study is the examination of the wealth effects of horizontal acquisitions on the takeover industry's suppliers and corporate customers. First, we examine the wealth effects of the takeover announcement on firms in supplier industries in order to test the buyer power motive. To our knowledge, our study is the first to directly test the effect of a horizontal takeover on the buying power of the merging firms. Second, we test the collusion motive by examining the wealth effects of a horizontal takeover on the rivals of

the merging firms, and on firms in supplier and customer industries. Thus, this study extends the work of Eckbo (1983) and Stillman (1983) who test the collusion motive by examining the wealth effects of merger and antitrust announcements on rival firms. Finally, we test whether firms in supplier and customer industries gain from an efficiency-driven takeover. Extending this argument further, we examine whether the structures of the takeover, supplier, and customer industries affect the wealth captured by the merging firms, rivals, suppliers, and corporate customers.

We use the benchmark input-output accounts for the U.S. economy to identify firms in industries that supply inputs to the takeover industry (suppliers), and firms in industries that use the output of the takeover industry (corporate customers). Consistent with prior research on takeovers, we find that the announcement of a takeover is associated with a positive average *combined wealth effect* to target and bidder stockholders.² In addition, we find that rivals and corporate customers earn positive abnormal returns during the takeover announcement period, while suppliers experience an adverse stock price effect.

To further investigate the announcement period abnormal returns, we partition our sample into two subsamples depending on whether the takeover results in a positive or negative combined wealth effect to the target and bidder. It is likely that efficiency, collusion, or buyer power motives drive takeovers with positive combined wealth effects. For a subsample of such takeovers (about 60% of the sample takeovers), we find significant positive abnormal returns to rivals, suppliers, and corporate customers, a result consistent with the efficiency motive. Inconsistent with the collusion and buyer power

motives, takeovers that create wealth to the merging firms appear to benefit customers and suppliers.

For the subsample of takeovers with negative combined wealth effects, we find significant negative abnormal returns to rivals, suppliers, and corporate customers. If agency problems drive some of these value-destroying takeovers, the evidence suggests that the wealth destruction has negative effects on suppliers and customers as well.³ However, the economically and statistically significant negative average abnormal return to rival firms is also consistent with the view in Mitchell and Mulherin (1996) that takeovers are the “message bearers” of the fundamental changes facing the takeover industry. If some takeovers are aimed at reducing industrywide excess capacity, the announcement of such takeovers can result in the negative valuation effects we find, even when the restructuring is driven by efficiency considerations (see, e.g., Jensen, 1993; Andrade and Stafford, 2003).

We conduct a cross-sectional analysis to examine the determinants of abnormal returns to the merging firms, rivals, suppliers, and corporate customers. We find that the higher the percentage of the supplier industry’s output sold to the takeover industry, the higher is the magnitude of abnormal returns to suppliers. We also find that the more important the takeover industry’s output as an input to the corporate customer industry, the higher is the magnitude of abnormal returns to corporate customers. Among other things, this evidence suggests that the stock market reaction to takeover announcements takes into account the economic fundamentals that relate the takeover industry to supplier and customer industries.

Under the market concentration doctrine, the anticompetitive effect of a collusive merger should be higher for takeovers with a larger takeover-induced increase in concentration (see Eckbo, 1985). Inconsistent with the collusion motive, we find that the merger-induced increase in the concentration of the takeover industry is not related to the abnormal returns to the merging firms, suppliers, and corporate customers. Contrary to the prediction of the collusion hypothesis, we find that the merger-induced increase in concentration is negatively related to rivals' abnormal returns. Thus, our study extends the findings in Eckbo (1983, 1985), which do not support the collusion motive, to the recent wave of horizontal consolidations. Our results suggest that the lenient antitrust policy in recent years relative to the sample period in Eckbo (1983, 1985) does not appear to have resulted in predominantly anticompetitive takeovers.⁴

Galbraith (1952) suggests that an increase in the concentration of the buying industry can result in a countervailing power that enables buyers to pressure their suppliers. Recent theoretical research such as Snyder (1996, 1998), Stole and Zwiebel (1996), and Chipty and Snyder (1999) suggest that, by increasing its size, a buyer can lower the costs of inputs bought from monopolistic or oligopolistic supplier industries. Consistent with this buyer-size effect, we find that the combined wealth effect to the target and bidder is higher if suppliers are concentrated *and* the merger results in a large firm relative to the independent target and bidder. The adverse effect of this increased buyer power on concentrated suppliers is pronounced if the merger is between firms that are large relative to the takeover industry. In addition, Snyder (1996) shows that the increased buyer power can benefit rivals by intensifying competition among concentrated suppliers. We find evidence consistent with this hypothesis.

If an efficiency-driven takeover creates wealth, do industry characteristics affect the wealth captured by the merging firms, rivals, suppliers, and corporate customers? We find that the higher the concentration of the takeover industry, the higher is the combined wealth gain to target and bidder stockholders, and the lower are the abnormal returns to corporate customers. Coupled with our findings that are inconsistent with the collusion motive, this evidence suggests that firms in concentrated industries can retain more of the takeover wealth gains, probably because of less intense competition in these industries. As a result, less of the efficiency gains are passed on to corporate customers.

Recent empirical evidence suggests that imports can intensify competition in concentrated industries (see, e.g., Domowitz, Hubbard, and Petersen, 1986; Katics and Petersen, 1994). Consistent with this prediction, we find that import competition in the takeover industry weakens the positive relation between the concentration of the takeover industry and the combined wealth gain to the merging firms. Finally, we find a positive relation between the concentration of customers and the abnormal returns to the merging firms and corporate customers. This evidence is consistent with the ability of the merging firms to retain more of the takeover gains whenever their customers are concentrated, probably because of lower marketing and other selling expenses (Ravenscraft, 1983; Scherer and Ross, 1990). It also appears that corporate customers benefit from this cost saving.

Fee and Thomas (2003) is an independent study that examines the effect of horizontal takeovers on rivals, suppliers, and corporate customers. One major difference between our methodology and theirs is in identification of suppliers and customers. We use the input-output tables to identify downstream and upstream industries. Fee and

Thomas (2003) identify the merging firms' key suppliers and customers relying on data disclosed in accordance with FASB No. 14, which requires firms to disclose the identity of any customer representing more than 10% of the firm's total sales. Because of this difference in methodology, Fee and Thomas (2003) examine takeover wealth effects on key supplier and customer firms, while we examine industry wealth effects. Thus, we draw conclusions regarding the collusion and buyer power motives that are relatively less affected by the contractual arrangements between the individual firms and their key suppliers and customers. Zingales (2000) argues that explicit and implicit contracts can affect the part of a firm's surplus that is captured by its nonfinancial claimholders such as employees, key customers, and suppliers.⁵ In addition, our methodology is designed to test collusion and buyer power theories, which for the most part, have industry-level implications. Finally, the analysis of the effects of industry structures and the economic links between the various industries on announcement period abnormal returns is unique to this study. Similar to our study, Fee and Thomas (2003) find evidence inconsistent with the collusion theory, and to some extent consistent with the buyer power motive. Therefore, our study and theirs complement each other in improving our understanding of the motive for horizontal takeovers.

The remainder of this study proceeds as follows. In Chapter II, we review the literature and develop our hypotheses. Chapter III provides details of the sample and the methodology used to identify suppliers and corporate customers. The event study results are reported in Chapter IV. Chapter V develops our cross-sectional hypotheses and presents the results of our regression analysis. Finally, Chapter IV provides our conclusion.

Chapter II

Related literature and hypotheses development

A. Motives for takeovers

The increase in productive efficiency, replacement of inefficient target management, wealth transfers from bondholders, employees, and/or taxing authorities, undervaluation of targets, agency problems and hubris, increase in market power, and increase in buyer power are among the prominent motives for takeovers. Below is a brief review of each of these explanations, with more emphasis on the motives that directly relate to this study.

A.1. Increase in productive efficiency

One view that governs horizontal takeovers is that they result in productive efficiency. The increase in efficiency can be the result of economies of scale/scope, technological changes, information sharing, the combination of complementary resources and the reduction in redundant costs. The empirical evidence regarding the efficiency improvement after takeovers, although mixed, is more in favor of this proposition. For example, Healy, Palepu and Ruback (1992) find that, for their sample of 50 large mergers, merging firms exhibit significant improvements in cash flows relative to their industry rivals. McGuckin and Nguyen (1995) conclude that the gains from synergies appear to be the most important motive for assets ownership change. Maksimovic and Phillips (2001) find also productivity gains following mergers. However, Ravenscraft and

Scherer (1987) conclude that, for their sample of tender offers, efficiency did not increase in the post-takeover period.

In addition, many studies such as Bhagat, Shleifer and Vishny (1990) argue that operating synergies are more likely to arise in related takeovers. The results in Healy, Palepu and Ruback (1992), Maquieira, Megginson and Nail (1998), and Maksimovic and Phillips (2001) find evidence consistent with the view that efficiency is more likely to arise when the target and the bidder are in the same industry.

Although the question of whether takeovers result in synergies is addressed, less research has been directed toward examining the sources of these synergies, mainly because of the difficulty in obtaining detailed data for large sample. While some case studies such as Kaplan, Mitchell, and Wruck (1997) provide insights regarding the sources of takeover productivity gains, their results cannot be generalized because of the nature of case studies.

If takeovers create efficiency gains, what are the economic changes that give rise to these gains in particular time periods? A growing body of research considers synergies to be arising from economic shocks that alter optimal firm boundaries. Jensen (1993) argues that takeovers are one way of dealing with excess capacity that arises due to changes in economic fundamentals. Comment and Schwert (1995) argue that the reduced number of takeovers in the late 1980s and early 1990s is due to changes in economic factors instead of changes in state and firm-specific antitakeover amendments. Consistent with this proposition, Mitchell and Mulherin (1996), Andrade, Mitchell and Stafford (2001) and Mulherin and Boone (2001) find that during the 1980s and 1990s, restructuring activity clustered disproportionately at the industry levels, and is correlated

with some proxies for economic shocks such as deregulation, demand shocks, technological changes, and increase in foreign competition.

A.2. Collusion motive

A horizontal merger reduces the number of firms in the takeover industry. Thus, it lowers the costs to monitor collusion and increases the ability of industry rivals to collude (Stigler, 1964). Eckbo (1983) tests the collusion theory by examining the effect of the takeover on rival firms. The rationale behind Eckbo's methodology is that rivals should benefit from takeovers that result in higher output prices. Therefore, one should observe an increase in rivals' stock prices at the announcement of the merger, and decrease at the announcement of the antitrust challenge. Although Eckbo (1983) finds that at the announcement of the mergers rivals earn positive abnormal return, he does not find a negative abnormal return at the announcement of the antitrust challenge. This result is interpreted as inconsistent with the collusion motive, but consistent with the hypothesis that the merger release new information regarding the potential increase in productivity within the takeover industry.

Using the same methodology, Stillman (1983), Eckbo (1985, 1992), Eckbo and Wier (1985), Banerjee and Eckard (1998), and Song and Walking (2000) find evidence inconsistent with the collusion hypothesis. For example, by examining abnormal returns to rival firms, Banerjee and Eckard (1998) find evidence suggesting that the great merger wave of 1897-1903 was motivated by efficiency rather than market power. However, using product market prices, Kim and Singal (1993) find airline mergers during the 1985-1988 sample period led to higher fares, resulting in wealth transfers from consumers to

the merging firms. Using product market and stock market data, Singal (1996) find, for a sample of airline mergers, evidence consistent with mergers resulting in both efficiency gains as well as higher market power. In sum, the evidence regarding the market power hypothesis suggests that while the average merger is not anticompetitive, there are few cases where horizontal mergers appear to result in an increase in market power.

A.3. Buyer power motive

Galbraith (1952) suggests that an increase in the concentration of the buying industry can result in a countervailing power that enables buyers to pressure their suppliers. Ellison and Snyder (2001) divide the theoretical research on the buyer-size effect into two categories. The first category includes theories that examine the effect of the size of a buyer on its bargaining power vis-à-vis a monopoly supplier (see, e.g., Stole and Zwiebel, 1996; Chipty and Snyder, 1999). These studies show that there are plausible conditions under which a large buyer is charged a lower input price. The second category focuses on tacitly colluding suppliers instead of a monopoly supplier. For example, Snyder (1996, 1998) shows that a merger between two buyers will increase their ability to intensify competition among colluding suppliers.

Empirically, the extent to which large buyers enjoy lower prices has been examined in inter-industry and intra-industry studies. Inter-industry studies find that industry profits are negatively correlated with proxies for the buyer power of downstream industries (see, e.g., Schumacher, 1991). Intra-industry studies find evidence consistent with large buyers enjoying lower input prices (see, e.g., Ellison and Snyder, 2001).

A.4. Agency and hubris motives

Some theories that relate corporate takeovers to agency problems indicate that self-interested managers will undertake value-destroying diversifying acquisitions. Managers have incentives to diversify the operation of their firm to improve their job security (Shleifer and Vishny, 1989), and/or to diversify their human capital (Amihud and Lev, 1981). Other theories are not restricted to diversifying mergers. For example, Jensen (1986) argues that managers have incentives to increase the size of the firm beyond its optimal level. Roll (1986) suggests that under the assumption of strong-form market efficiency, takeovers are a manifestation of the winner's curse; under the hubris hypothesis, takeovers destroy value because of the suboptimality of the new organization. The empirical evidence suggests that some acquisitions, especially diversifying ones, may be driven by managerial objectives (see, e.g., Mitchell and Lehn, 1990; Morck, Shleifer, and Vishny, 1990; Datta, Iskandar-Datta, and Raman, 2001).

A.5. Inefficient target management

Many economists argue that a major role of corporate takeovers is to remove inefficient managers (see, for example, Jensen, 1988; Scharfstein, 1988). The evidence relating to the inefficient management hypothesis, although mixed, appears to be more in favor of this hypothesis. For example, using Tobin's q as a proxy for managerial ability in a sample of tender offers, Lang, Stulz, and Walking (1989) find that abnormal returns to the merging firms are higher when targets have low q and bidders have high q . Servaes (1991) find similar results for mergers. Other studies such as Martin and McConnell (1991) and Kini, Kracaw, and Mian (2000) find evidence in support of the disciplinary

role of takeovers. On the other hand, Franks and Mayer (1996) do not find that takeovers in the UK are disciplinary in nature. Agrawal and Jaffe (2001) do not find support for the hypothesis that targets underperform in the pre-acquisition period.

A.6. Undervaluation of target

Under the target undervaluation hypothesis, takeovers are motivated by the systematic undervaluation of certain firms that ultimately become targets. Therefore, the positive market reaction to takeover announcements is the result of the correction of this undervaluation. Bradley, Desai, and Kim (1983) report evidence inconsistent with this hypothesis. They find that, for unsuccessful tender offers, only those targets that do not receive new bids lose the wealth gained at the announcement. Bhagat, Brickley, and Lowenstein (1987) find also results inconsistent with the undervaluation hypothesis. On the other hand, Brous and Kini (1993) find results consistent with the undervaluation hypothesis. Finally, Shleifer and Vishny (2001) argue that market misvaluation is one of the major driving forces for corporate acquisitions.

A.7. Other redistribution explanations

The positive market reactions to takeover announcements can also be the result of wealth redistributions from bondholders, employees, and/or the taxing authorities to the merging firms. Empirically, bondholders do not appear to lose at the announcement of takeovers (see, e.g., Dennis and McConnell, 1986; Maqueira, Megginson, and Nail, 1998). Regarding the wealth transfer from workers, the evidence in Shleifer and Summers (1988), Brown and Medoff (1988), Bhagat, Shleifer, and Vishny (1990), and

Rosett (1990) suggests that, while layoffs drive some takeovers, wealth transfer from labor is, on average, only a small fraction of takeover gains. Further, McGuckin and Nguyen (2001) conclude that the impact of ownership changes on labor markets is positive. Finally, studies such as Auerbach and Reishus (1987), Hayn (1989), and Bhagat, Shleifer, and Vishny (1990) provide mixed support for tax explanations. In conclusion, while some takeovers appear to result in transfers of wealth, the redistribution explanations can at best explain only a small fraction the positive market reaction to corporate takeover events.

B. Hypotheses development

We use abnormal returns for the takeover announcement period in order to examine the significance of the wealth effects of horizontal takeovers on rivals, suppliers, and corporate customers. In this section, we discuss the implications of the productive efficiency, collusion, and buyer power hypotheses on announcement period abnormal returns. Note that, as mentioned above, there are other possible motives for takeovers. In this study, we test motives that are specific to horizontal takeovers and have direct implications for firms in supplier and customer industries.

B.1. Productive efficiency hypothesis

An increase in productive efficiency has implications for rivals, suppliers, and corporate customers. First, as suggested by Eckbo (1983), the effect of an increase in efficiency on rivals is unrestricted. On the one hand, rival firms can lose since the efficiency-increasing takeover is expected to result in more intense industry competition. On the other hand, the takeover can signal that an industrywide increase in productivity is

available to rival firms. Rivals can also benefit if the takeover increases the probability that they will be acquired (see, e.g., Eckbo, 1983; Song and Walking, 2000).

Second, efficiency-driven horizontal takeovers have two effects on suppliers. An increase in productive efficiency results in a decrease in marginal costs, which will result in lower prices and higher output levels, thereby increasing the demand for factors of production. However, the increase in productive efficiency can result in a lower demand for inputs because of more efficient use of factors of production. The net effect can either be a decrease or an increase in input prices. Therefore, the effect of the announcement of a horizontal takeover on suppliers is unrestricted.

Finally, the increase in productive efficiency can result from two types of mergers: scale-increasing or scale-decreasing mergers (Eckbo, 1992; Andrade and Stafford, 2003). A scale-increasing merger will result in higher output levels and lower output prices. The effect of a scale-decreasing merger on output levels and prices will depend on the level of the takeover efficiency gains. As a result, corporate customers can either benefit or lose at the announcement of a horizontal takeover. To summarize, under the productive efficiency hypothesis, abnormal returns to rivals, suppliers, and corporate customers are unrestricted.

B.2. Collusion hypothesis

Our study extends the methodology in Eckbo (1983) to include supplier and customer industries.⁶ The collusion theory suggests that gains from horizontal takeovers are the result of higher output prices and lower input prices. Thus, this theory predicts that horizontal takeovers will hurt firms in supplier and customer industries. In addition,

an increase in the likelihood of collusion should benefit rival firms (Eckbo, 1983). Following the extent literature we focus on collusion, rather than predatory pricing, as the main source of any potential increase in the market power of the merging firms (see, e.g., Eckbo, 1983; Mullin, Mullin, and Mullin, 1995). However, since our methodology enables us to examine whether the mergers is expected to result in price wars in the takeover industry, we will discuss is issue where relevant. In sum, under the collusion hypothesis, the announcement of a takeover should be associated with positive abnormal returns to rival firms, while suppliers and corporate customers should experience an adverse wealth effect.

B.3. Buyer power hypothesis

One common implication of all buyer power models is that a horizontal merger is expected to benefit the merging firms at the expense of firms in the supplier industry. In addition, Snyder (1996) shows that rival firms will benefit from the intensified post-takeover competition among suppliers, which is caused by the increased buyer power of the merging firms. Finally, the buyer power models discussed in the previous section do not address the effect of the increased buyer power on customers.⁷ To summarize, under the buyer power hypothesis, suppliers are expected to experience an adverse stock price effect. According to Snyder (1996), rivals should benefit at the takeover announcement. The effect of an increase in buyer power on customers is unrestricted.

Chapter III

Data sources, takeover sample, suppliers, and corporate customers

A. Takeover sample

We use the Worldwide M&A Section of the Securities Data Company (SDC) database to obtain our horizontal takeover sample. We define a horizontal takeover as one between a target and a bidder that share the same four-digit primary SIC code. Kahle and Walking (1996) find that one major source of the inaccuracy of Compustat industry classification is that the Primary SIC Code data item is based on the current primary SIC code of a given firm although a large number of firms change their primary SIC code over time. For example, Kahle and Walking (1996) report that 23% of the firms common to Compustat and CRSP have had their SIC codes changed at least once over the 1974-1993 period. In this study, we use Compustat's Historical SIC Code data item, which represents the history of primary SIC codes for any particular firm. Since Compustat reports the historical primary SIC code from 1987 onward, and given our interest in the recent wave of horizontal takeovers, we restrict our sample to the period beginning on January 1, 1987 and ending on December 31, 1999.

Our sample includes successful mergers and tender offers.⁸ A takeover is considered successful if the bidder acquires at least 15% of the total number of target shares outstanding at the time of the announcement.⁹ We exclude takeovers in which the bidder holds more than 15% of the target's total shares outstanding prior to the takeover announcement, and transactions including financial firms (SIC codes between 6000 and 6999). We also require that both the target and the bidder be publicly traded domestic

firms, have stock returns data on the Center for Research in Security Prices (CRSP) tapes, and be covered by Compustat. These restrictions result in a sample of 352 mergers and 111 tender offers. The mean (median) market capitalization of bidder firms is \$5,996 million (\$688 million). The mean (median) market capitalization of target firms is \$526 million (\$100 million).

Panel A of Table 1 shows the distribution of our sample by year and industry classification at the two-digit SIC code level. The Panel shows a pattern of industry clustering similar to that reported in Andrade, Mitchell, and Stafford (2001). For example, 15.3% of the sample takeovers involve firms in the business services industry. Despite this industry clustering, the sample covers 142 four-digit SIC codes, which represent about one-third of the total number of four-digit SIC codes with publicly firms traded during 1999. Panel B (panel C) of Table 1 shows the distribution of the sample by year and type of takeover (method of financing). As reported in prior studies (see, e.g., Andrade, Mitchell, and Stafford, 2001), takeovers through tender offers and cash financing were more frequent during the late 1980s and early 1990s than during the mid and late 1990s.

Since we define a horizontal takeover based on primary SIC codes, it is important to examine the importance of the business derived from the primary segment relative to the overall operations of the merging firms. We use the Compustat Industry Segment (CIS) tapes to collect data on the segments in which the sample targets and bidders operate. We find that 90% of targets and 77% of bidders are single-segment firms. We also find that 95% of targets and 90% of bidders derive more than 75% of their sales

from their primary segment. Thus, the typical firm in our sample is focused and derives most of its business from the takeover industry.

B. Benchmark input-output accounts

The Bureau of Economic Analysis at the U.S. Department of Commerce publishes the benchmark input-output (IO) accounts for the U.S. economy every five years.¹⁰ The accounts are based primarily on data collected from economic censuses conducted by the Bureau of Census. In this study, we rely on the *Use* table of the benchmark accounts. For any pair of supplier and customer industries, the *Use* table reports estimates of the dollar value of the supplier industry's output that is used as input in the production of the customer industry's output. In Appendix A, we use the 1992 *Use* table to present some of the main inputs that enter in the production of the output of the Plastics and Synthetic Materials industry. For example, in order to produce one dollar of plastic and synthetic materials, the industry used 34 cents of industrial and other chemicals.

C. Rivals, suppliers and corporate customers

In the construction of portfolios of rivals, suppliers, and corporate customers described below, we only consider single-segment firms covered by CRSP and Compustat. We restrict our analysis to single-segment rival, supplier, and customer firms for three reasons. First and most importantly, it increases the power of our tests since many diversified firms will have segments in industries that are not affected by the takeover (McAfee and Williams, 1988). Second, in the case of supplier and customer

firms, this restriction will result in the exclusion of firms that have segments operating in the takeover industry. This is important in case the takeover announcement releases information that affect the valuation of any firm that operates in the takeover industry (see, e.g., Song and Walking, 2000). Finally, this restriction will also result in the exclusion of rival firms that operate in the supplier and/or the customer industry. We also repeat our analysis using all firms covered by Compustat and find results that are qualitatively similar to those reported here.

We define corporate customers as firms that operate in industries that buy the output of the takeover industry. For each pair of customer and takeover industries, we define two variables: *Customer Input Coefficient* and *Takeover Percentage Sold*. The variable *Customer Input Coefficient* is the dollar amount of the takeover industry's output sold to the customer industry divided by the customer industry's total output. This variable measures the importance of the takeover industry's output in the production of the customer industry's output. *Takeover Percentage Sold* is the percentage of the takeover industry's output sold to the customer industry. This variable measures the importance of the customer industry as a buyer of the takeover industry's output.

Since most takeover industries sell their output to a large number of industries, for each takeover industry, we examine two important industries from the list of customer industries with publicly traded firms. The *Main Customer* industry is the industry with the highest *Takeover Percentage Sold*. Simply put, amongst customer industries, this industry buys the highest percentage of the takeover industry's output. The *Dependent Customer* industry is the customer industry with the highest *Customer Input Coefficient*.

In other words, the *Dependent Customer* industry is the industry whose production depends on the takeover industry's output more than any other customer industry.

In order to account for the relatively low dependence of some of the identified customer industries on the takeover industry's output, we only consider customer industries with *Customer Input Coefficient* greater than 1%. This cutoff results in 334 (366) *Main Customer (Dependent Customer)* industries. We also repeat our analysis for 3% and 5% cutoffs and find qualitatively similar results.¹¹ Table 2 displays descriptive statistics for the variables *Customer Input Coefficient* and *Takeover Percentage Sold*.

We define suppliers as firms that operate in industries that supply the inputs used in the production of the takeover industry's output. For each pair of supplier and takeover industries we define two variables. *Takeover Input Coefficient* is the dollar amount of the supplier industry's output sold to the takeover industry divided by the takeover industry's total output. This variable measures the importance of the supplier industry's output in the production of the takeover industry's output. *Supplier Percentage Sold* is the percentage of the supplier industry's output sold to the takeover industry. This variable measures the importance of the takeover industry as a buyer of the supplier industry's output.

As in the case for customers, for each takeover industry, we examine two important industries from the list of supplier industries with publicly traded firms. The *Main Supplier* industry is the supplier industry with the highest *Takeover Input Coefficient*. Simply put, this industry supplies the main input to the takeover industry. The *Dependent Supplier* industry is the supplier industry with the highest *Supplier*

Percentage Sold. In other words, this industry's percentage of output sold to the takeover industry is higher than that of any other supplier industry.

Since some of the identified supplier industries do not sell a significant fraction of their output to the takeover industry, we include in our analysis supplier industries with *Supplier Percentage Sold* greater than 1%. This cutoff results in 316 (399) *Main Supplier (Dependent Supplier)* industries. We also repeat our analysis using 3% and 5% cutoffs and find qualitatively similar results.¹² Table 2 presents descriptive statistics for the variables *Takeover Input Coefficient* and *Supplier Percentage Sold*.

The Compustat database classifies industries by SIC codes, whereas the Use table is constructed using the IO six-digit coding system. In order to convert four-digit SIC codes to six-digit IO codes, we use the conversion table used by Fan and Lang (2000). They construct this table by using conversion tables published by the Bureau of Economic Analysis.¹³ In order to identify suppliers and corporate customers, we use the 1987, 1992 and 1997 tables for takeovers that occur during the 1987-1989, 1990-1994, and 1995-1999 periods, respectively. We also find similar results after repeating our analysis using the 1987, 1992 and 1997 tables for takeovers that occur during the 1987-1991, 1992-1996, and 1997-1999 periods, respectively.

Chapter IV

Methodology and Results

A. Measuring Abnormal Returns

We estimate abnormal returns to firm i at date t (AR_{it}) as follows:

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt}$$

where R_{mt} is the return on the CRSP value-weighted index on day t , R_{it} is the realized return to firm i on day t , α_i and β_i are parameters estimated using a market model.¹⁴ We use an estimation period of 250 days starting on day -300 relative to the takeover announcement date. A firm is included in our analysis if it has at least 100 daily returns for the estimation period. The takeover announcement date is the date when either the target or the bidder makes a public announcement regarding the takeover as reported by SDC. Following Bradley, Desai, and Kim (1988), we estimate *Combined Wealth Effect* (CWE) as the cumulative abnormal return (CAR) to a value-weighted portfolio of the bidder and target. The weights are the respective market values of the equity of bidder and target firms for day -10 relative to the announcement date. The target equity market value excludes the value of target shares held by the bidder prior to the announcement. To estimate CARs to rivals, suppliers, and corporate customers, we follow the literature by forming equally weighted portfolios to account for any contemporaneous cross-correlation of returns (see, e.g., Eckbo, 1983; Song and Walking, 2000).¹⁵ We follow the methodology of Mikkelson and Partch (1988) to test for the statistical significance of CARs. We also test for the significance of the percentage of positive CARs using a

nonparametric generalized sign test. This test uses the fraction of positive CARs in the estimation period as the normal one instead of assuming 50%.

B. Abnormal returns to bidder and target firms

Table 3 presents CARs to targets and bidders. Targets earn significant positive abnormal returns at the takeover announcement. The mean CAR to target firms is 15.89% ($t=72.69$) for the (-1,0) window. For the same window, the mean bidder CAR is -0.61% ($t=-4.06$). The combined wealth effect of the sample takeover averages 2.25% ($t=15.44$) for the (-1,0) window and 3.52% ($t=7.36$) for the (-10,10) window. These results are consistent with the extant evidence on the significance of wealth gains in takeovers.¹⁶ Note also that the percentage of positive CWE is about 61% over the (-10,10) window, indicating that a significant proportion of the sample takeovers (about 39%) have negative combined wealth effect. This evidence suggests, among other things, that some takeovers may be driven by agency problems, the takeover announcement releases negative information about the bidder, and/or, as we argue below, the takeover announcement indicates that the future prospects of the takeover industry are less than expected.

C. Abnormal returns to rivals, corporate customers, and suppliers

Table 4 presents abnormal returns for rivals, customer, and supplier industries. As shown in Panel A, rival firms earn an average CAR of 0.39% ($t = 2.91$) for the (-2,2) window. The positive average CAR to rival firms is consistent with the evidence in Eckbo (1983) and Song and Walking (2000), among others. The proportion of portfolios

with positive CAR to rival firms is not statistically significant for any of the reported windows. The average CAR to supplier and customer portfolios are insignificant for the shorter window (-1,0). For the longer window (-10,10), the CAR to a portfolio of firms in the *Main Customer (Dependent Customer)* industry averages a significant 0.50% (1.00%). The CAR to *Main Supplier (Dependent Supplier)* industry portfolios averages a significant -0.48% (-0.95%).¹⁷ The proportion of portfolios of *Main Supplier (Dependent Supplier)* industries with positive CAR is 45.25% (45.11), significantly lower than the 52% of the estimation period. Although somewhat weak, the evidence in Panel A of Table 4 suggests that, for the overall sample, rivals and customers gain while suppliers lose at the takeover announcement.

At first sight, the previous results appear to be consistent with both the efficiency as well as the buyer power hypothesis but inconsistent with the collusion hypothesis. In the productive efficiency (buyer power) hypothesis case, the results suggest that horizontal takeovers result in higher productivity (buyer power) to the merging firms, which can hurt suppliers. In addition, due to competition in the takeover industry, some of the efficiency is passed on to corporate customers through lower prices and/or higher quality. However, we report above that a significant proportion of the sample takeovers results in negative CWE. Since the collusion and buyer power hypotheses predict a positive CWE, we follow Berkovitch and Narayanan (1993) by splitting our sample into two subsamples, depending on whether a takeover has a positive or negative CWE. An analysis of the two subsamples will enable us to further differentiate among the various competing hypotheses. The results reported in Panels A and B of Table 4 are based on a CWE measured over the (-2, 2) window.¹⁸

In Panel B of Table 4, we report CARs to rivals, customers, and suppliers for the subsample of takeovers with a positive CWE. Compared to the overall sample, the CARs to rivals and customers are significantly higher. The mean CAR to rival firms is 0.43% ($t=3.85$) for the (-1,0) period, compared to 0.08% for the overall sample (the difference between the two means is significant at the one percent level using a t-test). The mean CAR to *Main Customer (Dependent Customer)* industry portfolios is a significant 0.50% (0.52%) for the (-1,0) window, and 1.89% (1.76%) for the (-10,10) period. The CAR to *Main Supplier (Dependent Supplier)* industry portfolios averages a significant 1.06% (1.28%) for the (-10,10) window, statistically different at the one percent level from those for the overall sample.

The CARs for the negative CWE subsample are presented in Panel C of Table 4. Rival firms appear to lose at the takeover announcement. The average CAR to rival firms is -1.67% ($t=-4.53$) for the (-10,10) window. The proportion of portfolios of rivals with positive CARs is 39.67% ($z = -3.94$), compared to 58.67% for the positive CWE subsample. In addition, both customers as well as suppliers lose significantly at the announcement of a negative CWE takeover. Over the (-10,10) period, the CAR to a portfolio of firms in the *Main Customer* industry averages -1.50% ($t = -3.57$), and the proportion of positive CAR is 40% ($t=2.94$). Although the mean CAR to *Dependent Customer* industries is insignificant for all reported windows, the proportion of positive CAR is significantly lower than that expected by chance. Further, the CAR to the *Main Supplier (Dependent Supplier)* industry portfolio averages a significant -2.76% (-4.23%) for the (-10,10) window. For the same window, the proportion of positive CAR to *Main*

Supplier (Dependent Supplier) industries is 31.54% (27.78%), compared to 53.76% (56.96%) for the positive CWE subsample.

In short, for the positive CWE subsample, rivals, customers, and suppliers gain at the announcement of the takeover. On the other hand, for the negative CWE subsample, the pattern is reversed: rivals, suppliers and customers lose significantly at the takeover announcement. Thus, the evidence is inconsistent with the collusion and buyer power hypotheses and in fact, suppliers and customers appear to gain from horizontal takeovers that result in a positive combined wealth effect to merging firms. However, our results are consistent with takeovers resulting in increases in productive efficiency and/or releasing information about overall industry restructuring. Further, the magnitude of the negative CAR to customers, suppliers and, especially, to rival firms for the negative CWE subsample suggests that the announcement of some of these takeovers release negative information regarding the future prospects of the takeover industry. We suggest that agency problems cannot be the sole explanation of this negative valuation effect since, at least in the case of rival firms, we should expect rivals either to be unaffected or to experience a positive price effect; rival firms should benefit from the appearance of a bidder willing to overpay and/or from a less efficient combined firm. Thus, we believe that the above results support the proposition in Mitchell and Mulherin (1996) that takeovers appear to release information about overall industry restructuring. The released information can be negative if it suggests that the industry is experiencing a contraction period. Although we believe that this proposition can further be tested, we leave this issue for future research since it is beyond the scope of this study.

Panels D (Panel E) of Table 4 presents CARs for the subsample of tender offers (mergers). Except for the case of *Main Customers*, the CARs to the two subsamples are not statistically different (using a t-test for the difference in means). We also report in Table 4 CARs for two subsamples based on the method of financing. Panel F shows CARs for the subsample of cash-financed takeovers, while Panel G shows CARs to the subsample of takeovers whose method of financing included stock (i.e. pure stock financed, and cash and stock financed). This partition is motivated by the extent evidence that stock financed takeovers appear to release negative information. Except for rival firms, the difference in CARs for the two subsamples are statistically significant at least at the ten percent level (using at t-test), suggesting that stock-financed takeovers appear to be associated with lower abnormal returns to customers and suppliers. However, we do not draw any conclusion from these univariate results since, before doing so, we need to control for other factors that may affect the abnormal returns to rivals, suppliers, and corporate customers.

Eckbo (1983), Mitchell and Mulherin (1996), and Song and Walking (2000) suggest that the takeover announcements release information about other industry members. In addition, we hypothesize that the information release can also affect firms in supplier and customer industries. In the spirit of Song and Walking (2000), we construct the variable *Surprise Dummy* as a dummy that equals one if the takeover is announced after at least a twelve-months period since the announcement of the last horizontal takeover within the industry, and zero otherwise. Panel H (Panel I) reports CARs for the subsample of takeovers where *Surprise Dummy* equals one (equals zero). The reported results do not suggest that “surprising” takeovers appear to result in higher abnormal

returns. We argue that these insignificant results may mask the effect of positive and negative information on announcement period abnormal returns. In our cross-sectional analysis, we will test whether “surprising” takeovers appear to be associated with higher (lower) CARs in the subsample of takeovers that results in positive (negative) CARs to rivals, suppliers, and corporate customers.

D. Robustness checks

In order to check if the pattern of abnormal returns reported in Table 4 is not particular to the specific customer and supplier industries examined, we report in Table 5 CARs for two additional portfolios. The first portfolio consists of all single-segment firms that operate in the main five customer industries. To identify these industries, we rank all customer industries with publicly traded firms by *Takeover Percentage Sold*, and choose the top five. The second portfolio includes all single-segment firms in the five supplier industries that supply the main five inputs to the takeover industry. The pattern of abnormal returns to the customer and supplier portfolios reported in Panels A and B of Table 5 is very similar to that reported in Table 4, especially for the subsamples of takeovers with positive and negative CWEs.

The effect of a horizontal takeover on suppliers and customers may be less pronounced if either the bidder or the target operates in downstream and upstream industries. For example, if the merging firms can internally supply the inputs used in their production, it is plausible to expect firms in supplier industries not to be affected by any increase in the buyer power of the merging firms. In order to address this issue, we use the segment tapes to identify if either the bidder or the target has segments in the

customer and supplier industries examined. We find that only 7, 5, 8, 8, bidders have segments in the *Main Customer*, *Dependent Customer*, *Main Supplier*, and *Dependent Supplier* industries, respectively. In addition, we find that 3, 2, 6,1 targets have segments in the *Main Customer*, *Dependent Customer*, *Main Supplier*, and *Dependent Supplier* industries, respectively. We repeat our event study analysis after excluding these cases and find similar results.

Chapter V

Cross-sectional analysis

In the previous Chapter, we report evidence suggesting that the average horizontal takeover in our sample is driven by efficiency considerations instead of collusion or buyer power motives. In this section, we examine the relation between the various abnormal returns and the concentration of the takeover industry, takeover-induced change in the concentration of the takeover industry, and the concentrations of supplier and customer industries. The objective of this cross-sectional analysis is twofold. First, we test the presence of collusion and buyer power motives in the cross-section by examining the relation between the various abnormal returns and industry structures. Second, in the case of the productive efficiency hypothesis, we examine whether the structures of the takeover, supplier, and customer industries affect the wealth captured by the merging firms, rivals, suppliers, and corporate customers. In Section A, we develop the cross-sectional hypotheses. Section B describes the construction of our dependent variables. In Section C, we report and discuss our results.

A. Cross-sectional hypotheses

A.1. Concentration of the takeover industry

Firms earn zero economic profits in the long run in perfectly competitive markets. Therefore, if the takeover results in efficiency gains, final consumers will ultimately capture this efficiency because of product market competition. However, if the degree of competition varies across takeover industries, one should expect that the wealth captured

by the merging firms would be higher in less competitive takeover industries. In addition, the takeover can indicate that industrywide efficiency is available to other industry rivals, who can retain more of the wealth gains if the industry is not perfectly competitive. It follows that customers and suppliers of imperfectly competitive industries will benefit relatively less from the productive efficiency created through takeovers. Following the literature, we use the degree of concentration as a proxy for imperfect competition. Thus, the productive efficiency hypothesis predicts a positive (negative) relation between the concentration of the takeover industry and the abnormal returns to the merging firms and their industry rivals (suppliers and corporate customers). When testing this hypothesis, it is important to control for the degree of foreign competition in the takeover industry since studies such as Domowitz, Hubbard, and Petersen (1986) and Katicis and Petersen (1994) find that imports appear to intensify competition in concentrated industries.

If the takeover is anti-competitive, a higher degree of concentration in the takeover industry will lead to a higher likelihood of collusion, which will benefit the merging firms and their rivals, and hurt suppliers and corporate customers. In addition, the effects of a collusive merger will be more pronounced if the takeover-induced increase in concentration is higher (Eckbo, 1985). Therefore, the collusion hypothesis predicts that both, the concentration of the takeover industry and the takeover-induced change in concentration, are positively (negatively) related to the abnormal returns to the merging firms and rivals (suppliers and corporate customers).

A.2. Concentration of customers

Based on the buyer power model in Snyder (1996), the presence of a large buyer reduces the ability of sellers to collude. Under this theory, the presence of concentrated customers can mitigate the anticompetitive effects of a collusive takeover. Therefore, conditional on the validity of the buyer power theory, the collusion hypothesis predicts a negative (positive) relation between the concentration of corporate customers and the abnormal returns to the merging firms (corporate customers).

Ravenscraft (1983) suggests that an industry that sells its output to concentrated buyers will have relatively higher price-cost margins because of lower advertising and other selling expenses. Consequently, if the takeover results in productivity gains, more of this gain will be translated into profits if the customer industry is concentrated. In the presence of market competition in the takeover industry, customers will ultimately capture some of this cost savings. Thus, the efficiency hypothesis predicts a positive relation between the concentration of corporate customers and the abnormal returns to the merging firms and corporate customers.

A.3. Concentration of suppliers

In all the buyer power models discussed above, the size of the buyer is relevant only if the supplier industry is not perfectly competitive. For example, buyer power in Snyder (1996) is the ability of a large buyer to induce tacitly colluding suppliers to undercut the collusion price. Therefore, in order for the takeover to result in higher buyer power for the merging firms, the supplier industry should be sufficiently concentrated in

order to sustain collusion. Further, according to Snyder (1996), rival firms will benefit from a horizontal takeover since the increased buyer power will lead to more intense competition in an imperfectly competitive supplier industry. Therefore, the buyer power hypothesis predicts a positive (negative) relation between the concentration of suppliers and the abnormal returns to the merging firms and their industry rivals (suppliers).

B. Measurement of independent variables

The construction of our concentration measures requires detailed data pertaining to the market shares of firms in the takeover, supplier, and customer industries. Following the literature, we use Compustat to obtain market share data (see, e.g., Lang and Stulz, 1992; Song and Walking, 2000).¹⁹

As a measure for the concentration of the takeover industry, we use the Herfindahl index constructed as follows:

$$\text{Herfindahl Index} = \sum_{i=1}^n (\text{MS}_i)^2,$$

where MS_i is the market share of firm i , measured as sales of firm i divided by the takeover industry's total sales. We use sales for the fiscal year preceding the year of the announcement. The takeover-induced change in concentration is measured as follows:

$$\text{Change in Herfindahl Index} = 2 * \text{MS}_b * \text{MS}_t,$$

where MS_b is the bidder market share and MS_t is the target market share. If either the bidder or the target is a diversified firm, we use the CIS tapes to obtain sales data for the primary SIC code.

In order to measure the concentration of corporate customers, we estimate sales based Herfindahl index as follows:²⁰

$$\text{Customer Concentration} = \sum_{i=1}^n (S_i)^2,$$

where S_i is the estimated percentage of the takeover industry's output sold to firm i , and n is the number of firms in all customer industries. We estimate S_i by multiplying the sales of firm i by the *Customer Input Coefficient* variable that corresponds to the firm's industry, and dividing by the takeover industry's total output. Note that this measure assumes that industries with no publicly traded firms are atomistic. For example, the higher the percentage of a takeover industry's output sold to final consumers, the lower is the customer concentration measure.

Most takeover industries use a large number of inputs. Therefore, a measure of supplier concentration has to account for the industry concentration of each input used and the importance of that input in the production of the takeover industry's output. Following Ravenscraft (1983), we construct *Supplier Concentration* as the weighted average of the Herfindahl indices for all supplier industries. Thus, for every takeover industry, the supplier concentration measure is constructed as follows:

$$\text{Supplier Concentration} = \sum_{j=1}^n (\text{Herfindahl Index}_j) * \text{Takeover Input Coefficient}_j,$$

where *Takeover Input Coefficient_j* is the dollar amount of the j^{th} supplier industry's output used as input to produce one dollar of the takeover industry's output, *Herfindahl Index_j* is the Herfindahl index of the j^{th} supplier industry. As an alternative measure, we use *Main Supplier Concentration*, which is the Herfindahl index of the *Main Supplier* industry. In the regression analysis of the CAR to the *Dependent Supplier* industry, we use *Dependent Supplier Concentration*, which is the Herfindahl index of this industry.

To control for import competition, we follow Mitchell and Mulherin (1996) and construct *Foreign Competition* as the takeover industry's total imports divided by its total

supply. Following the extant literature, in our regression analysis of the combined wealth effect variable, we use the control variables described below.²¹

- (i) *Offer Includes Stock* is a dummy variable that equals one if the bid includes stock financing, and zero otherwise.
- (ii) *Relative Size* is the ratio of the market capitalization of the target to that of the bidder, with both values being measured ten days prior to the announcement of the takeover.
- (iii) *Hostile Takeover* is dummy variable that equals one if the transaction is characterized by SDC as a hostile takeover, and zero otherwise.

Table 6 presents the mean, median, minimum and maximum values of the dependent variables. The mean (median) takeover industry has a Herfindahl index of 0.157 (0.130). The average takeover-induced change in concentration is 0.004. The mean (median) value of the customer concentration measure is 0.050 (0.024). The mean (median) value of *Supplier Concentration* is 0.064 (0.056). The mean value of *Main Supplier Concentration (Dependent Supplier Concentration)* is 0.112 (0.276). The range of values of *Foreign Competition* suggests that the takeover industry vary considerably in the global competition they face. *Foreign Competition* ranges from 0 to 0.705, with an average value of 0.099. The mean (median) *Relative Size* is 0.327 (0.155). Finally, about 35% of the transactions are cash financed and only 11 takeovers are characterized by SDC as hostile.

C. Crosssectional results

In this Section, we report the results on the determinants of CARs to the merging firms, rivals, suppliers and corporate customers. We cumulate the various abnormal returns over the five-day period surrounding the takeover announcement. We also repeat our analysis for the (-1,1) and (-5,5) windows. We do not report these results since they are not sufficiently different from those reported below. All dependent variables are winsorized at the first and 99th percentiles to mitigate the effect of outliers on our results.²² We also repeat our analysis after winsorizing the dependent variables at the fifth and 95th percentile and find qualitatively similar results.²³

C.1. Regression of Combined Wealth Effect

In Table 7 we report results of Weighted Least Squares (WLS) regressions of the combined wealth effect variable on the various independent variables, where the weight is the inverse of the standard deviation of the estimation period residuals.²⁴ Consistent with both the productive efficiency and collusion hypotheses, the coefficient on the Herfindahl index of the takeover industry is positive and significant at the one percent level in the three reported models. However, inconsistent with the collusion hypothesis, the coefficients on *Change in Herfindahl Index* is not significantly different from zero. To further examine the collusion hypothesis, we interact *Change in Herfindahl Index* with *Herfindahl Index* to test whether the takeover-induced change in concentration has a more significant effect on the combined wealth variable at high levels of pre-takeover concentration. As reported in Table 7, the coefficient on this variable is also statistically insignificant.

Taken together, the above three results suggest that, while horizontal takeovers do not appear to increase the likelihood of collusion in the takeover industry, firms in concentrated industries are able to retain more of the wealth created through takeovers, probably due to less intense competition in these industries.²⁵ Further, while the coefficient on *Foreign Competition* by itself is insignificant, the coefficient on the interaction between *Herfindahl Index* and *Foreign Competition* is negative and significant at the five percent level. This evidence suggests that foreign competition seems to increase the competition only in concentrated takeover industries, leading to lower takeover gains to the target and bidder combined. This result is consistent with the evidence that import competition leads to lower price-cost margins in highly concentrated industries (see, e.g., Katics and Petersen, 1994).

In Models 1 and 2 of Table 7, we add to our regressions *Weighted Main Supplier Concentration*, which is the Herfindahl index of the *Main Supplier* industry weighted by *Takeover Input Coefficient*. The weight is used to account for the importance of the supplier industry to the takeover industry.²⁶ The coefficient on this variable by itself is insignificant. In Model 1 (Model 2), we interact *Weighted Main Supplier Concentration* with *Relative Size (Change in Herfindahl Index)*. *Relative Size* is used as a proxy for the size of the combined firm relative to the independent target and bidder. *Change in Herfindahl Index* is used to proxy for the importance of the merger relative to the takeover industry. The positive and significant coefficient on the interaction between *Main Supplier Concentration* and *Relative Size* is consistent with the buyer power hypothesis; a takeover that results in a large combined firm relative to the independent target and bidder results in higher buyer power if suppliers are concentrated. As shown in

Model 3, using *Supplier Concentration* instead of *Weighted Main Supplier Concentration* results in qualitatively similar results. In addition, coupled with the previous result, the insignificant coefficient on the interaction between *Weighted Main Supplier Concentration* and *Change in Herfindahl Index* suggest that the takeover does not have to be large relative to the takeover industry in order to increase the buyer power of the merging firms. However, we should expect that the size of the takeover should be relevant when we examine the wealth effects on suppliers.

In the three models displayed in Table 7, the coefficient on *Customer Concentration* is positive and statistically significant at the one percent level. This evidence is consistent with the productive efficiency hypothesis; under this hypothesis, the merging firms can retain more of the wealth created if their customers are concentrated, probably because of lower marketing and other selling expenses (Ravenscraft, 1983; Scherer and Ross, 1990).

The effects of other control variables on the combined wealth effect variable are as follows. The variable controlling for the method of payment (*Offer Includes Stock*) is negative and statistically significant, consistent with the findings in Travlos (1987) and the extant literature thereafter. The coefficient on *Relative Size* is positive and significant, consistent with the findings in Servaes (1991) and Mulherin and Boone (2000) among others. The coefficient on the hostility variable is also positive and significant.²⁷

C.2. Regression of abnormal returns to rivals

Our results on the determinants of the CAR to rival firms are reported in Table 8. In Model 1, the coefficients on *Herfindahl Index*, *Change in Herfindahl Index*, and the interaction between the two variables are statistically insignificant. These results are inconsistent with the collusion hypothesis. In addition, in Model 2, the coefficient on *Change in Herfindahl Index* is negative and statistically significant at the ten percent level. This negative relation suggests that a merger between two large industry firms results in a competitive disadvantage for their rivals, and does not support the collusion hypothesis, which predicts a positive relation. The coefficients on *Customer Concentration* and *Foreign Competition* are insignificant. However, the coefficient on the interaction between *Foreign Competition* and *Herfindahl Index* is negative and significant. This evidence suggest that, if the takeover signals that rivals can benefit from the restructuring activity in their industry, foreign competition, by intensifying competition in concentrated takeover industries, leads to lower expected gains for firms in these industries.

The negative relation between the CAR to rivals and the concentration of suppliers measure is consistent with concentrated suppliers expropriating more of the wealth that is expected to accrue to rivals. In addition, the coefficient on the interaction between *Change in Herfindahl Index* and *Supplier Concentration* is positive and statistically significant at the one percent level. This evidence suggests that rival firms benefit from the takeover between two large industry firms only when their suppliers are concentrated. This result is consistent with Snyder (1996) who shows that the increase in buyer power after a horizontal takeover can intensify competition among colluding

suppliers, which will benefit rival firms. In unreported results, we use *Weighted Main Supplier Concentration* instead of *Main Supplier Concentration* and find similar results.

In unreported results, we add to our regressions *Surprise Dummy*, which is a dummy variable that equals one if the takeover is announced after at least a twelve-months period since the announcement of the last horizontal takeover within the industry, and zero otherwise. We also interact *Surprise Dummy* with *Negative Rival CAR Dummy*, a dummy variable that equal one when rivals' CAR is negative. While the coefficient on *Surprise Dummy* is positive and significant, the coefficient on the interaction between *Surprise Dummy* and *Negative Rival CAR Dummy* is negative and statistically significant. Since the sum of the two coefficients is significant using an F-test, the evidence suggests that takeovers that release industrywide positive (negative) information have higher (lower) valuation effects if they are announced after at least a one year hiatus.

Finally, as shown in Model 2 of Table 8, the coefficient on the combined wealth effect variable is positive and highly significant. This evidence is inconsistent with the hypothesis that a horizontal takeover can result in a large firm that may engage in predatory pricing to drive its rivals out of business. Note that despite the correlation between the combined wealth variable and some of the independent variables reported in Table 7, adding this variable to our regressions does not affect the results reported in Model 1.

C.3. Regression of abnormal returns to customers

Table 9 displays results of regressing CAR to the portfolio of firms in the *Main Customer* industry on the various explanatory variables. In addition to the explanatory

variables discussed above, we add *Customer Input Coefficient*. Recall that this variable captures the dependence of the customer industry on the input bought from the takeover industry. We expect that higher *Customer Input Coefficient* should be associated with higher magnitude of abnormal returns to customers. In Model 1 of Table 9, the coefficient on this variable is negative and significant. We hypothesize that this negative coefficient masks a positive relation between the CAR to the *Main Customer* industry and *Customer Input Coefficient* in the positive CAR range, and a negative relation between the two variables in the negative CAR range. To test this hypothesis, in addition to *Customer Input Coefficient*, we add *Main Customer Negative CAR Dummy*, a dummy variable that equals one if the dependent variable is negative, and we interact this variable with *Customer Input Coefficient*. The results of this specification, presented in Models 2 and 3 of Table 9, support our prediction. The coefficient on *Customer Input Coefficient* is positive and significant. Further, the coefficient on the interaction between *Main Customer Negative CAR Dummy* and *Customer Input Coefficient* is significantly negative. The sum of the two coefficients, which represents the Coefficient on *Customer Input Coefficient* for the negative CAR range, is negative and significant at the one percent level using an F-test. These results suggest that, in the positive CAR range, an increase in *Customer Input Coefficient* results in higher abnormal returns to corporate customers, while, in the negative CAR range, an increase in the *Customer Input Coefficient* results in lower abnormal returns to corporate customers.

The results presented in Table 9 do not support the collusion hypothesis. The coefficient on *Change in Herfindahl Index* and the interaction between this variable and the Herfindahl index of the takeover industry are insignificant, supporting our earlier

conclusion that horizontal mergers do not appear to be driven by collusion motives. The negative and significant (at the 10% level) coefficient on *Herfindahl Index* is consistent with the results of the previous section; highly concentrated industries appear to retain more of the wealth created, thus customers capture less of the takeover gains.^{28, 29}

The coefficient on *Customer Concentration* is positive and significant in all reported models. Recall that we also find that *Customer Concentration* is positively correlated with *Combined Wealth Effect*. These two results are consistent with the hypothesis that more of the takeover efficiency gains will be translated into profits when customers are more concentrated, probably because of lower marketing and other selling expenses (Ravenscraft, 1983; Scherer and Ross, 1990). Both the merging firms as well as their customers appear to benefit from this cost saving. The negative and significant coefficients on *Foreign Competition* in Models 2 and 3 suggest that customers that have foreign sources for their inputs benefit less from a more efficient domestic input market. The positive and significant (at the 10% level) coefficient on the interaction between *Foreign Competition* and *Herfindahl Index* is consistent with imports intensifying competition in highly concentrated takeover industries, thus resulting in greater gains to customers. Finally, the positive and significant coefficient on the combined wealth effect is inconsistent with the collusion hypothesis, which predicts a transfer of wealth from customers to the takeover industry. The result is instead consistent with customers benefiting more from takeovers that create more wealth to the merging firms.

Table 10 displays regression results of the CAR to the *Dependent Customer* industry portfolio. Most of these results are qualitatively similar to those reported in Table 9. However, the coefficient on the interaction between *Change in Herfindahl Index*

and the Herfindahl index of the takeover industry is positive and significant. This result is also inconsistent with the collusion hypothesis that predicts a positive relation. In addition, the coefficients on the customer concentration and combined wealth variables are positive as in Table 8, but are statistically insignificant. The difference in the significance levels of these two variables for the *Main Customer* and *Dependent Customer* industries can be due to potential measurement errors.

C.4. Regression of abnormal returns to suppliers

Our results on the determinants of the CAR to the *Main Supplier* industry portfolio are reported in Table 11. Since abnormal returns to any supplier industry should be related to the percentage of the industry's output sold to the takeover industry, we add *Supplier Percentage Sold* to our regressions. Recall that this variable measures the importance of the takeover industry as a buyer from the supplier industry. We expect that higher *Supplier Percentage Sold* should be associated with higher magnitude of abnormal returns to suppliers. As in the case for customers, we also include *Negative Main Supplier CAR Dummy*, and interact this variable with *Supplier Percentage Sold*. The positive coefficient on *Supplier Percentage Sold* in both Models 2 and 3 of Table 11 suggests that, for takeover that result in positive CARs to the *Main Supplier* industry, an increase in the percentage of output sold to the takeover industry results in higher abnormal returns. Further, the coefficient on *Supplier Percentage Sold* for takeovers that result in negative abnormal returns to the *Main Supplier* industry, which is equal to the sum of the coefficients on *Supplier Percentage Sold* and the coefficient on the interaction between *Supplier Percentage Sold* and *Main Supplier Negative CAR Dummy*, is negative and

statistically significant at the 10% level using an F-test. This negative coefficient suggests that, for takeovers that result in negative abnormal returns to the *Main Supplier* industry, an increase in the percentage of output sold to the takeover industry results in lower abnormal returns.

The results in Table 11 are inconsistent with the collusion hypothesis. The coefficients on *Herfindahl Index*, *Change in Herfindahl Index*, and the interaction between these two variables are statistically insignificant. In order to test the buyer power hypothesis, we add to our regressions *Weighted Main Supplier Concentration*, which is the Herfindahl index of the *Main Supplier* industry weighted by *Supplier Percentage Sold*.³⁰ Although the coefficient on *Weighted Main Supplier Concentration* is statistically insignificant, the coefficient on the interaction between this variable and *Change in Herfindahl Index* is negative and statistically significant in all reported specifications. This result suggests that the increased buyer power of the combined firm results in significant losses to suppliers if the takeover is large relative to the takeover industry *and* the supplier industry is highly concentrated. We do not find evidence that foreign competition, even for highly concentrated takeover industries, affects the CAR to the *Main Supplier* industry. The positive and significant coefficient on *Combined Wealth Effect* indicates that suppliers benefit more from takeovers that result in higher combined wealth.

Table 12 displays regression results of the CAR to a *Dependent Supplier* industry portfolio. The high statistical significance on the interaction between *Weighted Dependent Supplier Concentration* and *Change in Herfindahl Index* enforces our conclusion above; large takeovers appear to increase the buyer power of the merging

firms if suppliers are concentrated. This result supports Snyder (1996, 1998). In addition, the coefficient on the foreign competition variable by itself is negative and significant in the three reported specifications. One interpretation of this result is that takeover industries that face global competition are under relatively more pressure to reduce their costs through consolidations, which can hurt suppliers. Unlike the result reported in Table 11, the coefficient on the combined wealth variable is not statistically significant. Finally, all other coefficients reported in Table 12 are similar to those in Table 11, suggesting that the wealth effects of takeover announcements on the *Dependent Supplier* and *Main Supplier* industries are similar.

Chapter VI

Conclusion

We extend the research on the motives and wealth effects of takeovers using a sample of 463 horizontal takeovers and tender offers during the 1987-1999 period. We use the benchmark input-output accounts for the U.S. economy to identify firms in industries that supply inputs to the takeover industry (suppliers), and firms in industries that use the output of the takeover industry (corporate customers). We examine the wealth effects of takeover announcements on the merging firms, rivals, suppliers, and corporate customers.

We find that, on average, the announcement of a horizontal takeover is associated with value creation to the combined firm, rivals, and corporate customers, while suppliers experience an adverse stock price effect at the takeover announcement. In addition, we find economically and statistically significant positive (negative) announcement period abnormal returns to rivals, suppliers, and corporate customers for the subsample of takeovers with positive (negative) combined wealth change to target and bidder shareholders. Taken as a whole, these results indicate that horizontal takeovers are generally motivated by productive efficiency and overall industry restructuring, instead of market power or buyer power.

In our cross-sectional analysis, we find no support for collusion as a motive for horizontal takeovers. The takeover-induced change in concentration, even for highly concentrated takeover industries, is not related to the abnormal returns of the combined firm, rivals, and corporate customers. However, we find that the higher the concentration

of the takeover industry, the higher (lower) are the abnormal returns to the combined firm (corporate customers). This evidence is consistent with the merging firms retaining more of the wealth created if their industry is imperfectly competitive. In addition, we find evidence suggesting that horizontal takeovers can increase the buyer power of the merging firms if suppliers are concentrated. Further, we find that the concentrations of the takeover, supplier, and customer industries are related to the abnormal returns of the merging firms, rivals, suppliers, and corporate customers. We also find results consistent with a stock market reaction to takeover announcements that takes into account the economic fundamentals relating the takeover industry to supplier and customer industries.

The results for the subsample of takeovers with negative combined wealth effect to the target and bidder suggest that some takeovers appear to release negative information that affects the valuation of firms in the takeover, supplier, and customer industries. Future research can be directed toward a better understanding of this informational effect of takeover announcements. For example, takeovers may release new information about technological changes that are underway in the takeover industry. They can also suggest that the future prospects of the takeover industry are less than expected because of changes in macroeconomic factors (for example, increase in global competition). Exploring this issue can potentially improve our understanding of takeover wealth effects and motives. For example, as suggested in this study, it is possible for a takeover to create synergies, and yet to be associated with negative wealth effects because of the release of negative information regarding the future prospects of the takeover industry.

In addition, our finding of significant takeover wealth effects on supplier and customer firms suggests that a fruitful area for future research is the examination of the effects of the restructuring of one industry on the consolidation of other related industries. Finally, the degree of interdependence among firms in related industries, which is evident from our results, suggests that our study is just one step toward understanding the effects of the structures of the firm's related industries on its investment decisions.

Appendix A

Inputs that enter in the production of plastic and synthetic materials (IO code 28) ^a

<u>IO input code</u>	<u>Input description</u>	<u>Dollar amount (in millions)</u>	<u>% of total output</u>
27A	Industrial and other chemicals	16,336	34.00
32	Rubber and miscellaneous plastics products	2,023	4.21
68A	Electric services (utilities)	1,072	2.23
73B	Legal, engineering, accounting, and related services	1,348	2.81
	Other inputs ^b	10,882	25.97
	Total intermediate inputs	33,252	69.22
	Value added ^c	14,788	30.78
	Total industry output	48,040	100.00

a. This data is obtained from the 1992 benchmark input-output accounts.

b. Other inputs include a detailed list of all other inputs that enter in the production of this output. We suppress this list for space consideration.

c. Value added includes, among others, compensation of employees, indirect business tax, and corporate profits.

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Table 1
Distribution of sample by year, industry classification, type of takeover, and method of financing

The sample consists of 463 horizontal takeovers during the 1987-1999 period. A takeover is considered horizontal if the bidder and the target have the same primary four-digit SIC code. The takeover sample is obtained from the Worldwide M&A section of the Securities Data Company (SDC). Panel A displays the distribution of the sample by year and industry classification. Panel B shows distribution of the sample by type of takeover (mergers or tender offer). Panel C displays the distribution of the sample by method of payment. Cash-financed takeovers are takeovers whose method of financing is pure cash. Stock-financed takeovers are takeovers whose method of financing includes stock..

Panel A: Distribution of sample by year and industry classification

Industry description	SIC code	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total	%of Total
Agricultural Services	7	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.2
Metal Mining	10	0	0	0	0	1	0	0	0	0	1	1	2	0	5	1.1
Oil And Gas Extraction	13	3	0	0	4	1	0	0	6	2	1	9	3	1	30	6.5
Mining Of Nonmetallic Minerals	14	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.2
Building Construction	15	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.2
Food And Kindred Products	20	0	1	0	0	0	1	0	0	0	0	2	1	0	5	1.1
Textile Mill Products	22	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0.4
Apparel	23	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.2
Lumber And Wood Products	24	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0.4
Furniture And Fixtures	25	0	0	0	1	0	0	0	0	0	0	0	0	1	2	0.4
Paper And Allied Products	26	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.2
Printing and Publishing	27	0	0	0	0	0	0	1	0	1	1	0	1	0	4	0.9
Chemicals And Allied Products	28	0	0	1	0	2	0	0	4	7	5	2	4	4	29	6.3
Petroleum Refining	29	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0.2
Rubber and Plastics	30	2	0	0	1	0	0	0	0	1	1	1	0	0	6	1.3
Leather	31	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.2
Stone, Clay and Glass	32	1	1	0	0	0	0	0	0	0	0	0	1	0	3	0.6
Primary Metal	33	0	2	0	0	1	0	1	0	0	0	1	1	0	6	1.3
Fabricated Metals	34	0	0	0	1	0	1	0	0	1	1	1	1	0	6	1.3
Industrial Machinery	35	1	2	2	0	1	1	2	1	5	4	4	4	3	30	6.5
Electronical Machinery	36	1	2	0	0	2	3	1	4	0	3	6	11	9	42	9.1
Transportation Equipment	37	1	0	0	0	0	0	0	2	0	1	1	1	1	7	1.5

Industry description	Sic code	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total	%of Total
Instruments	38	2	2	1	1	1	0	1	3	4	3	6	2	3	29	6.3
Misc. Manufacturing	39	1	0	0	0	1	0	0	0	0	0	0	1	0	3	0.6
Railroad Transportation	40	0	0	0	0	0	2	0	0	0	0	0	1	0	3	0.6
Passenger Transportation	41	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.2
Motor Freight Transportation	42	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0.4
Water Transportation	44	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.2
Transportation By Air	45	3	1	0	0	1	0	1	0	0	0	1	1	1	9	1.9
Transportation Services	47	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.2
Communications	48	1	0	0	2	0	1	2	6	3	6	5	4	8	38	8.2
Electric, Gas, And Sanitary Services	49	0	1	0	0	0	0	1	1	0	0	1	3	6	13	2.8
Wholesale Trade-durable Goods	50	0	0	0	1	0	0	0	2	1	1	2	4	0	11	2.4
Wholesale Trade-non-durable Goods	51	0	0	0	0	0	0	0	0	1	1	1	0	0	3	0.6
Building Materials	52	0	0	0	0	0	0	1	0	0	0	0	1	0	2	0.4
General Merchandise Stores	53	0	0	1	1	0	0	1	0	1	1	1	2	1	9	1.9
Food Stores	54	0	2	0	0	0	0	0	1	0	2	0	2	0	7	1.5
Automotive Dealers	55	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0.4
Apparel And Accessory Stores	56	0	0	0	1	0	0	0	0	1	0	0	0	1	3	0.6
Home Furniture	57	0	0	0	0	0	0	0	1	0	1	1	0	0	3	0.6
Eating And Drinking Places	58	0	0	0	0	0	0	0	1	2	1	1	1	1	7	1.5
Miscellaneous Retail	59	0	0	1	1	0	0	1	2	1	3	2	3	0	14	3.0
Hotels and Rooming Houses	70	0	0	0	0	0	0	1	0	0	0	2	0	1	4	0.9
Personal Services	72	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0.4
Business Services	73	3	0	4	2	3	1	3	4	5	4	13	21	8	71	15.3
Automotive Repair	75	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0.4
Motion Pictures	78	0	4	2	0	0	0	0	0	1	0	1	0	0	8	1.7
Amusement	79	0	0	0	0	0	0	0	0	1	1	3	3	0	8	1.7
Health Services	80	0	0	0	0	0	2	5	3	0	4	4	0	0	18	3.9
Social Services	83	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0.2
Engineering and Related Services	87	0	0	0	0	0	0	0	0	1	0	0	0	1	2	0.4
Total		19	18	12	18	14	14	22	41	42	51	76	85	51	463	100.0
% of Total		4.1	3.9	2.6	3.9	3.0	3.0	4.8	8.9	9.1	11.0	16.4	18.4	11.0	100.0	

Table 1 (continued)*Panel B: Distribution of sample by year and type of takeover (mergers vs. tender offers)*

<u>Year</u>	<u># of mergers</u>	<u>% of mergers</u>	<u># of tender offers</u>	<u>% of tender offers</u>
1987	11	0.58	8	0.42
1988	11	0.61	7	0.39
1989	6	0.50	6	0.50
1990	12	0.67	6	0.33
1991	11	0.79	3	0.21
1992	13	0.93	1	0.07
1993	20	0.91	2	0.09
1994	34	0.83	7	0.17
1995	34	0.81	8	0.19
1996	37	0.73	14	0.27
1997	61	0.80	15	0.20
1998	66	0.78	19	0.22
1999	36	0.71	15	0.29

Panel C: Distribution of sample by year & method of financing (cash vs. stock financed)

<u>Year</u>	<u># of cash financed</u>	<u>% of cash financed</u>	<u># of stock financed</u>	<u>% of stock financed</u>
1987	10	0.53	9	0.47
1988	10	0.56	8	0.44
1989	6	0.50	6	0.50
1990	9	0.50	9	0.50
1991	4	0.29	10	0.71
1992	5	0.36	9	0.64
1993	5	0.23	17	0.77
1994	12	0.29	29	0.71
1995	9	0.21	33	0.79
1996	17	0.33	34	0.67
1997	21	0.28	55	0.72
1998	29	0.34	56	0.66
1999	21	0.41	30	0.59

Table 2
Descriptive statistics for the variables used to identify customer and supplier industries

The sample consists of 463 horizontal takeovers during the 1987-1999 period. A takeover is considered horizontal if the bidder and the target have the same primary four-digit SIC code. Customer and supplier industries are identified using the benchmark input-output accounts for the U.S. economy. For each pair of customer and takeover industries, *Customer Input Coefficient* is the dollar amount of the takeover industry's output sold to the customer industry divided by the total output of the customer industry. *Takeover Percentage Sold* is the percentage of the takeover industry's output sold to the corporate customer industry. The *Main Customer* industry is the customer industry with the highest *Takeover Percentage Sold*. The *Dependent Customer* industry is the customer industry with the highest *Customer Input Coefficient*. Only customer industries with *Customer Input Coefficient* greater than 1% are included. For each pair of supplier and takeover industries, *Takeover Input Coefficient* is the dollar amount of the supplier industry's output sold to the takeover industry divided by the takeover industry's total output, expressed in percentage terms. *Supplier Percentage Sold* is the percentage of the supplier industry's output sold to the takeover industry. The *Main Supplier* industry is the supplier industry with the highest *Takeover Input Coefficient*. The *Dependent Supplier* industry is the supplier industry with the highest *Supplier Percentage Sold*. Only supplier industries with *Supplier Percentage Sold* greater than 1% are included. All figures are expressed in percentage terms.

	N	Mean	Median	25 th percentile	75 th percentile
<u>Main Customer Industry</u>					
Customer Input Coefficient	334	9	3	1	7
Takeover Percentage Sold	334	14	5	2	14
<u>Dependent Customer Industry</u>					
Customer Input Coefficient	366	12	6	3	13
Takeover Percentage Sold	366	14	5	2	14
<u>Main Supplier Industry</u>					
Supplier Percentage Sold	316	13	7	2	15
Takeover Input Coefficient	316	9	6	4	11
<u>Dependent Supplier Industry</u>					
Supplier Percentage Sold	399	25	17	8	37
Takeover Input Coefficient	399	9	3	1	7

Table 3
Announcement period abnormal returns to target and bidder firms

This table reports announcement period abnormal returns to targets and bidders for a sample of 463 horizontal takeovers during the 1987-1999 period. A takeover is considered horizontal if the bidder and the target have the same primary four-digit SIC code. The takeover sample is obtained from the Worldwide M&A section of the Securities Data Company (SDC). Abnormal returns are estimated using a market model. Day 0 in event time is the day of the takeover announcement. *Combined Wealth Effect* is the cumulative abnormal return to a value-weighted portfolio of the bidder and target. A nonparametric generalized sign test is used to test for the percentage of positive cumulative abnormal returns. The symbols *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Window	Targets		Bidders		Combined Wealth Effect	
	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	15.89*** (72.69)	81.20*** (14.97)	-0.61*** (-4.06)	41.46** (-2.24)	2.25*** (15.44)	59.17*** (3.42)
(-2,2)	21.1*** (60.13)	82.46*** (15.43)	-1.27*** (-4.96)	42.95 (-1.68)	2.68*** (11.19)	60.04*** (3.80)
(-10, 10)	25.57*** (33.78)	84.02*** (16.18)	-1.18* (-1.77)	46.00 (-0.28)	3.52*** (7.36)	60.69*** (4.08)

Table 4
Announcement period abnormal returns to rivals, customers, and suppliers.

This table reports cumulative abnormal returns (CAR) to *Rivals*, *Main Customer*, *Dependent Customer*, *Main supplier*, and *Dependent Supplier* industries. The sample consists of 463 horizontal takeovers during the 1987-1999 period. *Rivals* are all single-segment firms operating in the takeover industry. For each takeover industry, the *Main Customer* industry is the industry that buys the highest percentage of the takeover industry's output. The *Dependent Customer* industry is the industry whose production depends on the takeover industry's output more than any other customer industry. The *Main supplier* industry is the industry that supplies the main input to the takeover industry. The *Dependent Supplier* industry is the supplier industry whose percentage of output sold to the takeover industry is higher than that of any other supplier industry. A customer industry is included in the sample if its total dollar amount spent on the input bought from the takeover industry represents more than one percent of its total output. A supplier industry is included in the sample if it sells more than one percent of its total output to the takeover industry. Abnormal returns are estimated using a market model. CARs to rivals, suppliers, and customers are estimated using equally weighted portfolios of single-segment firms in the corresponding industry. Day 0 in event time is the day of the takeover announcement. Panel A reports CARs for the overall sample. Panel B (Panel C) reports CARs to the subsample of takeovers with positive (negative) *Combined Wealth Effect*. Panel D (Panel E) reports CARs to the subsample of tender offers (mergers). Panel F (Panel G) reports CARs to the subsample of cash-financed (stock-financed) takeovers. Panel H (Panel I) reports CARs to the subsample of takeovers with *Surprise Dummy* equal one (equal 0), where *Surprise Dummy* is a dummy variable that equals one if the takeover is announced after a minimum 12-month dormant period in the industry (mergers). The symbols *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Panel A: CAR (%) to the overall sample of takeovers

Window	Rivals 455 portfolios		Main Customer Ind. 334 portfolios		Dependent Customer Ind. 366 portfolios		Main Supplier Ind. 316 portfolios		Dependent Supplier Ind. 399 portfolios	
	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	0.08 (0.90)	51.21 (-0.65)	0.19 (1.30)	51.17 (-0.11)	0.12 (1.35)	51.91 (-0.99)	-0.02 (-0.72)	49.20 (-1.07)	0.18 (1.21)	50.12 (-0.60)
(-2,2)	0.39*** (2.91)	54.07 (0.57)	0.30* (1.82)	48.80 (-1.20)	0.21 (1.29)	49.03* (-1.94)	-0.05 (-1.08)	48.41 (-1.29)	0.28 (0.71)	48.37 (-1.30)
(-10,10)	0.52 (1.55)	53.41 (0.29)	0.50* (1.73)	52.10 (0.00)	1.00*** (2.70)	51.52 (-0.99)	-0.48** (-2.05)	45.25** (-2.42)	-0.95** (-1.99)	45.11*** (-2.60)
(10,20)	0.01 (-0.72)	48.79 (-1.68)	0.05 (-0.12)	48.80 (-1.21)	0.31 (1.02)	52.45 (-0.78)	0.09 (0.01)	42.85*** (-3.32)	-0.15 (-1.20)	44.61*** (-2.80)

Table 4 (continued)

Panel B: CAR (%) to the subsample of takeovers with positive Combined Wealth Effect

	Rivals 271 portfolios		Main Customer Ind. 199 portfolios		Dependent Customer Ind. 222 portfolios		Main Supplier Ind. 186 portfolios		Dependent Supplier Ind. 237 portfolios	
Window	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	0.43*** (3.85)	57.56* (1.88)	0.50*** (3.24)	58.29* (1.85)	0.52*** (2.74)	55.96 (0.84)	0.04 (0.03)	50.00 (-0.48)	0.59*** (3.11)	56.12 (1.44)
(-2,2)	1.25*** (7.17)	64.94*** (4.31)	0.79*** (4.24)	52.26 (0.15)	0.76*** (2.87)	52.75 (-0.11)	0.42*** (1.91)	53.76 (0.55)	1.37*** (4.34)	55.27 (1.18)
(-10,10)	1.95*** (5.52)	61.62*** (3.21)	1.89*** (4.86)	60.30*** (2.42)	1.76*** (3.04)	55.50 (0.71)	1.06*** (2.31)	53.76 (0.55)	1.28*** (3.12)	56.96* (1.70)
(10,20)	0.07 (-0.06)	48.34*** (-1.16)	0.04 (0.60)	51.26 (-0.14)	0.7 (1.18)	54.13 (0.30)	0.32 (0.80)	44.62* (-1.95)	0.24 (-0.14)	46.84 (-1.42)

Panel C: CAR (%) to the subsample of takeovers with negative Combined Wealth Effect

	Rivals 184 portfolios		Main Customer Ind. 135 portfolios		Dependent Customer Ind. 144 portfolios		Main Supplier Ind. 130 portfolios		Dependent Supplier Ind. 162 portfolios	
Window	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	-0.41*** (-3.22)	42.93*** (-3.05)	-0.25* (-1.71)	42.96** (-2.25)	-0.46 (-1.19)	45.83** (-2.38)	-0.10 (-1.13)	46.92 (-1.26)	-0.39* (-1.81)	41.98*** (-2.55)
(-2,2)	-0.85*** (-4.16)	36.96*** (-4.68)	-0.41*** (-2.94)	34.81*** (-4.14)	-0.64 (-1.50)	43.06*** (-3.05)	-0.72*** (-4.01)	38.46*** (-3.19)	-1.29*** (-4.16)	38.27*** (-3.50)
(-10,10)	-1.67*** (-4.53)	39.67*** (-3.94)	-1.50*** (-3.57)	40.00*** (-2.94)	-0.12 (0.55)	45.83** (-2.38)	-2.76*** (-6.16)	31.54*** (-4.77)	-4.23*** (-6.97)	27.78*** (-6.17)
(10,20)	-0.06 (-1.06)	50.00 (-1.13)	0.07 (-0.90)	45.19* (-1.73)	-0.29 (0.18)	48.61* (-1.71)	-0.15 (-0.79)	42.31** (-2.31)	-0.71 (-1.63)	41.36*** (-2.71)

Table 4 (continued)

Panel D: CAR (%) to the subsample of tender offers

Window	Rivals 107 portfolios		Main Customer Ind. 79 portfolios		Dependent Customer Ind. 90 portfolios		Main Supplier Ind. 73 portfolios		Dependent Supplier Ind. 95 portfolios	
	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	0.26** (2.15)	0.53 (0.37)	0.83*** (2.77)	0.58 (1.23)	0.57** (2.01)	0.57 (0.98)	-0.25 (-1.49)	0.42 (-1.47)	-0.24 (-0.36)	0.48 (-0.66)
(-2,2)	0.37*** (2.78)	0.57 (1.14)	1.02*** (2.72)	0.47 (-0.8)	0.92** (1.98)	0.53 (0.13)	0.14 (0.45)	0.49 (-0.30)	0.89* (1.72)	0.53 (0.16)
(-10,10)	0.99*** (2.64)	0.58 (1.33)	2.73*** (3.93)	0.59 (1.45)	2.48*** (2.81)	0.56 (0.76)	-0.31 (-0.39)	0.49 (-0.30)	0.69 (0.61)	0.58 (1.19)

Panel E: CAR (%) to the subsample of mergers

Window	Rivals 348 portfolios		Main Customer Ind. 255 portfolios		Dependent Customer Ind. 276 portfolios		Main Supplier Ind. 243 portfolios		Dependent Supplier Ind. 304 portfolios	
	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	0.03 (-0.17)	0.52 (-0.66)	0.00 (0.11)	0.50 (-0.87)	-0.02 (0.40)	0.50 (-1.63)	0.03 (-0.02)	0.50 (-0.64)	0.30 (1.61)	0.51 (-0.25)
(-2,2)	0.41* (1.77)	0.52 (0.20)	-0.12 (-0.62)	0.44*** (-2.62)	-0.03 (0.32)	0.48** (-2.23)	-0.14 (-1.56)	0.46* (-1.93)	0.09 (-0.11)	0.47 (-1.63)
(-10,10)	0.41 (0.25)	0.52 (-0.55)	-0.15 (-0.39)	0.50 (-0.75)	0.55 (1.59)	0.50 (-1.63)	-0.58 (-2.16)	0.43 (-2.83)	-1.38 (-2.59)	0.41 (-3.69)

Table 4 (continued)

Panel F: CAR (%) to the subsample of cash-financed takeovers

Window	Rivals 151 portfolios		Main Customer Ind. 108 portfolios		Dependent Customer Ind. 120 portfolios		Main Supplier Ind. 108 portfolios		Dependent Supplier Ind. 135 portfolios	
	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	-0.01 (0.76)	0.52 (-0.17)	0.33** (2.00)	0.53 (0.36)	0.20** (2.21)	0.58 (1.07)	0.05 (-0.59)	0.44 (-1.60)	-0.13 (0.34)	0.47 (-0.94)
(-2,2)	0.19*** (2.20)	0.52 (-0.17)	0.43** (2.19)	0.48 (-0.60)	0.47** (2.33)	0.55 (0.51)	0.27 (0.65)	0.50 (-0.44)	0.17 (1.47)	0.53 (0.27)
(-10,10)	0.72** (2.26)	0.56 (0.97)	1.99*** (3.72)	0.59* (1.71)	2.35*** (3.71)	0.56 (0.70)	0.32 (0.64)	0.55 (0.72)	-0.33 (-0.04)	0.50 (-0.25)

Panel G: CAR (%) to the subsample stock-financed takeovers

Window	Rivals 303 portfolios		Main Customer Ind. 226 portfolios		Dependent Customer Ind. 246 portfolios		Main Supplier Ind. 208 portfolios		Dependent Supplier Ind. 264 portfolios	
	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	0.13 (0.54)	0.52 (-0.40)	0.14 (0.45)	0.52 (-0.31)	0.09 (0.18)	0.54* (-1.77)	-0.07 (-0.65)	0.50 (-0.68)	0.32 (1.23)	0.51 (-0.12)
(-2,2)	0.50*** (1.97)	0.55 (0.86)	0.00 (-0.56)	0.44*** (-2.70)	0.07 (-0.03)	0.51*** (-2.54)	-0.22* (-1.90)	0.48 (-1.38)	0.34 (-0.14)	0.46* (-1.71)
(-10,10)	0.49 (0.43)	0.52 (-0.40)	-0.17 (-0.71)	0.48 (-1.24)	0.33 (0.74)	0.53* (-1.90)	-0.97*** (-3.17)	0.40*** (-3.60)	-1.18*** (-2.42)	0.42*** (-3.19)

Table 4 (continued)

Panel H: CAR (%) to the subsample of takeovers with Surprise Dummy equals one

Window	Rivals 227 portfolios		Main Customer Ind. 148 portfolios		Dependent Customer Ind. 180 portfolios		Main Supplier Ind. 139 portfolios		Dependent Supplier Ind. 189 portfolios	
	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	0.10 (0.86)	50.66 (-0.35)	0.52*** (2.51)	52.70 (0.17)	0.39* (1.91)	50.84 (-0.19)	-0.09 (-0.39)	51.08 (-0.22)	0.05 (0.74)	49.74 (-0.39)
(-2,2)	0.31 (1.61)	54.19 (0.71)	0.55** (2.35)	46.62 (-1.31)	0.45* (1.79)	48.04 (-0.93)	0.03 (0.04)	52.52 (0.12)	0.47 (1.18)	51.32 (0.05)
(-10,10)	0.60 (1.08)	51.54 (-0.08)	1.15*** (2.57)	54.05 (0.50)	0.87** (2.14)	51.96 (0.11)	-0.76 (-1.64)	45.32 (-1.58)	-1.29 (-1.58)	43.92** (-1.99)

Panel I: CAR (%) to the subsample of takeovers with Surprise Dummy equals zero

Window	Rivals 228 portfolios		Main Customer Ind. 186 portfolios		Dependent Customer Ind. 186 portfolios		Main Supplier Ind. 177 portfolios		Dependent Supplier Ind. 210 portfolios	
	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	0.06 (0.39)	51.75 (-0.61)	-0.06 (-0.45)	51.34 (-0.25)	-0.13 (0.01)	52.17 (-1.24)	0.05 (-0.44)	47.46 (-1.24)	0.27 (0.99)	50.71 (-0.41)
(-2,2)	0.50** (2.45)	53.95 (0.05)	-0.19 (-1.13)	43.32** (-2.45)	-0.06 (-0.08)	49.46** (-1.98)	-0.12 (-1.42)	43.50** (-2.30)	0.10 (-0.12)	45.50* (-1.92)
(-10,10)	0.47 (1.00)	54.39 (0.19)	0.04 (-0.23)	50.80 (-0.40)	1.17* (1.80)	51.09 (-1.54)	-0.26 (-1.23)	45.20* (-1.85)	-0.53 (-1.20)	45.97* (-1.78)

Table 5
Announcement period abnormal returns to the main five customer and supplier industries

The sample consists of 463 horizontal takeovers during the 1987-1999 period. Supplier and customer industries are identified using the benchmark input-output accounts for the U.S. economy. Panel A reports cumulative abnormal returns (CAR) to an equally weighted portfolio of all single-segment firms that operate in the main five customer industries. These industries are identified by ranking all customer industries with publicly traded firms by *Takeover Percentage Sold*, which is the percentage of the takeover industry's output sold to the corporate customer industry, and then selecting the top five. A customer industry is included in the sample if its total dollar amount spent on the input bought from the takeover industry represents more than one percent of its total output. Panel B reports CAR to an equally weighted portfolio that includes all single-segment firms that operate in the five industries that supply the top five inputs to the takeover industry. A supplier industry is included in the sample if it sells more than one percent of its total output to the takeover industry. Abnormal returns are estimated using a market model. Panels A and B report CARs to subsamples of takeovers with a positive and negative *Combined Wealth Effect*. The symbols *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Panel A: CAR (%) to the main five customer industries

Window	Overall sample (421 portfolios)		Positive CWE (250 portfolios)		Negative CWE (171 portfolios)	
	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	0.00 (-0.26)	49.86 (-1.34)	0.14** (2.05)	53.33 (0.14)	-0.19*** (-2.84)	44.74*** (-2.28)
(-2,2)	0.07 (0.38)	47.21** (-2.37)	0.41*** (3.32)	52.89 (0.00)	-0.45*** (-3.56)	38.82*** (-3.75)
(-10,10)	0.19 (0.73)	51.45 (-0.72)	0.91*** (4.38)	59.56** (2.01)	-0.88*** (-4.21)	40.13*** (-3.42)
(10,20)	0.01 (0.03)	48.80* (-1.75)	0.11 (1.37)	52.00 (-0.26)	-0.11 (-1.55)	48.68 (-1.30)

Panel B: CAR (%) to the main five supplier industries

Window	Overall sample (377 portfolios)		Positive CWE (225 portfolios)		Negative CWE (152 portfolios)	
	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)	Mean (t-stat)	% positive (z-stat)
(-1,0)	-0.04 (-1.10)	48.93* (-1.69)	0.13 (1.20)	53.2 (0.09)	-0.26*** (-3.01)	42.69*** (-2.74)
(-2,2)	0.08 (-1.01)	52.73 (-0.13)	0.61*** (2.85)	58.4* (1.73)	-0.66*** (-4.96)	42.69*** (-2.74)
(-10,10)	-0.38*** (-2.68)	46.32*** (-2.77)	0.98*** (3.15)	54.8 (0.59)	-2.33*** (-7.99)	33.33*** (-5.19)
(10,20)	0.14 (0.33)	49.64 (-1.4)	0.40 (1.59)	51.6 (-0.42)	-0.18 (-1.30)	45.61** (-1.97)

Table 6
Summary statistics for independent variables

The sample includes 463 horizontal takeovers during the 1987-1999 period. Customer and supplier industries are identified using the benchmark input-output accounts for the U.S. economy. *Herfindahl Index* is the sales-based Herfindahl index of the takeover industry. *Change in Herfindahl Index* is equal to $2 \times \text{target market share} \times \text{bidder market share}$. *Customer Concentration* is equal to $\sum_{i=1}^n (S_i)^2$, where S_i is the estimated percentage of the takeover industry's output sold to firm i . *Takeover Input Coefficient* is the dollar amount of the supplier industry's output sold to the takeover industry divided by the takeover industry's total output. *Supplier Concentration* is the weighted average of the Herfindahl indices of all supplier industries, in which the weight for every supplier industry is the corresponding *Takeover Input Coefficient*. *Main Supplier Concentration* is the Herfindahl index of the supplier industry that supplies the main input to the takeover industry. *Dependent Supplier Concentration* is the Herfindahl index of the supplier industry whose percentage of output sold to the takeover industry is higher than that of any other supplier industry. *Foreign competition* is the takeover industry's total imports divided by its total supply. *Relative Size* is the market value of equity of the target divided by that of the bidder. *Offer Includes Stocks* is a dummy variable that equals one if the bid includes stock financing, and zero otherwise. *Hostile Takeover* is a dummy variable that equals one if the takeover is characterized as hostile by the SDC database, and zero otherwise.

	<u>Mean</u>	<u>Median</u>	<u>Minimum</u>	<u>Maximum</u>
Herfindahl Index	0.1570	0.1305	0.0328	0.9319
Change in Herf. Index	0.0040	0.0003	0.0000	0.2042
Customer Concentration	0.0500	0.0244	0.0026	0.6469
Supplier Concentration	0.0642	0.0566	0.0113	0.2193
Main Supplier Concentration	0.1128	0.0809	0.0168	0.8158
Dependent Supplier Concentration	0.2761	0.2101	0.0397	1.0000
Foreign Competition	0.0994	0.0055	0.0000	0.7059
Relative Size	0.3276	0.1559	0.0005	4.9766
Offer includes stock (1/0)	0.6590	1.0000	0.0000	1.0000
Hostile Takeover (1/0)	0.0237	0.0000	0.0000	1.0000

Table 7
Weighted Least Squares regressions of the combined wealth gain to target and bidder firms

The dependent variable is *Combined Wealth Effect*, which is the cumulative abnormal return to a value-weighted portfolio of the bidder and target for the (-2,2) window. *Herfindahl Index* is the sales-based Herfindahl index of the takeover industry. *Change in Herfindahl Index* is equal to 2*target market share*bidder market share. *Supplier Concentration* is the weighted average of the Herfindahl indices of all supplier industries, in which the weight for every supplier industry is the corresponding *Takeover Input Coefficient*. *Customer Concentration* is equal to $\sum_{i=1}^n (S_i)^2$, where S_i is the estimated percentage of the takeover industry's output sold to firm i . *Foreign competition* is the takeover industry's total imports divided by its total supply. *Relative Size* is the market value of equity of the target divided by that of the bidder. *Offer Includes Stocks* is a dummy variable that equals one if the bid includes stock. The symbols *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)
Intercept	1.55* (1.67)	1.08 (1.18)	0.92 (0.73)
Herfindahl Index	13.20*** (3.20)	13.31*** (3.20)	12.27*** (2.96)
Change in Herfindahl Index	10.49 (0.34)	14.88 (0.38)	5.54 (0.18)
Herfindahl Index * Change in Herfindahl Index	-58.94 (-0.84)	-59.76 (-0.79)	-42.38 (-0.60)
Weighted Main Supplier Concentration	-42.23 (-1.35)	7.48 (0.30)	
Weighted Main Supplier Conc.*Relative Size	72.73** (2.33)		
Weighted Main Supplier Conc.*Change in Herf. Index		-478.36 (-0.34)	
Supplier Concentration			4.23 (0.26)
Supplier Concentration *Relative Size			31.20* (1.75)
Customer Concentration	14.19*** (2.84)	14.45*** (2.87)	13.97*** (2.70)
Foreign Competition	4.69 (1.43)	4.03 (1.23)	3.40 (1.01)
Herfindahl Index*Foreign Competition	-41.05** (-2.22)	-42.17** (-2.25)	-41.98** (-2.27)
Relative Size	2.10*** (4.19)	2.61*** (5.75)	1.05 (1.04)
Offer Includes Stock	-3.90*** (-5.10)	-3.76*** (-4.90)	-3.67*** (-4.79)
Hostile Takeover	8.33*** (3.76)	8.53*** (3.82)	8.52*** (3.84)
Number of observations	452	452	452
Adjusted R-squared	0.19	0.18	0.19

Table 8
Weighted Least Squares regression of cumulative abnormal returns to rival firms

The sample includes 463 horizontal takeovers during the 1987-1999 period. The dependent variable is the cumulative abnormal return to an equally weighted portfolio of rival firms for the (-2,2) window. Abnormal returns are estimated using a market model. The weight used in the Weighted Least Squares regressions is the inverse of the standard deviation of the estimation period residuals. Rivals are all single-segment firms operating in the takeover industry. *Herfindahl Index* is the Herfindahl index of the takeover industry. *Change in Herfindahl Index* is equal to $2 \times \text{target market share} \times \text{bidder market share}$. *Takeover Input Coefficient* is the dollar amount of the supplier industry's output sold to the takeover industry divided by the takeover industry's total output. *Supplier Concentration* is the weighted average of the Herfindahl indices of all supplier industries, where the weight for every supplier industry is the corresponding *Takeover Input Coefficient*. *Customer Concentration* is equal to $\sum_{i=1}^n (S_i)^2$, where S_i is the estimated percentage of the takeover industry's output sold to firm i . *Foreign competition* is the takeover industry's total imports divided by its total supply. *Combined Wealth Effect* is the cumulative abnormal return to a value-weighted portfolio of bidder and target firms over the (-2,2) window. The symbols *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)
Intercept	0.54 (1.22)	0.73* (1.71)
Herfindahl Index	2.95 (1.51)	1.44 (0.76)
Change in Herfindahl Index	-57.67 (-1.32)	-77.96* (-1.86)
Herfindahl Index *Change in Herfindahl Index	46.43 (0.54)	95.18 (1.14)
Supplier Concentration	-8.66 (-1.34)	-11.02* (-1.76)
Supplier Concentration *Change in Herfindahl Index	942.42*** (2.55)	1000.54*** (2.82)
Customer Concentration	1.43 (0.58)	0.39 (0.17)
Foreign Competition	1.47 (0.96)	1.62 (1.10)
Herfindahl Index *Foreign Competition	-19.90** (-2.02)	-17.54* (-1.86)
Combined Wealth Effect		0.08*** (6.15)
Number of observations	445	445
Adjusted R-squared	0.02	0.09

Table 9
Weighted Least Squares regression of CAR to the Main Customer industry

The sample includes 463 horizontal takeovers during the 1987-1999 period. The dependent variable is the cumulative abnormal return (CAR) on an equally weighted portfolio of all single-segment firms in the *Main Customer* industry for the (-2,2) window. Abnormal returns are estimated using a market model. The weight used in the Weighted Least Squares regressions is the inverse of the standard deviation of the estimation period residuals. The dependent variable is winsorized at the fifth and 95th percentile. The *Main Customer* industry is the industry that buys the highest percentage of the takeover industry's output. *Customer Input Coefficient* is the dollar amount of the takeover industry's output sold to the corporate customer industry divided by the total output of the corporate customer industry. *Main Customer Negative CAR Dummy* is a dummy variable that equals one if the dependent variable is negative. *Herfindahl Index* is the Herfindahl index of the takeover industry. *Change in Herfindahl Index* is equal to $2 \times \text{target market share} \times \text{bidder market share}$. *Customer Concentration* is equal to $\sum_{i=1}^n (S_i)^2$, where S_i is the estimated percentage of the takeover industry's output sold to firm i . *Foreign competition* is the takeover industry's total imports divided by its total supply. *Combined Wealth Effect* is the cumulative abnormal return to a value-weighted portfolio of the bidder and target for the (-2,2) window. The symbols *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)
Intercept	0.10 (0.82)	0.92*** (10.37)	0.92*** (10.44)
Main Customer Negative CAR Dummy		-1.87*** (-20.29)	-1.86*** (-20.16)
Customer Input Coefficient	-1.16* (-1.74)	1.81*** (2.65)	1.73** (2.55)
Customer Input Coefficient*Main Cust. Neg. CAR Dummy		-3.89*** (-4.75)	-3.86*** (-4.73)
Herfindahl Index	-1.51* (-1.86)	-0.76 (-1.50)	-0.97* (-1.88)
Change in Herfindahl Index	7.15 (0.97)	2.46 (0.54)	1.62 (0.35)
Herfindahl index *Change In Herfindahl index	-5.41 (-0.34)	3.00 (0.31)	4.99 (0.51)
Customer Concentration	3.84** (2.37)	2.52** (2.49)	2.59*** (2.58)
Foreign Competition	-0.69 (-0.95)	-0.79* (-1.76)	-0.81* (-1.82)
Herfindahl Index*Foreign Competition	3.38 (0.59)	6.02* (1.70)	6.60* (1.87)
Combined Wealth Effect			0.01** (2.01)
Number of observations	327	327	327
Adjusted R-squared	0.02	0.62	0.63

Table 10
Weighted Least Squares regression of CAR to the Dependent Customer industry

The sample includes 463 horizontal takeovers during the 1987-1999 period. The independent variable is the cumulative abnormal return to an equally weighted portfolio of single-segment firms in the *Dependent Customer industry* over the (-2,2) window. Abnormal returns are estimated using a market model. The weight used in the Weighted Least Squares regressions is the inverse of the standard deviation of the estimation period residuals. The dependent variable is winsorized at the fifth and 95th percentile. The *Dependent Customer industry* is the industry whose production depends on the takeover industry's output more than any other customer industry. *Customer Input Coefficient* is the dollar amount of the takeover industry's output sold to the corporate customer industry divided by the total output of the corporate customer industry. *Dependent Customer Negative CAR Dummy* is a dummy variable that equals one if the dependent variable is negative. *Herfindahl Index* is the Herfindahl index of the takeover industry. *Change in Herfindahl Index* is equal to $2 \times \text{target market share} \times \text{bidder market share}$. *Customer Concentration* is equal to $\sum_{i=1}^n (S_i)^2$, where S_i is the estimated percentage of the takeover industry's output sold to firm i . *Foreign competition* is the takeover industry's total imports divided by its total supply. *Combined Wealth Effect* is the cumulative abnormal return to a value-weighted portfolio of the bidder and target firms for the (-2,2) window. The symbols *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)
Intercept	0.27 (1.47)	1.63*** (12.12)	1.62*** (12.01)
Dependent Customer Negative CAR Dummy		-2.83*** (-20.64)	-2.83*** (-20.53)
Customer Input Coefficient	-0.73 (-0.76)	2.52** (2.44)	2.51** (2.43)
Customer Input Coefficient*Neg. Dep. Cust. CAR Dummy		-3.61*** (-2.95)	-3.60*** (-2.94)
Herfindahl Index	-2.64** (-2.22)	-1.71** (-2.26)	-1.79** (-2.35)
Change in Herfindahl Index	-2.63 (-0.25)	-7.30 (-1.09)	-7.73 (-1.15)
Herfindahl index *Change in Herfindahl index	44.57* (1.94)	30.14** (2.07)	31.23** (2.13)
Customer Concentration	2.09 (0.93)	-0.18 (-0.13)	-0.17 (-0.12)
Foreign Competition	-0.40 (-0.38)	-1.07 (-1.61)	-1.06 (-1.59)
Herfindahl Index*Foreign Competition	5.86 (0.71)	11.95** (2.27)	11.95** (2.27)
Combined Wealth Effect			0.00 (0.83)
Number of observations	358	358	358
Adjusted R-squared	0.02	0.60	0.60

Table 11
Weighted Least Squares regression of CAR to the Main Supplier industry

The sample includes 463 horizontal takeovers during the 1987-1999 period. The dependent variable is the cumulative abnormal return (CAR) on an equally weighted portfolio of single-segment firms in the *Main Supplier* industry. Abnormal returns are estimated using a market model. The weight used in the Weighted Least Squares regressions is the inverse of the standard deviation of the estimation period residuals. The dependent variable is winsorized at the fifth and 95th percentile. The *Main Supplier* industry is the industry that supplies the main input to the takeover industry. *Supplier Percentage Sold* is the percentage of the supplier industry's output sold to the takeover industry. *Main Supplier Negative CAR Dummy* is a dummy variable that equals one if the dependent variable is negative. *Herfindahl Index* is the Herfindahl index of the takeover industry. *Change in Herfindahl Index* is equal to 2*target market share*bidder market share. *Weighted Main Supplier Concentration* is the Herfindahl index of the *Main Supplier* industry, weighted by *Supplier Percentage Sold*. *Foreign Competition* is the takeover industry's total imports divided by its total supply. *Combined Wealth Effect* is the cumulative abnormal return to a value-weighted portfolio of the bidder and target firms for the (-2,2) window. The symbols *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)
Intercept	-0.06 (-0.37)	1.16*** (11.17)	1.13*** (10.89)
Main Supplier Negative CAR Dummy		-2.22*** (-22.40)	-2.21*** (-22.44)
Supplier Percentage Sold	1.29* (1.79)	1.01** (2.03)	1.04** (2.11)
Supplier Percentage Sold*Main Sup. Negative CAR Dummy		-1.49** (-2.32)	-1.49** (-2.33)
Herfindahl Index	-1.12 (-1.40)	-0.53 (-1.12)	-0.61 (-1.30)
Change in Herfindahl Index	-2.47 (-0.34)	-1.44 (-0.34)	-1.87 (-0.44)
Herfindahl Index*Change in Herfindahl Index	18.58 (1.17)	4.74 (0.51)	5.49 (0.59)
Weighted Main Supplier Concentration	-3.12 (-1.55)	-0.92 (-0.76)	-0.94 (-0.78)
Weighted Main Supplier Conc.*Change in Herf. Index	-755.50** (-2.08)	-385.00* (-1.81)	-381.92* (-1.80)
Foreign Competition	0.10 (0.16)	0.10 (0.25)	0.09 (0.24)
Herfindahl Index *Foreign Competition	1.28 (0.32)	0.45 (0.19)	0.61 (0.26)
Combined Wealth Effect			0.01** (2.24)
Number of observations	309	309	309
Adjusted R-squared	0.02	0.66	0.67

Table 12
Weighted Least Squares regression of CAR to the Dependent Supplier industry

The sample includes 463 horizontal takeovers during the 1987-1999 period. The dependent variable is the cumulative abnormal return (CAR) on an equally weighted portfolio of single-segment firms in the *Dependent Supplier* industry. Abnormal returns are estimated using a market model. The weight used in the Weighted Least Squares regressions is the inverse of the standard deviation of the estimation period residuals. The dependent variable is winsorized at the first and 99th percentile. The *Dependent Supplier* industry is the supplier industry whose percentage of output sold to the takeover industry is higher than that of any other supplier industry. *Supplier Percentage Sold* is the percentage of the supplier industry's output sold to the takeover industry. *Dependent Supplier Negative CAR Dummy* is a dummy variable that equals one if the dependent variable is negative. *Herfindahl Index* is the Herfindahl index of the takeover industry. *Change in Herfindahl Index* is equal to 2*target market share*bidder market share. *Weighted Dependent Supplier Concentration* is the Herfindahl index of the *Dependent Supplier* industry, weighted by *Supplier Percentage Sold*. *Foreign competition* is the takeover industry's total imports divided by its total supply. *Combined Wealth Effect* is the cumulative abnormal return to a value-weighted portfolio of the bidder and target for the (-2,2) window. The symbols *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	(1)	(2)	(3)
Intercept	-0.28 (-1.11)	1.83*** (9.32)	1.98*** (8.64)
Dependent Supplier Negative CAR Dummy		-3.56*** (-19.73)	-3.92*** (-18.67)
Supplier Percentage Sold	-0.90 (-0.71)	1.73 (1.44)	2.57** (2.07)
Supplier Percentage Sold*Dep. Sup. Negative CAR Dummy		-3.31** (-2.54)	-3.74*** (-2.84)
Herfindahl Index	1.21 (0.92)	0.13 (0.15)	-0.01 (-0.01)
Change in Herfindahl Index	8.86 (0.86)	10.66 (1.59)	13.86 (1.56)
Herfindahl Index*Change in Herfindahl Index	-12.68 (-0.61)	-25.12 (-1.63)	-28.06 (-1.43)
Weighted Dependent Supplier Concentration	7.12 (1.42)	3.09 (0.92)	2.60 (0.99)
Weighted Dependent Supplier Conc.*Change in Herf. Index	-1623.46*** (-2.60)	-1382.36*** (-3.41)	-1150.51*** (-3.20)
Foreign Competition	-1.70* (-1.68)	-1.35** (-2.05)	-1.30* (-1.74)
Herfindahl Index *Foreign Competition	1.43 (0.25)	1.33 (0.36)	-1.37 (-0.30)
Combined Wealth Effect			0.01 (1.08)
Number of observations	391	391	391
Adjusted R-squared	0.03	0.58	0.59

Endnotes

¹See also Mulherin and Boone (2000), Andrade, Mitchell, and Stafford (2001), and Andrade and Stafford (2003).

² See Jensen and Ruback (1983) and Jarrell, Brickley, and Netter (1988) for a summary of the early evidence. For more recent evidence, see Mulherin and Boone (2000) and Andrade, Mitchell, and Stafford (2001). Although the announcement of a takeover can have wealth effects on stakeholders other than the stockholders of the target and bidder, to be consistent with the literature, we use the term “combined wealth effect” to mean the combined gains to target and bidder stockholders.

³See, for example, Morck, Shleifer, and Vishny (1990) and Datta, Iskandar-Datta, and Raman (2001) for empirical evidence on the link between agency problems and takeovers.

⁴ Eckbo (1983) and Eckbo (1985) examine the collusion hypothesis using sample of horizontal takeovers during the 1963-1978 and 1963-1981 periods, respectively. See Kwoka and White (1999) for a discussion of the changes in US antitrust policies.

⁵ See also Allen and Phillips (2000) for evidence on the interaction between corporate equity ownership and product market relationships.

⁶ Mullin, Mullin and Mullin (1995) extend the methodology in Eckbo (1983) to include corporate customers. They find that the announcement of an antitrust challenge of the combination of eight steel companies in 1901 was associated with positive abnormal returns to railroads, for which steel is a major input.

⁷ The business press often suggests that buyer power can benefit consumers. For example, commenting on the recent consolidation in the cable industry, Frank and Solomon (2002) state: “Programmers like Walt Disney and Viacom, which supply cable companies with channels, are using their increasing power to charge cable companies higher fees for programs. Cable companies need equal reach, and influence as “gatekeepers” to the public, to resist the cost increases.” However, Dobson, Waterson and Chu (1998) suggest that customers can also suffer from a horizontal merger if the increased buyer power induces suppliers to underinvest.

⁸ Including only successful takeovers may bias our results against the collusion hypothesis as long as regulators block some potentially anticompetitive mergers. We believe that this problem is considerably mitigated given the lenient U.S. antitrust policy during the sample period (see Kwoka and White, 1999). Thus, we view our test of the collusion hypothesis as a test to whether the relative leniency in antitrust policy in recent years has allowed potentially collusive mergers to be completed.

⁹ The 15% cutoff is used following Kale, Kini and Ryan (2003). Although the efficiency hypothesis requires that the merger be fully consummated, the collusion and buyer power

hypotheses can be at work even if the bidder acquires only a fraction of the total number of shares outstanding. Therefore, excluding transactions with fraction of target shares acquired less than 100% can bias our results against the collusion and buyer power hypotheses. We also repeat our analysis for the subsample of consummated takeovers and find qualitatively similar results (the subsample includes 416 mergers and tender offers).

¹⁰ Mitchell and Mulherin (1996), Fan and Lang (2000), and Maksimovic and Phillips (2001) are recent papers that use this data.

¹¹ The 3% cutoff results in 176 (294) *Main Customer (Dependent Customer)* industries. The respective numbers for the 5% cutoff are 134 and 236.

¹² The 3% cutoff results in 218 (360) *Main Supplier (Dependent Supplier)* industries, respectively. The respective numbers for the 5% cutoff are 195 and 337.

¹³ Because of the importance of this conversion table to our study, we manually check its accuracy. We could not identify any case where the table results in industry misclassification.

¹⁴ We also find similar results after repeating the analysis that pertains to the bidder and the portfolio of the bidder and the target after constraining the market model intercept to equal zero (see Schwert, 1996).

¹⁵ Since CARs to value-weighted portfolios will be driven by the stock returns of few large firms, we believe that an analysis based on equally weighted portfolios is less likely to be affected by confounding events in a small number of firms. We also repeat our analysis using value-weighted portfolios of rivals, suppliers, and corporate customers. Taken as a whole, however, the results for the value-weighted portfolio analysis do not alter the main conclusions of this study. We find that announcement period abnormal returns are in general lower than those reported here. In the cross-sectional analysis, we find that the statistical significance of some of the results are lower than those reported here.

¹⁶ See Jensen and Ruback (1983), Bradley, Desai, and Kim (1988) and Jarrell, Brickley, and Netter (1988) for early evidence. For more recent evidence, see Mulherin and Boone (2000), Andrade, Mitchell, and Stafford (2001), among others. For example, Andrade, Mitchell, and Stafford (2001) report an average CWE of 1.4% for the (-1,1) window for their sample of mergers during the 1990-1998 period. The average CWE we report is higher, consistent with horizontal takeovers resulting in high wealth gains relative to diversifying takeovers.

¹⁷ Note that in many of the cases reported in Table 4, the statistical and economic significance of the average CAR increases as we augment the window. This increase in CAR can be due to at least three factors. First, extending the window to include pre-announcement days should capture any leakage of information about the takeover (see

Jarrell, Brickley, and Netter, 1988). Second, since the sample includes completed takeovers, the likelihood that the takeovers will be completed should be increasing in the time of the announcement. Finally, it may take few days for information to be impounded in small-firm stock prices (see Lo and Mackinlay, 1990). In order to check if the results for longer windows are not an artifact of the model of abnormal returns we use, we report CAR for the (10,20) window. In most cases, the average CAR for this window is statistically insignificant.

¹⁸ The results reported here are not sensitive to the window over which CWE is measured. We obtain qualitatively similar results after measuring CWE over the (-1,0), (-1,1), (-5,5) and (-10,10) windows. We also account for the fact that some targets may have received unsuccessful bids during the period preceding the successful bid. Thus, we define a contest as the set of bids that the target has received after at least one year of hiatus. We then use a window that starts five days prior to the first announcement of a contest and ends five days after the announcement of the successful bid. The corresponding results are qualitatively similar to those reported in table 5. We choose to form our windows around the announcement of the successful bid, and not long enough to include the announcement of unsuccessful bids, to minimize the effect of confounding events on the estimations of CARs to rivals, suppliers, and corporate customers.

¹⁹We use Compustat's consolidated tapes to construct our concentration measured despite the apparent advantage of using segment-level sales data, which can be collected from the CIS tapes. We make this choice for two reasons. First, since there are differences in the industry classification by the two databases, using the CIS tapes will result in inconsistencies between the SIC codes used to identify the takeover and those used in the construction of the concentration measures. Second, the SIC tapes are incomplete in that they do not cover all firms followed by Compustat. We also repeat our analysis using concentration measures constructed with segment-level sales data. Although there are differences in the statistical significance of some of the results reported below, the use of the CIS tapes does not change the main conclusions of this paper.

²⁰ This calculation assumes that firms in the same industry use the same percentage of a given input. This measure is, in essence, similar to the measure used in the industrial organization literature (see, e.g., Scherer and Ross, 1990).

²¹For the effect of the method of payment see Travlos (1987) and the extent literature thereafter. See, for example, Servaes (1991) and Mulherin and Boone (2000) for evidence on the effect of the target relative size. Schwert (2000) provides an extensive analysis of the effects of hostility in takeovers.

²² All our dependent variables display a high degree of dispersion. For example, the mean (median) value for the combined wealth variable is 2.68% (1.46%), while the minimum (maximum) value is -65.28% (74.50%).

²³ In addition, we repeat our analysis for takeovers that were announced after at least a twelve-month period since the announcement of the last horizontal takeover within the takeover industry. This specification is motivated by the results in Song and Walking (2000) who report that “surprising” mergers tend to have stronger effects on rival firms. The results of this analysis are not very different from those reported here, although some of the independent variables lose their explanatory power, probably because of the smaller sample size for this subset of takeovers.

²⁴ We use Weighted Least Squares regressions to correct for heteroskedasticity. We also repeat our analysis using OLS regressions. The results under this specification are not substantially different from those reported here.

²⁵ Since our regressions include interaction terms, the total marginal effect of a change in any given variable will obviously depend on the values of the variables with which it is interacted. When interpreting each coefficient separately, we will focus on the case where the values of the interacted variables are close to zero. For example, since the coefficient on the interaction between *Foreign Competition* and *Herfindahl Index* is negative and significant, our interpretation of the positive relation between *Herfindahl Index* and the combined wealth variable is only valid for industries with low foreign competition. In fact, the positive relation between the two variables weakens as foreign competition increases.

²⁶ One can view *Weighted Main Supplier Concentration* as an interaction variable between *Main Supplier Concentration* and *Takeover Input Coefficient*. We choose the former specification for expository purposes.

²⁷ In unreported regressions, we add a dummy variable that equals one if the takeover is a tender offer, and zero otherwise. The coefficient on this variable turns out to be positive and statistically significant despite its high negative correlation with the payment method variable. Further, none of the results for the other independent variables changes under this specification.

²⁸ We also use a Logit model to test whether the change in the concentration of the takeover industry increases the probability that the takeover results in negative CAR to customers. The results of this specification do not support the collusion hypothesis. We find an insignificant relation between the change in concentration and the probability of negative CAR to customers.

²⁹ It is possible that the insignificant results for the change in concentration are driven by the large number of small mergers that are not likely to affect the competitive structure of the takeover industry. In order to further test the collusion hypothesis, we estimate a piecewise linear regression. Thus, we construct two variables, *Low Change in Concentration* (*High Change in Concentration*), by multiplying the change in concentration variable by a dummy variable that equals one if *Change in Herfindahl Index* is less (greater) than its median, and zero otherwise. The results of this

specification are similar to those reported here. The change in concentration variable does not appear to be related to CARs of customers even at its high values.

³⁰The concentration measure is weighted by *Supplier percentage Sold* to account for the importance of the takeover industry as a buyer to the *Main Supplier* industry. One can view *Weighted Main Supplier Concentration* as an interaction variable between the Herfindahl index of the *Main Supplier* industry and *Supplier percentage Sold*. We choose the former specification for expository purposes.