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On the Patterns and Wealth Effects of Vertical Mergers*

We use industry commodity flows information to measure vertical relations in completed mergers from 1962 to 1996. Almost one-third of the mergers display vertical relatedness. Vertical merger activity is more intensive in the 1980s and 1990s and less so in the 1960s and the 1970s. Vertical mergers generate positive wealth effects that are significantly larger than those for diversifying mergers; the wealth effects in vertical mergers are comparable to those in pure horizontal mergers.

I. Introduction

Vertical mergers provide acquiring firms with ownership and control over adjacent stages of production. These mergers allow firms to substitute internal exchanges within the boundaries of the firm for contractual or market exchanges. Theoretical work on vertical integration is extensive.[1] But there is little empirical work on vertical mergers, and the little that has been done is based on small samples. Important and basic facts about vertical mergers remain un-

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1. Perry (1989) provides a useful survey of this literature. Notable contributions include (i) reduction in transactions costs when the costs of using markets exceed the costs of internal organization (Coase 1937); (ii) mitigation of the holdup problems associated with asset specificity and uncertainty in market transactions (Williamson 1971, 1975, 1979; Klein, Crawford, and Alchian 1978; Grossman and Hart 1986; Hart and Moore 1990); (iii) price control (Stigler 1951); (iv) risk aversion (Blair and Kaserman 1978); (v) price inflexibility (Carlton 1979); and (vi) market power.

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known. We know little about the intensity of vertical merger activity in a particular economy or an industry and how such activity has changed over time.[2] We also know little about the amount of wealth created by vertical mergers and how this compares with that from horizontal or diversifying mergers.

This is unfortunate for theory building because we do not know the most basic facts about the intensity and wealth effects of vertical mergers. This is also unfortunate for empirical work because we cannot distinguish between synergistic gains from different types of business combinations. For example, while we know that mergers during the 1980s and the 1990s were mostly between related firms, it is unclear if they were purely horizontal mergers or if they also provided firms with opportunities for vertical integration. Also, it is claimed that mergers during the 1960s and 1970s were diversifying because they were between firms in different industries. As we know, firms in different industries could be vertically related, so our lack of knowledge about vertical mergers makes a full assessment of the diversifying mergers of the 1960s and 1970s impossible.

Measuring vertical relations is difficult, which explains the lack of empirical evidence. The current literature, with few exceptions, classifies a merger as unrelated if the bidder and target have different Standard Industry Classification (SIC) codes.[3] For example, a merger between a petroleum-refining (SIC 29) company and a petroleum exploration (SIC 13) company would be classified as a diversifying merger because the refining and the exploration businesses are in different two-digit SIC industries. But these two industries obviously have significant vertical linkages. The SIC code–based classification scheme also does not tell us whether mergers between firms in the same industries create significant opportunities for vertical integration. Without a more sophisticated measure of input-output (IO) linkages, it is difficult to distinguish between vertical and horizontal mergers.

In this paper, we utilize the industry commodity flows information in IO tables to infer vertical relations in mergers.[4] With the IO data, we can capture the vertical relation between a pair of merging firms from the dollar amount of input transfer between the industries in which the merging firms operate. The idea is that two industries are vertically related if one can use the other's

2. Several nonmerger studies report the trends of vertical integration for industries or firms. These include those by Adelman (1955), Laffer (1969), Tucker and Wilder (1977), Maddigan (1981), Levy (1985), and Fan and Lang (2000).

3. The exceptions are Spiller (1985) and Ravenscraft and Scherer (1987). Spiller identifies vertical links in a list of mergers compiled by the Federal Trade Commission (FTC). Together with other sample selection criteria, his final sample consists of 29 vertical mergers. Ravenscraft and Scherer classify vertical relations in mergers in the FTC list, using the FTC's survey on the line of business for over 400 large manufacturing companies in 1974–77.

4. There are other non-IO-based measures of vertical integration of firms or industries (Adelman 1955; Gort 1962). Examples of subjective schemes to classify vertical relations are presented by Rumelt (1974) and Johnson and Houston (2000).

products or services as input for its own production or if it can supply output as the other's input. The IO-based measure captures potential integration and can be easily applied to measure vertical relations in large-sample studies.[5]

Using the IO-based method, we find significant vertical merger activity in a large sample of over 2,100 mergers completed between 1962 and 1996. More than one-third of the sample mergers show vertical relations. More important, almost 18% of the mergers create significant opportunities for vertical integration, even though they are between firms that belong to different industries and would surely be classified as unrelated by a classification scheme that relies only on industry codes. We also find that vertical merger activity has increased over time. A significantly higher number of mergers in the post-1980 period exhibit vertical relatedness than those during the pre-1980 period.

Vertical merger activity is not concentrated in a selected set of industries. Rather, it is evident in many different industries. For example, vertical merger activity was intense in the oil and gas and the food industries at the beginning of 1980s and in the communication and entertainment industries in the mid to late 1980s. Vertical merger activity also sharply increased in the medical equipment and transportation equipment industries in the 1990s. Vertical merger activity differs from diversifying merger activity in that it does not show declining patterns.

Vertical mergers generate significantly positive wealth effects. The average combined wealth effect in vertical mergers is about 2.5% during the three-day event window surrounding the announcement of the merger transactions. The wealth effect is significantly larger when compared with that for diversifying mergers. Overall, the wealth effect in vertical mergers is comparable to that in horizontal mergers.

Merger wealth effects are generally greater in the 1980s and 1990s relative to those in the 1960s and 1970s. More important, we find that the increasing wealth effects of merger activity in the 1980s and 1990s are mainly attributable to vertical mergers. There is no clear time-series pattern for the wealth effects in horizontal or diversifying mergers.

The remainder of this paper is organized as follows. In Section II, we describe the sample and the methodology. In Section III, we report the time patterns of vertical mergers and compare the patterns with those of horizontal and diversifying mergers. Section IV reports evidence on the relation between vertical mergers and wealth effects. Section V presents concluding remarks and suggests some avenues for future research.

5. Maddigan (1981), Lemelin (1982), Caves and Bradburd (1988), and Fan and Lang (2000) use IO-based methodologies to measure vertical relations. Merger studies that employ IO-based methodologies to classify vertical relations include those by McGuckin, Nguyen, and Andrews (1991) and Matsusaka (1996).

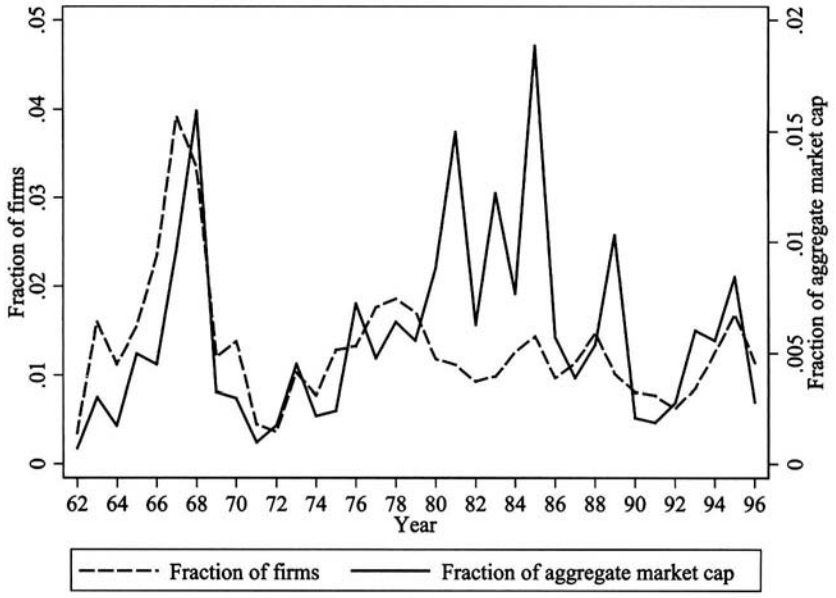

FIG. 1.—Merger activity, 1962–96. The dotted line indicates the ratio of the number of firms taken over during the year divided by the number of firms on the CRSP database at the beginning of the year. The solid line indicates the ratio of the aggregate dollar value of firms taken over during the year divided by the total beginning-of-year market capitalization of the firms listed on the CRSP database.

II. Sample and Methodology

A. The Sample

We construct a merger database by searching the Center for Research in Security Prices (CRSP) tapes for all New York Stock Exchange, American Stock Exchange, and NASDAQ firms delisted during 1962–96. CRSP uses delisting codes between 200 and 203 to identify firms that are delisted because of an acquisition. The delisting date is the effective date of the acquisition. For these delisted firms, we first check the *Wall Street Journal Index* (WSJI) to identify the bidder for each delisted target, the date of the first announcement of the merger transaction, and the method of payment. If this information is unavailable in the WSJI, we check the Lexis/Nexis database.

We include those mergers in the sample for which both the bidder and the target are listed on the daily NYSE/Amex/NASDAQ CRSP tapes. We exclude mergers for which we cannot identify the primary industry affiliation and mergers for which either the bidder or the target is a financial services firm. The final sample consists of 2,162 completed mergers.

Figure 1 presents the aggregate merger activity over time. The dotted line is the number of firms acquired during a year as a fraction of the beginning-of-year firms on the CRSP tapes. The solid line is the ratio of the aggregate

dollar value of firms taken over to the total beginning-of-year market capitalization of the firms listed on the CRSP database. The figure illustrates the well-known merger cycle as documented by Andrade, Mitchell, and Stafford (2001) and Jovanovic and Rousseau (2001). Merger activity was intensive in the mid-1960s, the 1980s, and the mid-1990s. Other periods exhibit relatively less intensive merger activity.

B. Measuring Vertical Relations of Merging Firms

Vertical relatedness is measured using a procedure similar to that used by Fan and Lang (2000). We begin by constructing the interindustry vertical relatedness coefficients. The building block of these coefficients is the Use Table of Benchmark Input-Output Accounts for the U.S. Economy. The use table is a matrix containing the value of commodity flows between each pair of roughly 500 private-sector intermediate IO industries. The table reports for each pair of industries, i and j, the dollar value of i's output required to produce industry j's total output, denoted as a_{ij}.

We divide a_{ij} by the dollar value of industry j's total output to get v_{ij}, which represents the dollar value of industry i's output required to produce one dollar's worth of industry j's output. Conversely, we divide a_{ji} by the dollar value of industry i's total output to get v_{ji}, which represents the dollar value of industry j's output required to produce one dollar's worth of industry i's output. The vertical relatedness coefficient of industries i and j, or V_{ij}, is the maximum of the two input requirement coefficients ($= \max(v_{ij}, v_{ji})$), and it measures the opportunity for vertical integration between industries i and j.

We use the plastics, i, and nontextile bags, j, industries as an example. In 1992, the total plastics output was \$31,502 million. The total output of nontextile bags was \$8,389 million. The nontextile bags industry consumed \$1,259 million in plastics (a_{ij}), and the plastics industry utilized \$10 million in nontextile bags (a_{ji}) as input. On a per dollar basis, the nontextile bags industry consumed \$0.15 (\$1,259/\$8,389) of plastics for each dollar of bags it produced (v_{ij}), and the plastics industry consumed \$0.0003 (\$10/\$31,502) of bags for each dollar's worth of plastics produced (v_{ji}). The vertical relatedness coefficient between the two industries is 0.15, which indicates the potential input transfers between the two industries on a per dollar basis.

In the second step, we assign a vertical relatedness coefficient to a given pair of merging firms according to their primary industry affiliations. This step requires us first to identify the industry affiliations of the firms constituting our sample.

The primary source of industrial classifications for bidders and targets is the historical SIC code information on the announcement dates in the CRSP database. If CRSP reports a missing SIC code on the announcement date, we replace it with the SIC code on the delisting date if it is available. If CRSP does not report any SIC code, we read the description of the bidder (or the target) in WSJI and Lexis/Nexis and assign it a SIC code from the 1987 SIC

manual. Finally, we check the validity of all SIC codes in our sample against the codes listed in the 1987 SIC manual. We were surprised to see that many CRSP-assigned SIC codes did not match the codes in the SIC manual. Some of these CRSP SIC codes follow the earlier 1977 SIC manual, and we use a concordance table to convert the 1977 CRSP SIC codes to the 1987 SIC codes. We correct the remaining errors in CRSP SIC codes by reading through the descriptions of the bidders and targets at the time of the merger and replacing these SIC codes. Since the use table classifies the input-output data by IO codes, we convert each of the SIC codes of bidders and targets into an appropriate IO code. The conversion table takes into account changes in industry definitions in the use table over time. The first year for which the IO data are available to us is 1982. The IO data are updated every five years. We use the 1982 IO data for mergers announced prior to 1985. To account for changing input-output relations over time, we switch to the 1987 IO data for mergers between 1985 and 1989. For mergers between 1990 and 1996, we use the 1992 IO data. We also replicate the analysis using IO data from the 1982 table for the entire sample and find similar results.

Once we identify the pair of primary industries for a pair of merging firms, we determine the vertical relation between them by using the vertical relatedness coefficient associated with that industry pair. While much of the paper is devoted to understanding the patterns and wealth effects of vertical relatedness between the primary segments of merging firms, we also examine multisegment firms to address concerns that mergers could take place between secondary and primary divisions of firms. Maksimovic and Phillips (2001) show that larger productivity gains occur when the firm's divisions match at primary as well as secondary levels.

C. *Defining Vertical Mergers*

We adopt two alternative cutoffs to categorize mergers as vertically related: a 1% cutoff and a 5% cutoff. On the basis of the looser criterion, we classify a merger as vertically related if its associated vertical relatedness coefficient is greater than 1%. On the basis of the stricter definition, we classify a merger as vertically related if its associated vertical relatedness coefficient is greater than 5%. These are also the cutoffs used by McGuckin et al. (1991) and Matsusaka (1996).

Figure 2 presents the distribution of the vertical relatedness coefficients for the merger sample. The distribution shows that approximately 65% of the mergers have vertical relatedness coefficients of less than 1%. Therefore, at the 1% cutoff, a little more than one-third of the mergers would be classified as vertical. At the 5% vertical relatedness cutoff, about 20% of the mergers would be classified as vertical. The 1% and the 5% cutoffs have the additional nice property that mergers are not clustered around these cutoffs, and hence our classification of vertical mergers is not sensitive to the choice of cutoffs.

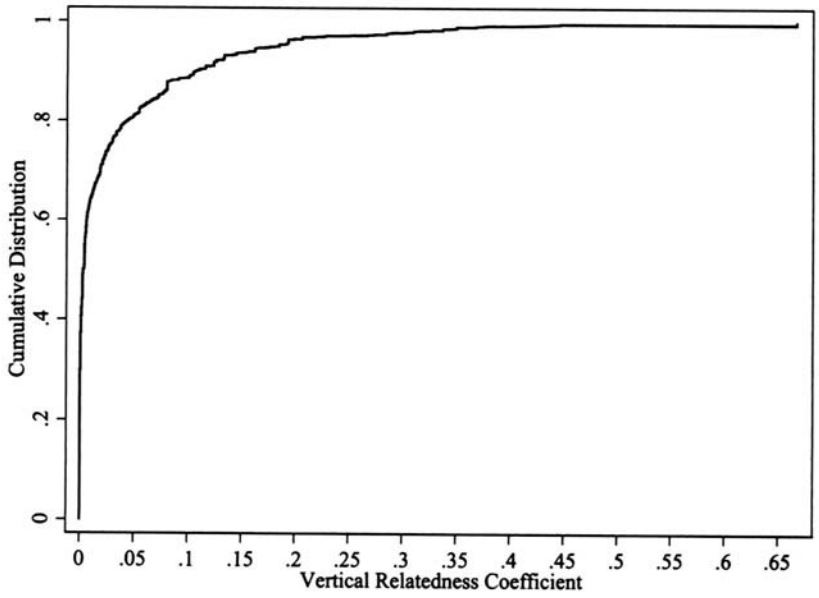

FIG. 2.—Cumulative distribution plot of vertical relatedness coefficient between pairs of merging firms.

We examine several alternative cutoffs such as 0.5%, 1.5%, 4.5%, and 5.5% and find qualitatively similar results.

While these cutoffs initially appear small, they are in fact economically large when one recognizes that labor expenses and value-added account for a large fraction of an industry's value of shipments. Using the National Bureau of Economic Research manufacturing productivity database, we estimate that for manufacturing industries, the fraction of material cost to an industry's value of shipments averages about 50%.[6] Thus the interindustry vertical relatedness coefficients, which are currently based on an industry's value of shipments, would actually be twice as large if they were based on material costs. In other words, a 5% cutoff implies that for a merger classified as vertically related, on average 10% of the material cost of a merging firm is accounted for by the output of the industry of the other firm.

III. Merger Patterns

A. Pattern of Vertical Merger Activity

Panel A of table 1 reports the summary statistics on the vertical relatedness coefficients for mergers during 1962–96. Overall, the mean vertical relatedness

6. See Bartelsman and Gray (1996). The data can be downloaded from http://www.nber.org/nberces/nbprod96.htm.

TABLE 1 Vertical Merger Activity

A. Descriptive Statistics for Vertical Relatedness Coefficients

	N	First Quartile	Mean	Median	Third Quartile
All mergers	2,162	<.001	.034	.003	.027
Cross-industry	1,544	.000	.022	.001	.011
Within-industry	618	.004	.065	.030	.104

B. Average Vertical Relatedness Coefficient and Vertical Merger Activity over Time

			Fraction of Vertical Mergers (1% Cutoff)		Fraction of Vertical Mergers (5% Cutoff)	
Period	*N*	Mean Vertical Relatedness Coefficient	By Number	By Value	By Number	By Value
1962–70	377	.031	.30	.35	.17	.20
1971–80	569	.028	.27	.36	.13	.14
1981–90	702	.035	.39	.44	.18	.25
1991–96	514	.041	.45	.51	.28	.25
1962–96	2,162	.034	.36	.43	.19	.22

NOTE.—The sample includes 2,162 mergers completed during 1962–96. Panel A provides descriptive statistics on the vertical relatedness coefficients in mergers grouped by whether they are cross- or within-industry. We follow the Bureau of Economic Analysis in defining cross-industry mergers as combinations between firms in different input-output (IO) industries. Within-industry mergers are combinations between firms in the same IO industry. We define the vertical relatedness coefficient as the maximum of the input requirement coefficients between the industries in which the merging firms operate. The input requirement coefficients of a pair of industries represent the dollar value of one industry's output required to produce one dollar's worth of the other industry's output. Panel B provides the mean vertical relatedness coefficient and the fraction of vertical mergers by number and by value (with both the 1% and 5% cutoffs) for various subperiods.

coefficient for the sample mergers is 0.034, which suggests that the potential input transfers between firms that engage in mergers average about three cents for every dollar of output produced. However, the median value is 0.003, indicating that a majority of the mergers are vertically unrelated. The third quartile is 0.027, suggesting significant vertical relations in at least a quarter of the sample.

We next examine separately the vertical relatedness coefficients in 1,544 cross-industry (across different IO industries) and 618 within-industry (within the same IO industry) mergers. We find some relatively large differences in the vertical relatedness between the two groups. The average vertical relatedness coefficient for within-industry mergers is significantly higher at about 0.065, compared with that for cross-industry mergers at 0.022. Mergers within the same IO industries generally have more opportunities for vertical integration than mergers across different IO industries.

Panel B of table 1 reports the average vertical relatedness coefficients and the fraction of mergers classified as vertically related for both the full sample and the subsamples over time. Over the entire sample period, vertical mergers account for approximately 36% of all mergers with the 1% cutoff.

We also estimate the vertical merger activity by value by estimating the combined market equity value of bidders and targets in vertical mergers as a

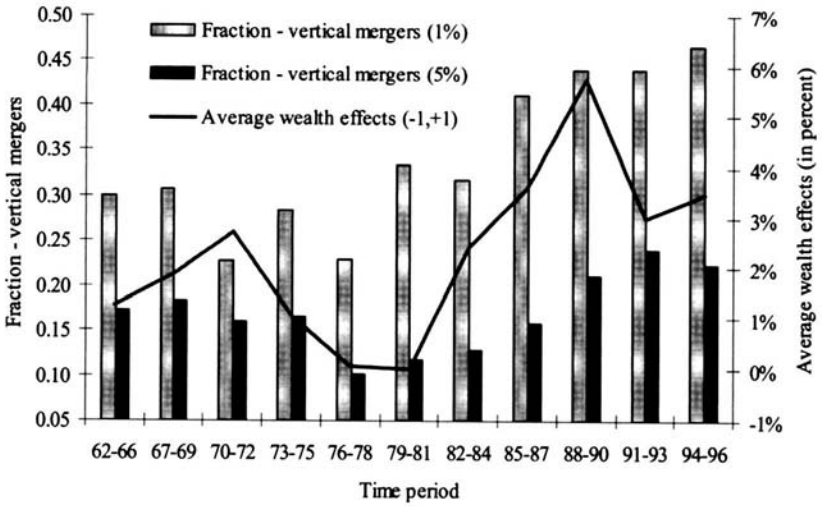

FIG. 3.—Fraction of mergers classified as vertically related (at the 1% and 5% cutoffs) and average combined wealth effects in vertical mergers during 1962–96.

fraction of the combined values of bidders and targets in all mergers. Using the combined bidder-target equity value, we find that vertical mergers account for 43% of the combined value of all mergers in the sample. When we use the stricter definition of vertical relatedness and classify a merger as vertically related if the vertical relatedness coefficient exceeds 5%, we find that 19% of the mergers by number and 22% by value are vertically related.

Panel B also shows a notable increase in vertical merger activity over time. The period-by-period mean values of vertical relatedness coefficients show that the mergers during the 1980s and 1990s are more vertically related than those during the 1960s and 1970s. The mean value of the vertical relatedness coefficient is about 0.03 in the 1960s and 1970s. The mean value increases to roughly 0.04 in the 1980s and 1990s. When we classify mergers as vertically related using the 1% cutoff, we find a similar increasing trend in the number and value fractions of vertical mergers relative to all mergers. With the 1% cutoff, the fraction of vertical mergers increased from about 30% in the 1960s and 1970s to about 45% in the 1990s. In terms of value, the corresponding figures for vertical mergers are 35% during the 1960s and 1970s and about 50% during the 1990s. Figure 3, which plots the fraction of vertical mergers, also shows an increasing proportion of vertical mergers during the 1980s and 1990s.

In sum, both the fraction of vertically related mergers and the market capitalization of assets involved in vertical mergers have increased over time. The pattern is robust to the vertical relatedness coefficient cutoff.

Robustness to industry composition of mergers.— Recent literature shows that merger activity in an industry is concentrated in time (see Mitchell and

Mulherin 1996; Andrade and Stafford 2004). Therefore, it is important to check that our inferences about increasing vertical merger activity in the more recent period are not due to changes in the industry composition of mergers. Our empirical strategy is first to classify the sample mergers by the acquirers' three-digit SIC code industry and then to compute the acquisition intensity for each industry sector for each year as the ratio of the combined market value of all acquirers and targets in that year to the total market value of publicly traded firms in the same industry in that year.[7] In unreported tables, we find that several industries exhibit increasing merger activity in the 1980s and the 1990s. For example, we notice increasing merger activity in the chemical, communication, stone and clay, and transportation industries. In addition, the oil and gas, food, medical equipment, and transportation equipment industries exhibit significantly more merger activity after the 1980s. In contrast, the wholesale and miscellaneous equipment industries have fewer mergers in the 1980s.

We next examine industry patterns of vertical mergers. We find that the communication and entertainment industries participated in increasing vertical mergers after the mid-1980s. Vertical mergers were also more intensive in the electric equipment (the mid-1960s), oil and gas[8] (the late 1970s through the early 1980s), medical equipment (mid-1980s and early 1990s), transportation, and transportation equipment (the late 1980s) industries. These results confirm that the increase in vertical merger activity cannot be attributed to the involvement of just one or two industries in restructuring over time. Rather, they reflect a trend toward greater vertical integration in quite a few industries over time.

B. *Horizontal Mergers, Vertical-Horizontal Mergers, and Conglomerate Mergers*

We now classify the sample mergers more finely by using a classification scheme similar to that used by McGuckin et al. (1991). We identify "pure vertical mergers" as those mergers between firms belonging to different IO industries but exhibiting vertical relatedness with the 1% cutoff. We identify "pure horizontal mergers" as those mergers that take place between firms in the same IO industry but exhibiting no vertical relatedness with the 1% cutoff. We classify mergers between firms in the same IO industry that also have vertical relations as "mixed vertical and horizontal mergers." Finally, when firms in different IO industries merge and the merging firms show no vertical relatedness, we classify them as "conglomerate mergers."

Comparisons with the FTC classification of mergers.—To validate the IO-based method of classifying mergers, we compare it to the FTC classifications of mergers for the period during which the FTC maintained and reported this data. The FTC published a report on mergers and acquisitions in 1980 in

7. We also repeat this exercise using the target's three-digit SIC code, and results are similar.
8. Fan (2000) also finds increasing vertical integration by petrochemical firms in the 1970s.

TABLE 2 Cross Tabulations between the IO-Based Classification of Mergers and the FTC Classification, 1962–78

IO-Based Classification	FTC Classification: Number of Vertical Mergers ($N=31$)	Number of Horizontal Mergers ($N=57$)	Number of Conglomerate Mergers ($N=321$)
Number of vertical mergers ($N=73$)	16 (52%) [22%]	11 (19%) [15%]	46 (14%) [63%]
Number of horizontal mergers ($N=51$)	1 (3%) [2%]	25 (44%) [49%]	25 (8%) [49%]
Number of conglomerate mergers ($N=285$)	14 (45%) [5%]	21 (37%) [7%]	250 (78%) [88%]

NOTE.—The sample consists of 409 mergers during 1962–78 that overlap with the FTC list of mergers published in 1980 and for which FTC provided its own classification. The table reports the numbers of mergers classified as vertical, horizontal, and conglomerate on the basis of the FTC classification and the IO-based classification. FTC's market extension mergers are reclassified as horizontal mergers. In the IO-based classification, vertical mergers are defined at the 1% vertical relatedness cutoff. The numbers in parentheses are percentages of column totals. The numbers in brackets are percentages of row totals.

which it classified acquisitions of large manufacturing and mining companies (with assets of $10 million or more) into three broad categories: vertical, horizontal, and conglomerate (FTC 1980). The FTC classified vertical mergers as those in which merging companies had a potential buyer-seller relationship prior to the merger. It classified horizontal mergers as those in which the merging companies produce one or more of the same or closely related products in the same geographic market. Conglomerate mergers as classified by the FTC are of three types: (a) product extension in which the acquiring and acquired companies are functionally related in production and/or distribution but do not compete directly with another, (b) market extension in which companies manufacture the same products but sell them in different geographic markets, and (c) other or pure conglomerates in which the companies are essentially unrelated in the products they produce and distribute. In the analysis below, we reclassified the FTC's market extension mergers as horizontal mergers consistent with our view of market extension mergers.

The FTC data and our merger sample overlap during the 1962–78 period, and we are able to match 409 out of 765 mergers in our sample to those in the FTC list (representing about 28% of the FTC sample for this period). Table 2 presents cross-tabulations between the two classification methods. Of the 409 mergers that exist in both the FTC sample and our sample during 1962–78, the FTC classified 31 of them as vertical, 57 as horizontal, and 321 as conglomerate. Our IO-based method classified 73 mergers as vertical (at the 1% cutoff), 51 as horizontal, and 285 as conglomerate. Of the 31 mergers classified as vertical by the FTC, 16 (or 52%) are also classified as vertical by our IO-based classification. The remaining FTC vertical mergers are largely classified as conglomerate by the IO method. Similarly, a majority of the

TABLE 3 **Merger Activity among Cross-Industry, Diversifying, Pure Vertical, Mixed Vertical and Horizontal, and Pure Horizontal Mergers during 1962–96**

	Cross-Industry Mergers		Diversifying Mergers		Pure Vertical Mergers		Vertical-Horizontal Mergers		Pure Horizontal Mergers	
Period	Number (1)	Value (2)	Number (3)	Value (4)	Number (5)	Value (6)	Number (7)	Value (8)	Number (9)	Value (10)
	A. Based on a 1% Cutoff									
1962–70	.81	.86	.64	.64	.17	.25	.13	.13	.06	.04
1971–80	.82	.86	.65	.67	.18	.22	.10	.16	.08	.03
1981–90	.67	.71	.49	.49	.18	.23	.20	.23	.12	.08
1991–96	.58	.72	.37	.40	.20	.33	.25	.19	.17	.11
1962–96	.71	.79	.53	.57	.18	.26	.17	.19	.11	.08
	B. Based on a 5% Cutoff									
1962–70	.81	.86	.73	.77	.07	.12	.10	.12	.10	.05
1971–80	.82	.86	.75	.78	.07	.10	.06	.05	.12	.13
1981–90	.67	.71	.62	.64	.05	.10	.13	.18	.20	.15
1991–96	.58	.72	.50	.66	.07	.07	.20	.18	.22	.13
1962–96	.71	.79	.65	.71	.07	.09	.12	.15	.16	.13

NOTE.—The sample consists of 2,162 mergers. Panel A reports the fraction of cross-industry, diversifying, pure vertical, vertical-horizontal, and pure horizontal mergers based on a 1% vertical relatedness cutoff. Panel B reports similar fractions except that vertical relatedness is based on a 5% cutoff. Cross-industry mergers are between firms belonging to different IO codes. Diversifying mergers are cross-industry and vertically unrelated. Pure vertical mergers are between firms that are vertically related but belong to different industries on the basis of IO codes. We classify vertically related mergers within an industry as mixed vertical-horizontal. A merger is purely horizontal if it is within an industry but vertically unrelated.

nonoverlapping IO-based vertical mergers are classified as conglomerate by the FTC. Misclassifications between vertical and horizontal categories are rare. The table also shows that about 44% of FTC horizontal mergers are also classified as horizontal by the IO-based method. The overlap in terms of classifying conglomerate mergers is as high as 78%. Tests for independence between the two classification methods are rejected at a p-value of 0.000 (χ^2 of 89.5). Overall, the results show that our mechanical IO-based method does reasonably well when compared to the FTC's subjective classification scheme, which is based on detailed knowledge of the transaction and merging firms.[9]

Table 3 reports the pattern of merger activity for mergers classified as cross-industry, conglomerate (or diversifying), pure vertical, mixed vertical-horizontal, and pure horizontal mergers. Column 1 reports the fraction of cross-industry mergers over time. Of the 2,162 mergers in the sample, 71% are between firms in different IO code industries. Cross-industry mergers occurred frequently in the 1960s and to some extent also in the 1970s. During these two decades, more than 80% of the mergers were between firms in different IO industries. Since the late 1970s, cross-industry mergers appear to be on

9. However, caution must be exercised in drawing strong conclusions from this comparison. First, the two samples only partially overlap. In contrast to our sample, the FTC covers only large mergers. Second, merger definitions differ between the two classification schemes.

the wane. In the 1990s, only about 58% of the mergers were between firms in different IO codes.

To see whether the time pattern is sensitive to the different industry classification systems, we alternatively classify cross-industry mergers using SIC codes at the two-digit, three-digit, and four-digit levels. These various classifications yield similar patterns in cross-industry merger activity.

Overall, the declining frequency of cross-industry mergers over time supports the conventional view, which suggests that conglomerate mergers peaked in the 1960s as firms diversified into new industries. Mergers since the 1970s are more likely to be between firms in similar industries, indicating a trend toward increasing focus.

However, not all cross-industry mergers are conglomerate mergers. A significant fraction of cross-industry mergers are vertically related. Columns 3 and 4 of table 3 report the trend for diversifying mergers. Similarly to the trends for cross-industry mergers, diversifying mergers show a marked decline over time. Overall, 53% of the mergers during the entire period were diversifying. In the 1960s, more than 60% of the mergers were diversifying. By contrast, in the 1990s, the proportion of diversifying mergers had declined to 40%. Again, these results suggest that conglomerate mergers common in the 1960s declined in importance, and in the past two decades, firms more often chose related mergers.

Comparing the fraction of mergers classified as cross-industry and those classified as diversifying suggests that crude measures of relatedness based on SIC codes can substantially overstate the number of unrelated mergers in the sample. Almost 18% of the mergers in the sample are cross-industry and vertically related and would have been classified as unrelated on the basis of the simple SIC code method of classifying mergers. In these pure vertical mergers, there are significant vertical linkages, even though the bidders and the targets have different industry codes. In contrast to the results on vertically related mergers, the time trend for pure vertical mergers is unclear.

The number of mixed vertical-horizontal mergers accounts for the increasing intensity of vertical relatedness over time. The results in table 3 show that almost 17% of all mergers are mixed vertical-horizontal; that is, the merging firms belong to the same IO industry and have significant vertical relatedness. Mirroring the pattern for vertical mergers reported in table 1, the proportion of mixed vertical-horizontal mergers in the sample shows a significant increasing trend. Although only about 13% of the mergers had both vertical and horizontal linkages between bidders and targets in the 1960s, the proportion substantially increased by the 1990s, when almost 25% of the mergers exhibited such linkages.

Finally, pure horizontal mergers account for approximately 11% of the sample. Reflecting the refocusing trend, pure horizontal merger activity significantly increased from 6% in the 1960s to almost 17% in the 1990s. We replicate all the tests using the stricter definition of vertical relatedness, that

is, the 5% cutoff. Panel B reports the results using the stricter definition of vertical relatedness. The results are qualitatively identical to those based on the 1% cutoff.

Our results show that, since the 1980s, mergers are often vertically related. This increase is largely attributable to firms merging with firms in their own industries that present good opportunities for vertical integration. We also find an increasing trend of pure horizontal mergers. Our results contribute to the literature on corporate diversification. Diversifying mergers—mergers that are neither vertical nor horizontal—have decreased in importance since the late 1970s. These findings are consistent with the trend of deconglomeration and refocusing documented in the literature (Ravenscraft and Scherer 1987; Markides 1995).

IV. Vertical Mergers and Wealth Effects

This section addresses several important issues concerning the wealth effects of mergers of different types. Do vertical mergers create value? How do the wealth effects of vertical mergers compare with those of horizontal and/or diversifying mergers?

Earlier studies show that wealth effects are smaller for cross-industry mergers.[10] Cross-sectional studies also report that firm value decreases with the degree of diversification (Lang and Stulz 1994; Berger and Ofek 1995; Comment and Jarrell 1995).[11] In particular, diversity in SIC codes is negatively correlated with value. Berger and Ofek report that firms operating in unrelated businesses, defined as operating in different two-digit SIC codes, have lower values than firms operating in related businesses. Daley, Mehrotra, and Sivakumar (1997) find that spun-off segments experience improved performance, especially if they are unrelated.

Since not all cross-industry mergers are unrelated, an important question is whether the wealth effects in cross-industry, but vertically related, firms differ from those in cross-industry, but vertically unrelated, firms. We next turn to these tests.

10. See, e.g., Kaplan and Weisbach (1992), Andrade et al. (2001), Chevalier (2001), and Graham, Lemmon, and Wolf (2002). These studies also report that acquirers' abnormal returns are insignificant or slightly negative. Morck, Shleifer, and Vishny (1990) and Maquieira, Megginson, and Nail (1998) document that mergers between firms in different industries negatively affect acquirers' abnormal returns. Schoar (2002) finds that firms that acquire plants in unrelated industries experience a subsequent decline in total firm productivity. By contrast, Matsusaka (1993) and Hubbard and Palia (1999) show that conglomerate mergers in the 1960s and the early 1970s were associated with positive abnormal returns for acquirers.

11. Empirical research provides some evidence that diversification reduces financial constraints. Shin and Stulz (1998) show that divisional investments depend not only on a division's cash flow but also on the cash flows of other divisions. Hubbard and Palia (1999) show that acquisitions in which a financially unconstrained buyer acquired a constrained target created more value in the 1960s. However, diversification is also costly since it is prone to result in misallocation of capital (Scharfstein 1997; Rajan, Servaes, and Zingales 2000) or is motivated by agency problems (Denis, Denis, and Sarin 1997).

A. *Measuring the Wealth Effects of Mergers*

We use standard event study methodology to estimate the wealth effects of mergers. We estimate market model parameters for bidders and targets, using daily returns over a 255-day estimation period that ends 46 days before the initial merger announcement. We use the CRSP value-weighted index as the market proxy. We estimate cumulative abnormal returns (CARs) for two different event windows, a smaller window, one day before the event date through one day after the event date, $(-1, +1)$; and a larger window, 10 days before the event date through 10 days after the event date, $(-10, +10)$, where day 0 is the initial merger announcement as determined by the WSJI or the Lexis/Nexis database. Following Bradley, Desai, and Kim (1988) and Mulherin and Boone (2000), we estimate the combined wealth effects of mergers as the weighted average CARs of bidders and targets, where the weights are the respective market values of the equity of the bidders and targets 10 days before the initial announcement.

B. *Wealth Effects by Merger Type and by Period*

Table 4 reports average wealth effects for the overall sample and for various subsamples classified by merger types and subperiods. Results from standard t-tests of the null hypothesis that the mean wealth effects are equal to zero are reported using superscript asterisks. The combined average wealth effect for the entire sample of 2,162 mergers during 1962–96 is 1.9% for the $(-1, +1)$ window and 2.4% for the $(-10, +10)$ window. Both of these average wealth effects are significantly different from zero.[12] Overall, the magnitude of the wealth effects for this sample of mergers supports the findings in previous studies on the value of gains in mergers. For example, Andrade et al. (2001) report a very similar positive 1.8% average combined wealth effect for the $(-1, +1)$ window for CRSP mergers during 1973–98.[13]

The combined wealth effects for vertical mergers are larger compared with the effect for the overall sample. The combined wealth effect in the $(-1, +1)$ window is statistically significant at 2.5% for vertical mergers compared with 1.9% for the entire sample. The difference between wealth effects for vertical mergers and those for all mergers is significant at the 1% level (p-value = 0.008). When we disaggregate the vertical mergers into pure vertical mergers and mixed vertical-horizontal mergers, we find that the wealth effects for these subsamples are similar to those for the overall vertical merger sample. The wealth effects for pure vertical mergers are 2.3% and 2.7% for mixed vertical-horizontal mergers; they are not significantly different from each other (p-value = 0.23). The average wealth effect for pure horizontal mergers is

12. Though not reported in the table, the median combined return is in excess of 1%. Only a little over one-quarter of the mergers destroy value, i.e., have negative wealth effects.

13. Jensen and Ruback (1983) and Jarrell, Brickley, and Netter (1988) survey the earlier evidence on the wealth effects in mergers and acquisitions. Mulherin and Boone (2000) provide more recent evidence from the 1990s.

TABLE 4 Wealth Effects for the Sample Mergers by Time Period and Relatedness, 1962–96

Period	All Mergers (1)	Vertically Related (2)	Pure Vertical (3)	Pure Horizontal (4)	Mixed Vertical and Horizontal (5)	Diversifying Mergers (6)
	A. Mean Wealth Effects (−1, +1) by Period and by Type of Mergers (1% Cutoff)					
1962–70	.015***	.014***	.011**	.033***	.018***	.014***
1971–80	.015***	.012***	.017***	.039***	.003	.014***
1981–90	.021***	.033***	.031***	.020**	.035***	.012***
1991–96	.024***	.029***	.026***	.031***	.031***	.016***
1962–96	.019***	.025***	.023***	.029***	.027***	.014***
	B. Mean Wealth Effects (−10, +10) by Period and by Type of Mergers (1% Cutoff)					
1962–70	.022***	.030***	.028***	.022	.032**	.018***
1971–80	.019***	.024***	.022**	.049***	.027**	.013***
1981–90	.027***	.046***	.045***	.037**	.047**	.009
1991–96	.027***	.037***	.038***	.024*	.036***	.015**
1962–96	.024***	.037***	.035***	.033***	.038***	.013***
	C. Mean Wealth Effects (−1, +1) by Period and by Type of Mergers (5% Cutoff)					
1962–70	.015***	.016***	.016**	.031***	.016**	.013***
1971–80	.015***	.009*	.018**	.031***	−.002	.014***
1981–90	.021***	.033***	.036***	.028***	.031***	.016***
1991–96	.024***	.031***	.032***	.031***	.031***	.017***
1962–96	.019***	.025***	.026***	.030***	.025***	.015***
	D. Mean Wealth Effects (−10, +10) by Period and by Type of Mergers (5% Cutoff)					
1962–70	.022***	.031***	.029*	.025*	.033**	.019***
1971–80	.019***	.012	.016	.051***	.008	.015***
1981–90	.027***	.048***	.040***	.038***	.051***	.017***
1991–96	.027***	.042***	.049***	.024**	.039***	.019***
1962–96	.024***	.037***	.034***	.035***	.038***	.017***

NOTE.—This table reports the combined wealth effects for a sample of 2,162 mergers during 1962–96. The combined wealth effect is the value-weighted average of the bidder and target cumulative abnormal returns (CAR), where we estimate the weights on the basis of bidder and target equity values 10 days before the initial merger announcement. We estimate the CARs for the bidder and the target around the day of the merger announcement for two different event windows, (−1, +1) and (−10, +10), using a market model with an estimation period of 250 days ending 46 days before the announcement. The table also reports CARs for mergers stratified by various relatedness types. In panels A and B, we classify mergers as vertically related if the vertical relatedness coefficient exceeds 1%. In panels C and D, we classify mergers as vertically related if the vertical relatedness coefficient exceeds 5%. Pure vertical mergers are between firms that belong to different IO codes but are still vertically related. Mixed vertical-horizontal mergers are between firms that belong to the same IO code and are also vertically related. Pure horizontal mergers are between firms that are not vertically related but belong to the same IO code. Diversifying mergers are between firms in different IO codes that are also vertically unrelated. Results from the standard *t*-test that tests the null hypothesis that combined wealth effects equal zero are reported using superscript asterisks.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

approximately 2.9%, and again it is not significantly different from the wealth effect for vertical mergers (the p-value for the difference in means is 0.43).[14]

By contrast, diversifying mergers generate significantly lower wealth effects. The average wealth effects for diversifying mergers are about 1.4% over the entire period. The wealth effects for diversifying mergers are significantly smaller than those for the overall sample (p-value < 0.01). The wealth effects in diversifying mergers are also significantly smaller than those for both vertical and horizontal mergers (the p-values in both cases are less than 0.01).

Although diversifying mergers are associated with smaller wealth effects, they are nonetheless significantly positive. These results are consistent with a number of previous studies that show that the announcement reaction is positive for mergers between firms in different industries. Schipper and Thompson (1983) and Hubbard and Palia (1999) provide evidence of a positive market reaction to unrelated mergers in the 1960s; Matsusaka (1993) reports a positive market reaction to unrelated mergers in the late 1960s and 1970s; and Chevalier (2001) provides evidence of a positive reaction to unrelated mergers in the 1980s and 1990s.

To examine robustness, panel B of table 4 presents results on the combined wealth effects for the larger window $(-10, +10)$. Panels C and D present results for related mergers for the two windows for vertical relatedness at the 5% cutoff. The results in these panels indicate that our conclusions are robust to the choice of the length of the event window and the vertical relatedness cutoff that defines merger types.

The period-by-period wealth effects for the overall sample suggest that the average merger wealth effects are greater during the 1980s and 1990s than those during the 1960s and 1970s. In particular, *vertical mergers* generated significantly greater wealth effects during the 1980s and 1990s than in the previous two decades. Vertical mergers, defined at the 1% cutoff, indicate wealth effects of 3.3% and 1.9% for the $(-1, +1)$ window during the 1981–90 and the 1991–96 subperiods, respectively. In contrast, the wealth effects in the earlier 1962–70 and 1971–80 periods are only 1.4% and 1.2%, respectively. Measuring wealth effects using the $(-10, +10)$ window yields a similar result. When we disaggregate vertical mergers into pure vertical and mixed vertical and horizontal mergers, we find that both types of vertical mergers generated higher wealth effects in the 1980s and 1990s. We do not find a similar trend in the wealth effects for the pure horizontal mergers or for the diversifying mergers.

C. *Regression Analysis*

To examine whether wealth effects and the degree of vertical relatedness are cross-sectionally related, we regress the combined wealth effects of mergers

14. Fee and Thomas (2003) find that increased buying power is an important source of gain in horizontal mergers. Similarly, Shahrur (2005) finds that some horizontal takeovers result in higher buying power for the merged firms.

on several sets of variables that indicate relatedness. As control variables, all regressions include the relative size of the target and dummies for stock-financed mergers, industry, and time on the right-hand side.

All the estimated regressions include three broad industry dummies for basic, manufacturing, and utility industries. The broad industry dummy variables equal one if the acquirer is primarily affiliated with basic (SIC < 3000), manufacturing (3000 ≤ SIC < 4000), or utilities (4000 ≤ SIC < 5000) industries. We also include three time period dummies that are equal to one if the initial announcement of the merger occurred during 1971–80, 1981–90, or 1991–96. The coefficients on the industry and time dummies are not reported in the tables.

In table 5, the dummy for stock-financed mergers takes a value of one if the merger is partially or wholly financed by stock. We include a dummy for stock-financed mergers because several studies show that announcement returns to bidding firms are higher in cash offers than those in stock offers (see Travlos 1987). We expect stock-financed mergers to generate lower wealth effects because of the adverse selection associated with payments in stock. We estimate the relative size as the ratio of the target's equity value divided by the bidder's equity value two days before the initial merger announcement.

Table 5 presents the regression results. The dependent variable in columns 1–4 is the wealth effect for the (−1, +1) window. The dependent variable in columns 5–8 is the wealth effect for the (−10, +10) window. In addition to the control variables, the independent variables in the first equation include a vertical relatedness dummy that takes a value of one if the merger is between firms with a vertical relatedness coefficient that exceeds 1%. The second equation includes a set of dummy variables for related mergers. We include a dummy for pure vertical mergers, a dummy for mixed vertical-horizontal mergers, and a dummy for pure horizontal mergers.

The results show that the wealth effects are significantly higher for vertically related mergers relative to other types of mergers. The estimated coefficient on the vertical merger dummy is significant and positive at the 1% level. Like our previous findings, results in column 2 suggest that vertically and horizontally related mergers create significantly greater wealth effects than diversifying mergers. The estimated coefficients on pure vertical mergers and on mixed vertical-horizontal mergers are both positive and significant.

The intercept term is positive and significant in column 2, suggesting that diversifying mergers also create value, albeit less value than other related mergers create. This evidence is consistent with the basic statistics in table 4 and echoes evidence from prior studies.

As predicted, the estimated coefficient on the stock-financed dummy is consistently negative and the estimated coefficient on relative size is consistently positive. Although we do not report the estimated coefficients on the broad industry dummies and time period dummies, we generally find that mergers that involve bidders in the manufacturing industry are indicative of

TABLE 5 Wealth Effects and Vertical Mergers

	(−1, +1) Window				(−10, +10) Window			
	Vertically Related at the Level of				Vertically Related at the Level of			
	1% (1)	1% (2)	5% (3)	5% (4)	1% (5)	1% (6)	5% (7)	5% (8)
Intercept	.022	.014	.23	.016	.018	.005	.021	.010
	(4.3)***	(2.6)***	(4.6)***	(3.0)***	(2.1)**	(.5)	(2.5)**	(1.1)
Vertical merger dummy	.009		.006		.20		.014	
	(3.0)***		(1.8)*		(4.2)***		(2.4)**	
Pure vertical merger dummy		.009		.010		.023		.016
		(2.9)***		(2.1)**		(4.2)***		(2.0)**
Vertical-horizontal merger dummy		.013		.009		.028		.022
		(3.6)***		(2.1)**		(4.1)***		(2.8)***
Pure horizontal merger dummy		.017		.016		.030		.024
		(3.0)***		(3.6)***		(3.3)***		(3.3)***
Dummy if stock financed	−.18	−.018	−.018	−.018	−.021	−.021	−.021	−.021
	(−7.3)***	(−7.4)***	(−7.3)***	(−7.4)***	(−4.6)***	(−4.6)***	(−4.6)***	(−4.6)***
Relative size	.009	.009	.009	.009	.014	.014	.014	.014
	(2.4)**	(2.3)**	(2.4)**	(2.3)**	(3.1)***	(3.1)***	(3.1)***	(3.1)***
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2,137	2,137	2,137	2,137	2,141	2,141	2,141	2,141
R^2	.06	.07	.06	.06	.04	.05	.04	.04

NOTE.—The table presents regressions of combined wealth effects on variables that describe the vertical and/or horizontal relations of the merged firms, a dummy for stock-financed mergers, and relative size of the target. All of the regressions control for industry and time period effects (coefficients are not reported in the table). The vertical merger dummy takes a value of one if the merged firms are vertically related at the 1% (5%) cutoff and zero otherwise. The pure vertical dummy takes a value of one if the merged firms are vertically related but belong to different IO industries. The mixed vertical-horizontal dummy takes a value of one if the merged firms are vertically related and belong to the same IO industry. The pure horizontal dummy takes a value of one if the merged firms are vertically unrelated and are assigned the same IO industry. We measure relative size as the ratio of the prebid equity value of the target to the prebid equity value of the bidder. t-statistics are in parentheses.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

higher-value gains. However, the differences are not statistically significant across industry groups.

To examine the robustness of the results, we define vertical relatedness at the alternative 5% cutoff and repeat the regression tests. We obtain results that are similar to those reported in columns 1 and 2 of table 5. We also replicate the regression tests using wealth effects defined by the larger (−10, +10) window. The results in columns 5–8 remain similar.

To examine whether these regression results are period specific, we divide our sample into four subperiods. We reestimate the three equations described above separately for each of the subperiods, but without the time period dummies. Table 6 reports the results from these subperiod regressions.

The notable finding that emerges from these estimated regression results is that, in the 1960s, the wealth effects in mergers are unrelated to the relatedness measures and the method of payment. During the 1970s, the wealth effects are systematically related to the stock payment dummy and relative size but are still unrelated to various relatedness measures. However, the sensitivity of wealth effects to vertical and horizontal relatedness dramatically increases in the 1980s and 1990s. These period results are robust to the choice of event window and the vertical relatedness cutoff.

It is unclear why the wealth effects of relatedness in the 1960s and 1970s are insignificant. Perhaps the lack of relationship indicates that the merging firms were unable to realize potential synergies or that they faced additional costs in vertical or horizontal combinations.

D. The Effect of Secondary Segments

Maksimovic and Phillips (2001) show that many mergers are between secondary and primary divisions of firms. Focusing on primary segments of merging firms, as we have done so far, raises two important concerns with the empirical tests. First, some transactions that we classify as vertical mergers on the basis of the primary division of merging firms may have additional horizontal components with secondary divisions. Second, some transactions may have important vertical relations at the secondary level that are not captured in our analysis of relatedness between primary segments.

We address these concerns by examining relatedness in both the primary and secondary divisions for acquirers and targets listed on the Compustat segment database. The segment database has segment information for 1,257 acquirers and targets. Roughly half of this sample consists of firms that operate in multiple segments. We focus on the top two segments by sales and estimate the vertical relatedness coefficient between pairs of primary and secondary divisions of acquirers and targets. The vertical merger dummy takes a value of one if the vertical relatedness coefficient of any pair of segments exceeds 1%. We similarly redefine the pure vertical merger dummy to include vertical relations between both primary and secondary segments.

Table 7 reports the results for the mergers with segment information. In

TABLE 6 Period Analysis of the Relation between Wealth Effect and Vertical Relatedness

	1962–70		1971–80		1981–90		1991–96	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	.026	.019	.024	.016	.010	.003	.026	.014
	(2.1)**	(1.3)	(4.1)***	(2.4)**	(1.5)	(.4)	(3.7)***	(1.7)*
Vertical merger dummy	−.003		−.004		.021		.010	
	(−.7)		(−1.0)		(4.1)***		(1.6)	
Pure vertical merger dummy		−.005		.003		.021		.013
		(−.9)		(.7)		(3.1)***		(1.6)
Vertical-horizontal dummy		.002		−.011		.027		.020
		(.2)		(−1.9)*		(4.1)***		(2.5)**
Pure horizontal dummy		.015		.018		.015		.022
		(1.1)		(1.8)*		(1.5)***		(2.0)**
Dummy if stock financed	−.008	−.009	−.018	−.017	−.025	−.025	−.014	−.014
	(−1.6)	(−1.8)*	(−5.0)***	(−5.0)***	(−5.1)***	(−5.1)***	(−2.4)**	(−2.4)**
Relative size	.014	.014	.025	.024	.013	.013	.002	.002
	(2.3)**	(2.2)**	(4.7)***	(4.6)***	(3.0)***	(3.0)***	(.7)	(.7)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	370	370	564	564	693	693	510	510
R^2	.05	.06	.14	.15	.11	.12	.02	.03

NOTE.—The table presents regressions of combined wealth effects (−1, +1) on variables that describe the vertical and/or horizontal relations of the merged firms, a dummy for stock-financed mergers, and the relative size of the target. We estimate the regressions separately for the 1962–70, 1971–80, 1981–90, and 1991–96 periods and include broad industry dummies. The vertical relatedness dummy takes a value of one if the merged firms are vertically related at the 1% cutoff and zero otherwise. The pure vertical dummy takes a value of one if the merged firms are vertically related but belong to different IO industries. The mixed vertical-horizontal dummy takes a value of one if the merged firms are vertically related and belong to the same IO industry. The pure horizontal dummy takes a value of one if the merged firms are vertically unrelated and are assigned the same IO industry. We measure relative size as the ratio of the prebid equity value of the target to the prebid equity value of the bidder. t-statistics are in parentheses.

* Significant at the 10% level.

** Significant at the 5% level

*** Significant at the 1% level.

TABLE 7 Wealth Effects and Merger Relatedness at Both the Primary and Secondary Levels

	Mergers Exhibiting Horizontal Relations at the Secondary Level Are Excluded		Mergers Exhibiting Horizontal Relations at Both the Primary and Secondary Levels Are Excluded	
	(1)	(2)	(3)	(4)
Constant	.025	.021	.017	.017
	(4.7)***	(3.3)***	(2.3)**	(2.3)**
Vertical merger dummy	.013		.013	
	(3.3)***		(2.6)***	
Pure vertical merger dummy		.013		.013
		(2.5)**		(2.6)***
Vertical-horizontal merger dummy		.008		
		(1.1)		
Pure horizontal merger dummy		.018		
		(3.4)***		
Dummy if stock financed	−.02	−.02	−.024	−.024
	(5.1)***	(5.1)***	(5.2)***	(5.2)***
Relative size	.007	.007	.013	.013
	(1.8)*	(1.8)*	(2.6)***	(2.6)***
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
N	1,139	1,139	715	715
Adjusted R^2	.05	.05	.09	.09

NOTE.— The table presents ordinary least squares of combined wealth effects (−1, +1) on variables that describe the vertical and/or horizontal relations of the merged firms, a dummy for stock-financed mergers, and relative size of the target for mergers with segment information on both acquirers and targets. The vertical merger dummy takes a value of one if the merged firms are vertically related at the 1% cutoff and zero otherwise at either the primary or the secondary level. The pure vertical dummy takes a value of one if the merged firms are vertically related but belong to different IO industries at either the primary or the secondary level. The mixed vertical-horizontal dummy takes a value of one for vertically related firms operating in same IO industries at the primary level. The pure horizontal dummy takes a value of one if the merged firms are vertically unrelated and are assigned the same IO industry. We measure relative size as the ratio of the prebid equity value of the target to the prebid equity value of the bidder. The regressions control for industry and time period effects. t-statistics are in parentheses.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

columns 1 and 2, we exclude mergers for which the acquirer and target are horizontally related at the secondary level. There are 118 out of 1,257 mergers for which either (i) the primary division of the acquirer shares the same IO code as the secondary division of the target, (ii) the secondary division of the acquirer shares the same IO code as the primary division of the target, or (iii) the secondary divisions of both the acquirer and the target share the same IO code. Excluding these mergers addresses the concern that the transactions we have classified as vertical may have horizontal components for multisegment firms, or vice versa.

In column 1, we find that the estimated coefficient on the redefined vertical merger dummy is positive and significant at the 1% level. In column 2, we find that the redefined pure vertical merger dummy and the pure horizontal dummy (between primary segments) are both positive and significant at the 1% level. In columns 3 and 4, we exclude all horizontal mergers, whether at

the primary level or at the secondary level. The results are again consistent with significantly greater wealth effects in vertical mergers. We find that these results are robust to our choice of event window or the vertical relatedness cutoff.

V. Concluding Remarks and Suggestions for Future Work

By using industry commodity flows information in input-output tables, we measure vertical relatedness in a large sample of mergers during the period 1962–96 and present three key findings in this paper.

First, a significant fraction of mergers during 1962–96 exhibit significant vertical relatedness. When we classify a merger as vertically related if the vertical relatedness coefficient exceeds 1%, almost one-third of the mergers in the sample exhibit vertical relatedness. When we use a stricter definition of vertical relatedness that requires the vertical relatedness coefficient to exceed 5%, almost 19% of mergers are vertically related.

Second, we find that the vertical merger activity has been increasing over time. Mergers in the 1980s and 1990s indicate significantly greater opportunities for vertical integration. This increase cannot be attributed to the involvement of one or two industry sectors in restructuring over time. Rather, several industries exhibit greater incidence of vertical merger activity beginning in the 1980s and continuing into the 1990s.

Third, vertical mergers result in positive wealth effects that are comparable to those in horizontal mergers. Even in a subsample of mergers between bidders and targets in different industries, vertically related mergers generate significantly greater positive wealth effects than vertically unrelated mergers. The wealth effects of vertical mergers are greater in the post-1980 period than those in the 1960s and 1970s. Moreover, we can attribute the higher merger wealth effects in the 1980s and 1990s relative to the 1960s and 1970s to vertical mergers.

Our ability to measure vertical mergers in large samples and to document patterns and wealth effects associated with different types of mergers opens up several avenues for testing theories of vertical integration and future empirical work. We offer some tentative suggestions here.

A prominent view of why firms vertically integrate is based on the transactions cost theory in the tradition of Coase (1937), Williamson (1971, 1975, 1979), and Klein et al. (1978). In this theory, vertical mergers arise to mitigate holdup problems associated with asset specificity and uncertainty in market transactions. Future research could examine how the incidence of vertical mergers changes with measures of relationship-specific assets interacted with demand or cost shocks to industries. One expects that vertical mergers are more likely when firms with relationship-specific assets face increasing demand or supply uncertainty and when their market structures become more concentrated and therefore more prone to bilateral bargaining situations.

There is also a large literature that views vertical integration as a response

to incomplete contracting (Grossman and Hart 1986; Tirole 1986; Hart and Moore 1990). According to this literature, incomplete contracting causes ex ante investments to be inefficient. Vertical integration is an ownership arrangement that allocates residual control rights (those not specified in the contract) over production decisions. Through vertical integration, ownership and control rights are allocated to the party whose benefits are most sensitive to the production decisions of both parties. The incomplete contracting approach is related to the transaction cost approach but focuses more explicitly on the effects of ownership arrangements on the ex ante incentives in specialized investments.

Future research could compare the patterns of specialized investments before and after vertical mergers. The incomplete contracting approach predicts a higher degree of specialized investments subsequent to vertical mergers.

Finally, there is a growing body of literature that emphasizes the effect of resources on the boundary of the firm. According to this view, firms expand their boundaries by acquiring new businesses to utilize their excess capacity in noncontractible resources, such as managerial or organizational talents (Penrose 1959; Teece 1982; Montgomery and Wernerfelt 1988). A recent paper by Maksimovic and Phillips (2002) argues that organizational talent has a general as well as an industry-specific component. Future research could examine how the interplay between general and specific organizational talent affects the likelihood of related mergers (horizontal or vertical) in comparison to diversifying mergers.

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