



The impact of industry shocks on takeover and restructuring activity

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(Received December 1994; final version received June 1995)

Abstract

We study industry-level patterns in takeover and restructuring activity during the 1982–1989 period. Across 51 industries, we find significant differences in both the rate and time-series clustering of these activities. The interindustry patterns in the rate of takeovers and restructurings are directly related to the economic shocks borne by the sample industries. These results support the argument that much of the takeover activity during the 1980s was driven by broad fundamental factors and have general implications for the stock price spillover effects of takeover announcements, corporate performance following takeovers, and the timing of takeover waves.

Key words: Industry shock; Takeover; Restructuring; Mergers and acquisitions

JEL classification: G34

1. Introduction

The large number of corporate takeovers during the 1980s has been characterized as the fourth takeover wave in the U.S. during the past 100 years. This paper assesses the proposition that industry shocks contribute to the extensive

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We acknowledge comments on prior drafts by Eugene Fama, Joseph Fan, Gordon Hanka, David Ikenberry, Mike Maloney, Krishna Palepu (the referee), G. William Schwert (the editor), Dennis Sheehan, Fred Weston, session participants at the NBER Corporate Finance Workshop and the 1994 ASSA Meeting, and seminar participants at the Federal Trade Commission, Northwestern University, and Penn State University. Mark Carhart, Violet Law, and David Schanzer provided research assistance.

takeover and restructuring activity of that decade. Examples of shocks include deregulation, changes in input costs, and innovations in financing technology that induce or enable alterations in industry structure. The hypothesis we maintain in our analysis is that corporate takeovers such as tender offers, mergers, and leveraged buyouts are often the least-cost means for industry structure to respond to the changes brought about by economic shocks. Our central prediction is that the takeover and restructuring activity in the 1980s clusters in the industries that experience shocks of the greatest magnitude.

A number of observers point to factors such as deregulation as being part of the impetus for the 1980s takeover wave. However, little systematic analysis has been performed regarding the importance of such shocks for industry variation in takeover and restructuring activity. The analysis of the 1980s has instead focused on the role of hostile takeovers and leveraged buyouts in restructuring the assets at particular firms. Our analysis of industry shocks broadens the knowledge of the forces at work behind the wave of takeovers during the 1980s.

Our research is motivated by the relatively meager understanding of the dynamics of takeover activity. Prior research finds that takeovers do not occur evenly over time, but instead cluster in distinct waves. Past studies have been less successful, however, in determining the reasons why takeover activity varies over time. As such, the treatment of takeover waves has tended to be ad hoc, with each of the four takeover waves in the past century having its own label: the 1890s for monopoly, the 1920s for oligopoly, the 1960s for conglomerate takeovers, and the 1980s as the decade of hostile bust-up takeovers.

Consistent with this ad hoc characterization, the recent burst of takeover activity that began in 1993 has been viewed as a distinctly new wave that is driven by strategic, synergistic factors. One notable feature of the current takeover activity is that it clusters in a few particular industries. Table 1 reports that seven of the 50 industries tracked by Mergerstat Review account for half of the takeover activity during 1993 and 1994. Moreover, the industries with the greatest activity are sectors that are currently responding to deregulation, technological advancements, and other fundamental factors. Many commentators contrast this response of specific industries to fundamental change with the widespread bust-up takeovers in the 1980s.

In spite of the perceived differences between takeovers in the 1980s and 1990s, our results indicate that the takeover activity in the two decades shares common features. Like the recent patterns displayed in Table 1, our analysis shows that takeover activity in the 1980s clusters disproportionately at the industry level. Moreover, we find that industries experiencing the greatest amount of takeover activity in the 1980s are those exposed to the greatest fundamental shocks. The empirical results support the argument that broad-based fundamental factors play an important role in the takeover and restructuring activity of the 1980s.

The importance of industry shocks for takeover activity in these two decades suggests a direction for future research on the time series of takeovers during the

Table 1
Takeover activity during 1993–94

This table lists seven industries that account for more than half of the takeover activity in the 1993–94 period for the 50 industries tracked by Mergerstat Review. Takeover value is in \$ millions. % of total takeover value is the value of takeovers in a particular Mergerstat industry divided by the total value of takeovers in the Mergerstat sample. % of total equity value is the value of the firms in a Mergerstat industry divided by the total equity value at year-end 1992 for all publicly traded firms on CRSP. The matching between CRSP and Mergerstat is done via SIC codes. (Mergerstat Review provides the SIC codes associated with each Mergerstat industry; CRSP provides the primary SIC code for each listed firm.)

Industry	Takeover value	% of total takeover value	% of total equity value
Banking & finance	\$ 51,637	12.8%	2.5%
Broadcasting	\$ 43,129	10.7	0.8
Communications	\$ 27,661	6.9	4.3
Leisure & entertainment	\$ 25,339	6.3	1.5
Insurance	\$ 22,017	5.5	2.4
Health services	\$ 21,896	5.4	1.0
Wholesale & distribution	\$ 15,704	3.9	1.5
Sum for 7 industries	\$207,383	51.5	14.0
Total takeover value	\$403,071		

entire century. Past work on this topic has focused with mixed success on macroeconomic variables as the source of takeover activity; the most robust result from this line of research is that takeover activity is positively related to overall stock market performance. Our results suggest that a fruitful research design would consider the joint effect of macroeconomic and industry-level factors in modeling the behavior of takeovers over time.

Our work is relevant to the recent debate concerning the decline in the takeover market at the end of the 1980s. Linking takeover activity with fundamental shocks is consistent with the analysis of Comment and Schwert (1995), who argue that relatively broad-based economic factors, rather than state laws and firm-specific antitakeover amendments, reduced the number of takeovers.

Our work also has implications for interpreting the effect that a takeover announcement for one firm in an industry has on the equity value of other industry members. Because we find that takeover activity has industry-driven factors, our results imply that one firm's takeover announcement gives information about other industry members that may be tied to economic fundamentals rather than market power, as is often asserted by regulators.

Some observers express concern that takeovers are too often followed by business failures. Because we find that takeovers are driven in part by industry shocks, it is not surprising that many firms exhibit volatile performance following takeovers, with actual failures following some negative shocks. Rather than

being the actual source of performance changes, the takeovers are often merely messengers of the underlying economic changes taking place in the industry.

The paper proceeds as follows. Section 2 develops our arguments on the link between industry shocks and takeover activity, and places our approach in the context of prior research. Section 3 describes our data set and reports evidence on the overall magnitude of takeover activity during the 1980s. Section 4 analyzes the extent to which there were interindustry differences in the rate of takeover activity during the 1980s, and Section 5 reports the interindustry variation in the timing of takeovers. Section 6 relates the variation in the rate of takeover activity to measures of industry shocks. The final section summarizes the analysis and discusses the implications of the results.

2. Industry shocks and takeover activity

Our concept of an industry shock is any factor, whether expected or unexpected, that alters industry structure. Similarly, we define takeovers broadly to include tender offers, mergers, and leveraged buyouts. In most of the analysis, we group friendly and hostile takeovers together. Because our analysis focuses at the industry level, the means of, or intent behind, a particular takeover is secondary to the fact that organizational change is taking place.

2.1. Shocks, industry structure, and takeover activity

In linking takeover activity and industry shocks, we assume that the structure of an industry, including the number and size of firms, is a function of factors such as technology, government policy, and demand and supply conditions. Major changes, or shocks, in any of these factors cause shifts in industry structure. This neoclassical framework of the dynamics of industry structure is sufficient for our purposes, especially given the lack of a more detailed dynamic model in the industrial organization literature. Breshnahan (1989), for example, notes that much of the analysis in industrial organization has focused on market power, rather than specifically addressing the response of industry structure to economic shocks.

Firms in an industry can respond to a shock either internally or externally. For example, a technological shock that triggers an increase in firm size can be accomplished either through internal expansion or takeovers. Our maintained hypothesis is that the takeover route is often the least-cost method to alter industry structure.

As a specific example of takeover activity and industry shocks, consider the ongoing changes in the U.S. banking system. Recent federal legislation has removed regulatory hurdles to nationwide banking, and industry members have responded by expanding across state lines and regional boundaries. Analysts

predict that the economies of scale brought about by such expansion will lower operating costs by roughly 33% (Standard & Poor's Industry Surveys, June 4, 1992, p. B4). With assets already in place, takeovers are arguably the quickest way to accomplish this expansion, as internal growth would create excess capacity in the relatively mature banking industry. Hence, it is not altogether surprising that the banking industry sits atop the list in Table 1 by having more than \$50 billion in takeover activity in the 1993–94 period.

Related arguments can be made that link takeover activity with negative industry shocks. A shock-driven decline in demand can cause the members of an industry to close unprofitable facilities, but it can also pressure firms to merge the remaining facilities in order to react to the post-shock optimal plant size. For example, Dutz (1989) provides theory and case-study evidence that takeovers in the steel industry in the 1980s allowed firms to better accomplish downsizing by eliminating duplicate facilities and matching capacity, thus maintaining economies of scale under the new industry structure of fewer firms. Jensen (1993) suggests that the ongoing consolidation and organizational change in many industries can be traced to the alteration in input costs that stemmed from the oil price shocks of the 1970s.

2.2. *Related research on takeovers*

A large body of research has studied takeover activity. Much of the analysis of takeovers in the 1980s has been firm-specific in nature, and has shown the role of takeovers in reversing value-decreasing acquisitions (Mitchell and Lehn, 1990), returning assets to their core industries (Bhagat, Shleifer, and Vishny, 1990; Comment and Jarrell, 1995), penalizing poor managerial performance (Morck, Shleifer, and Vishny, 1988, 1989), and improving cash flow and other fundamentals (Kaplan, 1989; Smith, 1990). Another set of analyses considers the effect that macroeconomic variables have had on the level of takeover activity over long periods of time (see, e.g., Becketti, 1986; Golbe and White, 1988; Melicher, Ledolter, and D'Antonio, 1983).

Relative to these firm-specific and macroeconomic analyses of takeover activity, our research design more closely resembles the approach found in papers such as Blair and Schary (1993) and Gort (1969), which study restructuring and takeover activity at the industry level. Blair and Schary (1993) find some evidence of a relation between financial restructuring and free cash flow during the first part of the 1980s, although the findings are not robust to the entire decade. Gort (1969) documents interindustry variation in the rate of takeover activity during the 1950s, and suggests that the patterns are consistent with an economic disturbance model. As part of his analysis of takeovers at the turn of the century, Nelson (1959) also notes industry differences in the rate of takeover activity. McGowan (1971, Table 5) reports international evidence on the industry clustering of takeovers during the 1950s and 60s.

Our research broadens the inquiry into the sources of interindustry variation in takeover and restructuring activity. To some extent, our approach attempts to empirically implement Jensen's (1993) model in which the takeovers and restructurings of the 1980s are linked to widespread technological, regulatory, and economic change. Our approach is also consistent with Weston, Chung, and Hoag's (1990) observation that recent takeover activity has been high in industries undergoing deregulation, experiencing oil price shocks, and otherwise facing structural alteration.

3. Takeover and restructuring activity during the 1980s

This section describes the primary database on takeover and restructuring activity used in this study. In reporting summary statistics, we corroborate two stylized facts: The takeover activity of the 1980s was widespread, and it targeted large firms. The database entails 1,064 firms that were listed in the Value Line Investment Survey at year-end 1981. Our sample is a refinement of that used in Mitchell and Lehn (1990), covering 51 industries for which Value Line followed ten or more firms.¹ The firms in the database comprise more than 60% of the value of the listings on the NYSE, AMEX, and NASDAQ as of year-end 1981.

For each of the sample firms, we search the *Wall Street Journal*, Dow Jones Broadtape, Moody's Industrial Manuals, the Value Line Investment Survey, and related financial publications for evidence of takeover and/or restructuring activity during the 1982–89 period. The starting year for the analysis parallels the initiation of the tolerant antitrust policy of the Reagan administration and the beginning of the 1980s bull market. The ending year coincides with the significant decline in takeover activity at the close of the 1980s, as documented by Comment and Schwert (1995).

The use of Value Line as the source for the sample ensures that the firms are heavily covered by the financial press, thereby enabling the analysis of both successful and unsuccessful bids, not just completed takeovers. Our classification of takeovers includes tender offers, mergers, and leveraged buyouts. Additionally, in the absence of an explicit takeover bid, a firm is classified as having a defensive asset restructuring if it undertakes a significant sale of assets or a major recapitalization that can be traced to implicit takeover pressure, such as a large block purchase by a corporate raider or the growing incidence of acquisitions in the firm's industry.

¹Heavily regulated industries such as utilities and financial services are excluded from the analysis. Because we restrict the analysis to firms incorporated in the U.S., two industries in our sample – Medical Services and Coal, Uranium, and Geothermal – have only nine firms.

Table 2 reports the frequency of the takeover and restructuring activity for our sample during the 1982–89 period. Twenty-seven percent of the firms experience a friendly bid, while 23% are the object of a hostile acquisition attempt. An additional 7% of the firms undertake a defensive asset restructuring, indicating that 57% of the sample firms experience a takeover attempt or major restructuring during the eight-year period of examination. The value-weighted data tell a similar story: Roughly half the sample shows the footsteps of some form of takeover or restructuring during the 1980s.

The more detailed categories in Table 2 indicate that 41% of the firms in the sample are actually acquired – 25% via a successful friendly takeover, 8% in a successful hostile takeover, and 8% in a friendly acquisition that follows an

Table 2
Frequency of takeover and restructuring activity during 1982–89

This table presents the incidence of takeover and restructuring activity for a sample of 1,064 firms listed in the Value Line Investment Survey at year-end 1981. Takeover and restructuring activity in the 1982–89 period is determined by searching financial periodicals. Takeovers include tender offers, mergers, and leveraged buyouts. Friendly takeovers are those not initially opposed by target management. Hostile takeovers are those initially opposed by target management. Defensive asset restructurings include any major asset restructuring or recapitalization induced by implicit takeover pressure, such as a large block purchase by a corporate raider or the growing occurrence of takeover activity in the firm's industry. The value-weighted % is the total value (market equity plus book debt) of the firms in the respective category divided the total value of the full sample, for which all values are recorded at year-end 1981.

Classification	Number of firms	Equally weighted %	Value-weighted %
Friendly takeover target	286	26.9%	13.6%
Successful	268	25.2	13.0
Unsuccessful	18	1.7	0.6
Hostile takeover target	243	22.8%	23.4%
Successful	85	8.0	7.3
Unsuccessful	35	3.3	2.2
Unsuccessful followed by friendly takeover	87	8.1	7.0
Unsuccessful followed by restructuring	36	3.4	6.9
Defensive asset restructuring	78	7.3%	11.8%
Asset restructuring	64	6.0	9.0
Financial recapitalization	14	1.3	2.8
Remainder of the sample	457	43.0%	51.2%
Total sample	1,064	100.0%	100.0%

In 15 successful friendly takeovers, the bidder gained control without an actual takeover. In four unsuccessful friendly takeovers, the firms subsequently engaged in major asset restructurings.

unsuccessful hostile attempt. On a value-weighted basis, 27% of the sample is actually acquired. The evidence on actual acquisitions affirms the breadth of takeover activity during the 1980s.

Since Value Line covers the more actively traded firms, the description of takeover activity in our primary data base applies to the larger publicly traded firms. As an assessment of the robustness of the summary statistics, we employ the CRSP database to replicate the analysis of actual takeovers. For the 5,294 NYSE, AMEX, and NASDAQ firms listed on the CRSP files at year-end 1981 (total equity value of \$1.3 trillion), we impose criteria similar to those used for the data set taken from Value Line. That is, we use the two-digit SIC industry classification and exclude industries with fewer than ten firms, regulated industries such as utilities and financial services, and firms for which a two-digit SIC code is unavailable. The resulting data set consists of 3,660 firms (total equity value of \$1.0 trillion) in 46 industries. We then track each firm until the end of 1990 to determine whether CRSP dropped the firm because of a tender offer, merger, or leveraged buyout.² This procedure indicates that 31% of the CRSP sample is acquired during the period of study; weighting by equity value, 28% of the CRSP sample is acquired. These percentages compare with 41% and 27%, respectively, for the equally weighted and value-weighted incidence of actual takeovers in the Value Line sample. The comparable size of the value-weighted numbers in the two samples attests to the breadth of takeover activity during the 1980s. The greater fraction of firms actually acquired in the Value Line sample indicates the degree to which the corporate control activity of the 1980s involves large firms.

To further benchmark takeover activity during the 1980s, we construct data sets for takeovers during two earlier decades. For the 2,094 NYSE and AMEX firms that were listed on CRSP as of July 2, 1962, we find that 425 (20%) were acquired by the end of 1972, although on a value-weighted basis, the fraction of takeover activity was only 7% during the 1962–72 period. Similarly, for the 6,277 NYSE, AMEX, and NASDAQ firms listed on CRSP as of January 1, 1973, 1,202 (19%) were acquired by the end of 1981, although, as in the 1960s, the percentage of equity acquired was only 8%. Hence, the rate of actual takeover activity in the 1960s and 70s was not only less than the 1980s, but the activity in the earlier periods was tilted much more toward small firms, as indicated by the noticeably smaller value-weighted numbers for takeover activity in the earlier decades.

²We track the firms through 1990 because we only have actual takeover completion dates for the CRSP sample, rather than the announcement dates available for the Value Line sample. Ending the tracking period at earlier dates (such as December 1989 or June 1990) does not alter the results applying to the CRSP sample here or later in the paper.

4. Industry differences in the rate of takeover and restructuring activity

In analyzing whether industry shocks are a source of takeover activity, our first step is to examine whether there is significant variation in the amount of takeover activity across the industries in our sample. Table 3 reports the takeover and restructuring activity for each of the 51 Value Line industries. We report the equally weighted and value-weighted fraction of the 1982–89 activity for five categories: total takeover and restructuring activity, takeover attempts, friendly bids, hostile bids, and actual takeovers. The presentation of the various classifications of takeover activity allows both comparisons with, and extensions of, prior analysis of the 1980s. To a large extent, however, the finer distinctions, such as friendly versus hostile takeovers, are not central to our main question of the impact of industry shocks on takeover activity.

The data in Table 3, presented in descending order of the equally weighted fraction of total takeover and restructuring activity, indicate a wide variation in the rate of takeover and restructuring across the 51 industries during the sample period. In seven industries (Entertainment, Drugstores, Petroleum Producing, Broadcasting, Textiles, Tire and Rubber, and Integrated Steel), three-fourths or more of the firms receive a takeover bid or undertake a major restructuring between 1982 and 1989. At the other extreme, one-third or fewer of the firms in Paper and Paper Products, Specialty Chemicals, and Metal Fabricating experience takeover and restructuring activity. The value-weighted measure of takeover and restructuring activity exhibits even more interindustry variation: The standard deviation of the value-weighted measure is 25% compared to only 15% for the equally weighted frequency. The finer classifications of takeover activity also vary widely across industries. Overall, the data in Table 3 reveal a noticeable interindustry variation in takeover activity during the 1980s, although no industry is fully immune to takeover pressure. Furthermore, both friendly and hostile bids occur in nearly all industries.

We next use chi-square tests to assess whether the variation in takeover and restructuring activity is significant across the 51 Value Line industries. The null hypothesis is that the actual takeover rate in each industry equals its expected takeover rate. (The expected takeover rate is that for the entire Value Line sample.) Table 4 reports the probability values associated with the null hypothesis of equal rates of activity across industries for three measures: total takeover and restructuring activity, takeover attempts, and actual takeovers.³

³We perform separate analysis for friendly and hostile takeover attempts, and obtain results similar to those reported in Table 4. We do not report the results for the finer categorization of takeover attempts because they are somewhat redundant, given the results for total takeover attempts, and also because the distinction between friendly versus hostile takeovers is not integral to our analysis of industry shocks.

Table 3
Cross-sectional variation in takeover and restructuring activity by Value Line industry during 1982–89

This table presents the takeover and restructuring activity during 1982–89 across 51 industries encompassing 1,064 firms listed in the Value Line Investment Survey at year-end 1981. Takeover and restructuring activity in the 1982–89 period is determined by searching financial periodicals. Industry value is the sum of the total value (book debt plus market equity, in \$ millions) of the firms in the industry as of year-end 1981. Total activity is the fraction of firms in an industry that experience a takeover bid or a major restructuring in the 1982–89 period. Takeover attempts is the fraction of firms that receive a takeover bid. Friendly bids and hostile bids respectively segregate the fraction of takeover bids into friendly and hostile categories. Actual takeovers reports the fraction of firms that actually realize a change in control. The 'Equal' columns show the % of firms in an industry that experience activity. The 'Value' columns show the proportion of total value in an industry, based on year-end 1981 values, that experiences activity in the 1982–89 period. The data are presented in descending order of the fraction of firms experiencing takeover or restructuring activity.

Industry	Number of firms	Industry value	Total activity		Takeover attempts		Friendly bids		Hostile bids		Actual takeovers	
			Equal	Value	Equal	Value	Equal	Value	Equal	Value	Equal	Value
Entertainment	17	11,204	82%	88%	71%	83%	47%	22%	24%	61%	59%	61%
Drugstores	10	3,525	80	79	70	67	60	51	10	16	70	67
Petroleum producing	19	17,972	79	91	63	71	26	14	37	57	47	63
Broadcasting	13	8,200	77	83	77	83	38	42	38	41	69	64
Textiles	17	4,248	77	82	76	82	41	22	35	60	71	81
Tire & rubber	12	7,464	75	90	67	75	17	4	50	71	50	31
Integrated steel	12	17,441	75	81	33	44	17	12	17	32	17	9
Air transport	23	18,462	74	70	70	70	39	42	30	28	48	41
Toiletries & cosmetics	15	7,011	73	97	60	91	27	7	33	84	47	47
Metals & mining	11	13,862	73	57	64	43	0	0	64	43	18	16
Natural gas	21	41,647	71	76	67	53	29	17	38	36	57	45
Precision instruments	21	17,811	71	28	62	14	48	8	14	6	43	8
Retail stores, special lines	17	6,810	71	34	65	30	35	15	29	15	47	26
Grocery stores	20	10,662	70	72	70	72	35	19	35	53	65	60
Truck & transport leasing	20	7,118	70	58	45	42	15	5	30	37	45	42
Integrated petroleum	36	2,14,134	69	60	56	41	17	8	39	34	39	28
Hotels & gaming	12	8,000	67	81	42	38	8	6	33	32	17	10
Coal, uranium, geothermal	9	4,620	67	56	44	36	22	4	22	32	22	4
Construction machinery	17	11,740	65	27	65	27	24	9	41	17	53	20

Multiform	40	38,755	63	79	50	40	28	20	23	20	45	38
Building	58	23,195	62	65	52	44	29	19	22	26	40	29
Replacement auto parts	15	5,710	60	48	47	37	27	12	20	25	33	33
Home appliances	10	2,740	60	44	60	44	50	26	10	22	60	44
Original equip. auto parts	10	3,807	60	34	50	23	40	22	10	1	50	23
Packaging & containers	22	9,206	59	70	50	67	23	20	27	47	45	66
Publishing	22	10,778	59	48	59	48	32	16	27	32	50	24
Oilfield services	27	37,193	59	52	41	37	30	32	11	5	30	30
Apparel	26	3,987	58	74	54	68	35	52	19	16	46	63
Fast food & restaurants	16	6,779	56	31	50	28	31	19	19	9	50	28
Medical services	9	9,916	56	59	56	59	44	47	11	12	56	59
Food processing	54	40,722	56	57	52	51	28	25	24	26	48	50
Machinery	38	16,757	55	48	50	38	37	27	13	12	47	31
Retail stores	38	35,333	55	30	50	28	29	7	22	21	39	19
Industrial services	19	6,713	53	25	53	25	47	23	5	2	47	24
Computer data processing	31	63,916	52	14	45	11	19	2	26	9	45	11
Shoes	12	4,515	50	44	33	35	17	12	17	23	17	12
Mfg. hous. & rec. vehicles	12	890	50	37	42	36	42	36	0	0	42	36
General steel	10	1,725	50	34	40	28	20	14	20	14	40	28
Aerospace & defense	28	24,383	50	34	46	25	25	8	21	17	39	18
Basic chemicals	13	45,656	46	26	38	25	15	7	23	18	23	7
Electrical equipment	34	33,430	44	22	38	8	26	6	12	2	38	8
Diversified chemicals	14	21,212	43	41	21	12	7	7	14	5	21	12
Toys & school supplies	10	1,410	40	29	40	29	30	23	10	6	40	29
Health care & hosp. supply	23	19,965	39	16	35	14	13	3	22	12	35	14
Drugs	13	28,814	38	31	38	31	31	30	8	1	38	31
Office equipment & supplies	13	7,243	38	19	38	19	31	13	8	6	38	19
Machine tool	16	5,378	38	21	38	21	6	1	31	20	31	20
Electronics	41	26,688	37	25	37	25	22	20	15	5	29	23
Paper & paper products	27	32,245	33	24	33	24	7	4	26	20	26	21
Specialty chemicals	22	8,058	27	14	27	14	9	5	18	9	14	8
Metal fabricating	19	4,463	26	21	26	21	16	15	11	6	26	21
All firms	1,064	1,013,512	57%	49%	50%	37%	27%	14%	23%	23%	41%	28%

The first two columns of p -values in Table 4 are based on conventional chi-square statistics: the Pearson chi-square statistic and the likelihood ratio chi-square statistic.⁴ For both test statistics, the null hypothesis is rejected for all categories of takeover and restructuring activity.

A drawback of these conventional test statistics is that they are only approximations of the true p -values; statistics research has shown that the approximations may not be valid for cases in which some of the expected frequencies are less than five. For the Value Line sample, there are several industries for which this is the case. For example, in the category of actual takeover occurrences, the expected takeover rate is 41% implying an expected frequency of less than five takeovers for the 13 industries with less than 13 firms. One way of reducing the number of industries with expected frequencies below five is to group related industries, such as those in the different steel sectors. When we do so, the probability values associated with the various takeover categories fall noticeably.

As a more general improvement over the weakness in the conventional tests in the presence of sparse data, we compute exact tests of significance that yield the true p -values regardless of sample size. Specifically, we employ the simulation algorithms developed by Mehta and Patel (1983), which extend the Fisher exact test for a 2×2 table to an $r \times c$ table. Using their algorithm, we simulate probability distributions associated with the takeover and restructuring data, and obtain the likelihood that the observed data exhibit variation across industries.⁵ These probability values are presented in the third column of Table 4, and confirm that the variation in takeover activity during the 1982–89 sample period is indeed significant.

To verify the robustness of the results, we analyze the actual takeovers during 1982–90 in the 46 SIC-designated industries taken from the CRSP files. As reported in Table 10 in the Appendix, this larger sample of 3,660 firms also exhibits interindustry variation in takeover activity. For example, 60% of the firms in Food Stores are acquired between 1982 and 1990, compared with only 10% of the firms in Coal Mining over the same interval. Weighting by equity value, the fraction of actual takeovers ranges from 71% in Textile Mill Products

⁴The Pearson chi-square statistic pertains to the difference between the actual and expected proportions of takeover and restructuring activity across industries. It takes the form: $Q_p = \sum_i \sum_j (Actual_{ij} - Expected_{ij})^2 / Expected_{ij}$. The likelihood ratio chi-square statistic pertains to the ratio of the actual and expected proportions across industries: $G_2 = 2 \sum_i \sum_j Actual_{ij} \ln(Actual_{ij} / Expected_{ij})$.

⁵We thank Montse Fuentes and Augustine Kong of the Department of Statistics at the University of Chicago for the simulation work and for helpful discussions on this topic. The SAS statistical package also applies the Mehta and Patel (1983) algorithm, but memory constraints impede execution when the number of control groups (i.e., industries) is high relative to the number of observations, as is the case for our sample.

Table 4

Tests comparing takeover and restructuring frequency across industries

This table reports the probability values from tests assessing the null of no variation in takeover and restructuring activity across 51 Value Line industries during the 1982–89 period, and actual takeovers across 46 CRSP SIC industries during the 1982–90 period. Pearson refers to the Pearson chi-square statistic that pertains to the difference between the actual and the expected proportions of corporate control activity across industries: $Q_p = \sum_i \sum_j (Actual_{ij} - Expected_{ij})^2 / Expected_{ij}$. Likelihood ratio refers to the likelihood ratio chi-square statistic that pertains to the ratio of the actual and expected proportions across industries: $G_2 = 2 \sum_i \sum_j Actual_{ij} \ln(Actual_{ij}/Expected_{ij})$. Exact test is based on the simulation of probability distributions using algorithms developed by Mehta and Patel (1983). Degrees of freedom are 50 for the three Value Line categories and 45 for the CRSP sample. A description of the Value Line takeover and restructuring categories is provided in Table 3. The CRSP sample is described in Table 10 in the Appendix.

Category	Probability value		
	Pearson	Likelihood ratio	Exact test
Total activity	0.003	0.002	0.002
Takeover attempts	0.081	0.060	0.064
Actual takeovers	0.069	0.042	0.040
Actual takeovers, CRSP sample	0.001	0.001	0.001

to 3.7% in the Leather industry. As reported in Table 4, the statistical tests indicate that the fraction of actual takeover occurrences varies significantly at the 0.001 level across the 46 SIC industries. These data confirm the results from the Value Line sample, and indicate that the interindustry variation in takeover activity during the 1980s is a broad phenomenon.

5. Industry differences in the timing of takeover and restructuring activity

To complement the prior section, we next examine the extent to which the timing of takeover and restructuring activity during the 1980s varies across industries. Using tests for equality of variance and for equality of means, we find that relative to the entire distribution the takeovers in a given industry tend to cluster in a subsample of years during the 1980s. This evidence is consistent with the argument that industry shocks contribute to the takeover and restructuring activity of the 1980s. The relatively tight distribution of activity in a particular industry suggests that takeovers and restructurings in that industry are driven by a common shock.

Table 5 presents the number of takeovers and restructurings by industry on an annual basis for the 1982–89 period. The data are sorted by the maximum fraction of takeovers and restructurings occurring in an industry in an adjacent two-year period within the eight-year sample period. While the choice

Table 5

Takeover and restructuring activity by year for Value Line industries

This table reports the number of takeovers and restructurings by industry by year for a sample of 1,064 firms from 51 industries listed on Value Line as of fourth quarter 1981. A takeover or restructuring is assigned to the year in which the initial announcement of the event occurs. Maximum cluster % in 2 years is the greatest fraction of takeovers and restructurings occurring in an industry in an adjacent two-year period.

Industry	Number of takeovers and restructurings per year								Maximum cluster % in 2 years
	82	83	84	85	86	87	88	89	
Orig. equip. auto parts	0	0	0	2	4	0	0	0	100%
Home appliances	0	0	0	1	4	0	1	0	83
Drugstores	0	0	4	2	1	0	1	0	75
Paper & paper products	0	0	1	3	3	0	1	1	67
Basic chemicals	0	0	0	2	2	0	1	1	67
Specialty chemicals	0	0	0	0	1	1	2	2	67
Air transport	0	2	1	1	6	5	1	1	65
Grocery stores	1	0	2	0	2	5	4	0	64
Construction machinery	1	0	1	0	3	4	1	1	64
Drugs	0	0	0	1	0	1	0	3	60
Broadcasting	0	2	0	4	2	1	0	1	60
Metal fabricating	0	1	0	0	1	0	3	0	60
Replacement auto parts	2	0	0	0	1	1	2	3	56
Tire & rubber	0	1	1	1	1	3	2	0	56
Petroleum producing	2	5	3	3	1	1	0	0	53
Electronics	2	0	0	1	2	2	4	4	53
Oilfield services	1	1	7	1	4	0	0	2	50
Entertainment	4	3	2	2	1	0	0	2	50
Mfg. hous. & rec. vehicle	3	0	0	0	0	1	1	1	50
Aerospace & defense	4	0	1	3	4	1	1	0	50
Metals & mining	1	0	0	2	0	2	2	1	50
Coal, uranium, geothermal	1	1	1	2	0	0	0	1	50
Shoes	0	0	0	1	1	2	1	1	50
Toys & school supplies	1	0	2	0	0	0	1	0	50
Diversified chemicals	0	1	0	0	2	1	2	0	50
Hotels & gaming	0	0	0	2	2	2	1	1	50
Multiform	2	5	7	3	1	4	2	1	48
Precision instruments	1	2	0	0	4	3	3	2	47
Electrical equipment	0	0	2	2	4	3	3	1	47
Fast food & restaurants	1	0	2	0	1	1	2	2	44
Integrated steel	1	3	1	1	3	0	0	0	44
Health care & hosp. supply	3	0	1	3	0	0	2	0	44
Computer data processing	0	3	2	1	4	3	1	2	44
Retail stores	4	1	8	1	4	1	2	0	43
Retail stores, special line	2	0	1	0	4	1	1	3	42
Medical services	0	1	1	0	1	1	1	0	40
General steel	2	0	0	1	1	0	1	0	40
Apparel	1	2	3	3	2	1	2	1	40
Office equip. & supplies	1	1	1	1	1	0	0	0	40

Table 5 (continued)

Industry	Number of takeovers and restructurings per year								Maximum cluster % in 2 years
	82	83	84	85	86	87	88	89	
Publishing	2	1	3	0	1	1	3	2	38
Packaging & containers	0	1	2	3	2	2	1	2	38
Textiles	3	2	2	1	1	2	2	0	38
Truck & transport leasing	1	2	2	2	3	2	2	1	36
Toiletries & cosmetics	0	1	1	2	2	1	1	3	36
Natural gas	2	3	1	3	2	1	1	2	33
Building	3	5	7	3	6	1	6	5	33
Food processing	4	4	3	6	2	2	8	1	33
Machinery	4	3	2	4	3	2	1	2	33
Machine tool	1	1	0	1	1	0	0	2	33
Integrated petroleum	3	4	5	3	4	1	5	0	32
Industrial services	3	0	3	0	3	0	1	0	30
Annual total	67	62	86	78	108	65	83	58	
% of all takeovers & restructurings	11.0	10.2	14.2	12.9	17.8	10.7	13.7	9.6	

of a two-year window is somewhat arbitrary, alternate groupings (e.g., a three-year period) yield similar conclusions.

The data in Table 5 suggest that takeover activity in a given industry tends to cluster within a narrow range of time. In the Original Equipment Auto Parts industry, for example, all six of the takeovers occur within a period of less than two years. Similarly, 83% of the takeovers in the Home Appliance and 75% in the Drugstore industries occur in a two-year period. More generally, we find that 50% of the takeovers in a given industry clusters within a two-year period; in other words, half of the takeovers in an industry tend to occur within one-fourth of the sample period. Similar results hold for value-weighted measures of clustering. This clustering of takeover activity by industry contrasts with the more evenly distributed takeover and restructuring activity for the full sample, which we report at the bottom of Table 5. Here, the maximum two-year cluster, found in the 1985–86 grouping, is 31%. Of course, several of the industries do not exhibit time-series clustering.

To perform a more formal analysis on whether takeover and restructuring activity clusters over time at the industry level, we use conventional procedures that compare the dispersion of an entire pool of data with the dispersion within control groups. First, we employ the chi-square test of the equality of variances, which computes the difference between the natural log of the variance of the entire sample and the weighted average of the variance of the 51 industry subsamples (see, e.g., Johnston, 1984, p. 298).

Table 6

Variation in the timing of takeover and restructuring activity

This table reports tests of the null hypothesis of no variation in the timing of takeover and restructuring activity for three takeover categories across 51 Value Line industries during 1982–89, and for actual takeovers across 46 CRSP SIC industries during 1982–90. Panel A reports results from chi-square tests that compare the variance of the timing of takeover activity for an entire sample with that within control groups (i.e., industries). Panel B reports results from ANOVA *F*-tests for the equality of mean takeover dates across industries. Degrees of freedom are 50 for the Value Line categories and 45 for the CRSP sample.

Panel A: Chi-square tests for the equality of variance

Category	Chi-square statistic	Probability value
Total activity	98.49	0.0001
Takeover attempts	103.20	0.0001
Actual takeovers	87.44	0.0008
Actual takeovers, CRSP sample	261.00	0.0001

Panel B: ANOVA F-tests for the equality of means

Category	<i>F</i> -statistic	Probability value
Total activity	2.02	0.0001
Takeover attempts	1.77	0.0015
Actual takeovers	1.53	0.0155
Actual takeovers, CRSP sample	1.67	0.0040

As reported in panel A of Table 6, the chi-square tests for the equality of variance indicate significant industry clustering. For each of the Value Line categories, the *p*-value is 0.0008 or lower. Replication of the analysis using data based on the actual takeover occurrences in two-digit SIC industries also indicates significance at the 0.0001 level. The tighter time distribution of takeover and restructuring at the industry level vis-à-vis the full sample confirms the time-series industry clustering of takeovers and restructurings. It is consistent with the argument that industry shocks are a source of the takeover and restructuring activity of the 1980s.

As a related test of clustering, we examine the interindustry variation in the mean takeover date. For the 607 firms that experience a takeover or restructuring in the Value Line data set, we assign a number based on announcement month that ranges from one if the takeover is announced in January 1982 to 96 if the takeover is announced in December 1989. We then use analysis of variance to test if the mean takeover month is the same across industries. Panel B of Table 6 displays the *p*-values from the ANOVA *F*-tests. In all cases, the *p*-values indicate significant variation in the time-series pattern of takeovers and restructurings by industry during the 1980s.

We perform the same analysis on the 1,133 actual takeover occurrences in the sample of CRSP-listed firms from the 46 industries classified by two-digit SIC codes. The sample dates range from January 1982 to December 1990, which we linearize from 1 to 108. As also reported in Table 6, the p -value is 0.004, confirming the significant variation over time in takeover activity by industry.⁶

The interindustry differences in the time-series clustering of takeover activity distinguish the 1980s from the two prior decades. For two samples of takeover occurrences taken from the CRSP files spanning July 1962 to December 1972 and January 1973 to December 1981, we replicate the analysis of variance tests. In contrast to the results from the 1980s, we find no evidence of significant industry clustering in the earlier time periods. These results concur with Palepu (1986), who finds no evidence of acquisition clustering by industry in the 1971–79 period.

6. Industry shocks and industry variation in takeover activity

The existence of interindustry differences in takeover activity reported in the prior two sections is consistent with the argument that industry shocks contribute to the 1980s takeover wave. In this section, we examine more explicitly the relation between industry shocks and takeover activity during the 1980s. We first analyze a broad-based proxy for industry shocks that is based on sales and employment data, and then study the effect of specific shocks, including deregulation, energy dependence, foreign competition, and financing innovations.

6.1. Broad industry shocks

Our concept of a shock is any factor that alters industry structure. Examples of industry shocks range from specific factors, such as deregulation and input price volatility, to broader effects, such as demographic or technological change. Whatever the underlying source, a shock leads to a change in industry structure. Our premise is that takeover and restructuring activity accommodates such change.

One way to gauge the shocks borne by an industry is to directly measure the economic change experienced by the industry's members. To create a proxy for industry shocks, we compute abnormal industry sales growth between 1977 and

⁶We conduct an additional examination of the timing of takeover and restructuring activity across industries, using chi-square tests to determine if takeover activity clusters at annual intervals and at biannual intervals. Consistent with the results reported in Table 6, the tests strongly reject the null of no industry clustering of takeover activity. These tests, however, suffer from the same weaknesses as discussed for the chi-square tests in Section 4. Analyzing, for example, 441 actual takeovers in eight year across 51 industries implies expected values of less than five in all cells of the contingency table.

1981, the five years preceding the sample period of 1982–89. Computing shocks from the same time period for all industries abstracts from the fact that the timing of takeover activity varies across industries. But in focusing on the 1977–81 period, we seek to assess whether the industries undergoing the most change in the period immediately preceding the 1980s takeover boom account for a disproportionate share of that takeover wave. The estimation of industry sales shocks in a period prior to that of the takeover sample also allows us to include data for all 1,064 firms in the sample.

For each of the 51 industries in our Value Line sample, we use Compustat data to first compute industry sales growth between 1977 and 1981. For the measure of the industry sales shock, we then take the absolute value of the difference between a particular industry's sales growth and the average sales growth across all 51 industries. This measure corresponds to our concept of a shock, because it emphasizes that shocks can have both positive and negative effects on industry growth. To benchmark the importance of the proxy for shocks, we also analyze the effect that industry sales growth has on takeover activity. As a further means of assessing the robustness of the results, we compute a similar shock variable based on employment data.

Table 11 in the Appendix reports the sales and employment shock measures for the 51 sample industries, with the data sorted by the sales shock measure. Note that the industries with the largest values for sales shocks include Medical Services, whose sales growth of 101% during the 1977–81 period was 83 percentage points greater than the sample average, and Manufactured Housing & Recreation Vehicles, whose sales growth of -43% was 61 percentage points below the sample average. By construction, both of these industries experienced large sales shocks between 1977 and 1981. Other industries with large values for the sales shock measure include much of the energy sector, which had high sales growth in the late 1970s, and underperformers, such as Textiles and Tire and Rubber. The employment shock measure provides a similar ranking to that for sales, with a correlation coefficient between the two shock measures of 0.81.

Panel A of Table 7 reports regressions of three measures of industry takeover activity on both sales shocks and sales growth. Each regression uses 51 observations, one for each industry in the sample. The results indicate that sales shocks are directly related to industry takeover activity. For example, the coefficient on Sales Shock in the Total Activity regression indicates that a 10-percentage-point deviation in industry sales growth from the sample average leads to a 4.6-percentage-point increase in takeover and restructuring activity in an industry. Similar results hold for the regressions using other measures of takeover activity. Sales shocks are positively and significantly related to the takeover attempts and actual takeovers across industries. By contrast, industry sales growth has no explanatory power for the industry variation in takeover activity during the 1980s.

Table 7

Regressions of takeover activity on broad industry shocks

This table reports regressions of industry measures of takeover activity on measures of industry shocks based on sales and employment data from the 1977–81 period. Panel A regresses takeover activity on industry sales shocks, and also industry sales growth, a proxy for industry performance. Panel B regresses takeover activity on industry employment shocks, and also industry employment growth, a proxy for industry performance. The definitions of the three takeover and restructuring categories are provided in Table 3. Industry sales and employment shocks and growth are defined in Table 11 in the Appendix. Each regression uses 51 observations. *t*-statistics are in parentheses.

Panel A: Takeover activity, sales shocks, and sales growth

	Total activity	Takeover attempts	Actual takeovers
Intercept	44.08 (8.92)	36.39 (8.34)	27.02 (7.07)
Sales shock	0.46 (2.10)	0.47 (2.38)	0.47 (2.74)
Sales growth	-0.04 (-0.26)	-0.11 (-0.72)	-0.11 (-0.82)
Adjusted R^2	0.05	0.07	0.10

Panel B: Takeover activity, employment shocks, and employment growth

	Total activity	Takeover attempts	Actual takeovers
Intercept	46.64 (10.34)	36.81 (9.36)	26.95 (7.74)
Employment shock	0.45 (1.77)	0.53 (2.39)	0.51 (2.60)
Employment growth	-0.22 (-1.16)	-0.21 (-1.26)	-0.14 (-0.93)
Adjusted R^2	0.03	0.07	0.09

These results indicate that takeover and restructuring activity is related to industry change, rather than being restricted to only low-growth or only high-growth industries. Indeed, in results not presented in Table 7, we find identical results from univariate regressions that employ only the sales shock or the sales growth explanatory variable. Takeover and restructuring activity is positively and significantly related to sales shocks, indicating that both high sales growth and large sales declines contribute to above-average takeover activity at the industry level.

Panel B of Table 7 replicates the analysis, using employment shocks and employment growth as the explanatory variables. Similar to the sales shock results, employment shocks are positively related to takeover activity. In contrast, employment growth is not significantly related to takeover activity.

As further evidence of the importance of industry shocks for takeover activity, we re-estimate the regressions, using sales and employment data for the 623 firms that remained independent entities through 1989. More than 73% of the firms, 457 out of 623, neither received a takeover bid nor engaged in restructuring activity during the sample period. In results not reported, the evidence from these surviving firms closely resembles that presented in Table 7. The industry sales and employment shocks estimated solely from the surviving firms are positively and significantly related to industry takeover and restructuring activity. Hence, the relation between industry shocks and takeover activity is not merely driven by acquired firms, but actually reflects industry-wide phenomena.

6.2. *Specific industry shocks*

The generic proxies for industry shocks analyzed in the prior section indicate the overall changes borne by the sample industries, rather than directly measuring shocks themselves. To focus the analysis on the sources of industry change that lead to takeover activity, we next examine the relation between takeover activity and specific industry shocks.

To determine the shocks to include in the analysis, we survey analyst reports of the sources of change facing the industries in our sample. As reported in Table 8, for the high-takeover industries these shocks include deregulation, energy price volatility, foreign competition, and financing innovations. Similar factors have been cited by Jensen (1993), Ravenscraft (1987), and Weston, Chung, and Hoag (1990) in their retrospectives on the 1980s takeover wave. We develop the measurement of each of these four shocks in turn.

6.2.1. *Deregulation*

Several industries reported in Table 8 experienced major federal deregulation in the late 1970s and early 1980s. As discussed in analysis of specific industries (e.g., Baltagi, Griffin, and Rich, 1995; Phillips, 1991; Rose, 1985; Whinston and Collins, 1992), deregulation removed artificial constraints on the size of existing firms and induced entry by new firms. The adaptation to these changes in industry organization could be facilitated by takeovers. Our expectation is that the shock of deregulation is positively related to takeover and restructuring activity.

As a measure of deregulation, we employ a dummy variable equal to one for five industries in our sample: Air Transport, Broadcasting, Entertainment, Natural Gas, and Trucking and Transport Leasing. These industries all experienced major federal deregulation; indeed, a search of industry name and the code word 'deregulation' on the Dow Jones News Service produces over 100 stories for each of these industries, more than for any of the other industries in our sample.

Table 8
Sources of change in industry structure

This table reports reasons offered for the changing structure of high-takeover industries during the 1980s. Reference sources for this table include the Value Line Investment Survey, S&P Industry Outlooks, the U.S. Industrial Outlook, the *Wall Street Journal*, and other analyst reports.

Industry	Source of change
Air transport	Airline Deregulation Act of 1978 phased out the government control of airline routes and pricing during the early 1980s. The deregulation facilitated entry, the development of the hub-and-spoke system, and the movement to nationwide route systems.
Apparel, Textiles	A significant increase of imports, induced in part by a shift to an antiprotectionist foreign trade policy, prompted consolidation as a means of streamlining operations to compete effectively.
Broadcasting, Entertainment	FCC policies in the early 1980s eliminated programming and ownership regulations that had limited the number of radio and television stations held by one corporation, and had impeded the sale of radio and television stations. Cable Communications Policy Act of 1984 phased out rate restrictions on cable TV.
Coal, uranium, geothermal	Changes in petroleum prices first induced expansion, and later contraction, in these energy sectors.
Drugstores	Moderate growth prospects and new competition from grocery stores and discounters (such as Walmart) induced consolidation among industry members.
Food processing	Excess capacity in mature industry due to low population growth rate led to consolidation.
Grocery stores	Declining industry growth, relaxed antitrust environment, high tangibility of assets, and ability to use leverage financing led to change in industry structure.
Hotels & gaming	Volatility in real estate and building prices.
Integrated petroleum, Oilfield services, Petroleum producing	1973 OPEC embargo and 1978–79 Iranian oil-export cutoff created price volatility that ultimately caused industry restructuring and consolidation.
Integrated steel	Secular decline in steel demand and subsidized foreign competition resulted in excess capacity and consolidation.
Medical services	The implementation of Medicare's Prospective Payment System in 1983 changed reimbursement from cost-based to a fixed payment per diagnosis. This inducement to curb costs prompted alterations in industry structure and promoted the growth of HMOs.
Metals & mining	Foreign competition, brought on in part by subsidization by foreign governments, resulted in excess capacity and subsequent industry consolidation.

Table 8 (continued)

Multiform	Conglomerates formed in the 1960s and 1970s restructured in the 1980s.
Natural gas	The Natural Gas Policy Act of 1978 phased in price deregulation and encouraged the combination of pipelines to enable regional and national gas transportation systems.
Packaging & containers	Foreign competition and the realignment from metal and glass led to industry restructuring.
Tire & rubber	Longer-lasting radial tires, rising imports, and the reduced demand for automobiles following energy price increases created excess capacity and subsequent industry consolidation.
Truck & transport leasing	Trucking deregulation of 1980 allowed new entry, resulting in excess capacity that led to consolidation.
Toiletries & cosmetics	Demographic changes slowed industry growth and led to consolidation.

6.2.2. Energy dependence

Jensen (1993) states that one shock driving takeover activity during the 1980s was the oil price volatility stemming from the 1973 OPEC boycott and continuing in the 1979 Iran embargo. He suggests that the shock not only directly affected the oil industry itself, but also was important for the structure of industries in which energy was a major input.

To empirically test the importance of the oil shock for takeover activity, we develop a proxy for energy dependence. Using data compiled every five years by the Department of Commerce, we estimate the fraction of inputs comprised of energy in 1982 for each of the industries in our sample. The data are presented in Table 12 in the Appendix. The qualitative ordering of the data is as one might expect. Energy and transportation industries are at the top of the list. Computations using Department of Commerce data from 1977 and 1987 yield similar orderings for the fraction of energy inputs by industry.

To proxy for energy dependence, we construct a dummy variable equal to one for any industry in which energy comprises 10% or more of input costs, a fraction large enough to induce industry change following rising energy prices. We also assign a dummy variable of one to Oilfield Services and Petroleum Producing. Although energy is not a large direct input in these two cases, the industries are clearly energy-related.

6.2.3. Foreign competition

Prior research (e.g., Clark, Kaserman, and Mayo, 1990; Katics and Petersen, 1994; MacDonald, 1994) documents the growing vulnerability of many U.S.

industries to foreign competition, and has found that changes in foreign competition affect price – cost margins and other measures of industry efficiency. We address the question of whether any industry consolidation induced by changes in foreign competition is accompanied by heightened takeover activity. Table 8 notes some leading examples, such as the Apparel, Textiles, Steel, and Tire and Rubber industries. Our analysis examines whether these cases generalize across the 51 sample industries.

To create a proxy for shocks stemming from foreign competition, we use data from the Department of Commerce to estimate the change in the import penetration ratio (imports/industry supply) in the 1980s for the 51 industries in our sample. Specifically, we compute the average import penetration for the five years prior to our sample, 1977–81, and for the sample period, 1982–89. We then compute the change in the import penetration ratio between these two time intervals.

The import data are reported in Table 13 in the Appendix. The data affirm the notion that import penetration increases in many industries during the 1980s. As a proxy for a foreign competition shock, we assign a dummy variable equal to one for the top third of the sample (17 industries) experiencing the greatest increase in import penetration during the 1980s. Designation of this subsample includes industries such as Textiles and Steel within those classified as experiencing a foreign competition shock. The results reported below are not affected by the specification of this variable.

6.2.4. *Financing innovations*

Another shock during the 1980s is the significant increase in high-yield debt financing. The enhanced ability to use leveraged financing removes obstacles to takeovers, especially at larger firms. Indeed, our comparison of takeover targets in the 1980s vis-à-vis the two prior decades indicates that one distinguishing feature of the 1980s merger wave is the relatively large size of takeover targets.

The increased accessibility of leveraged financing in the 1980s can be expected to have differential effects across industries. Jensen and Meckling (1976) and Myers (1977) point out the limitations of debt financing in the presence of asset substitutability and intangible assets. Empirical papers by Bradley, Jarrell, and Kim (1984) and Long and Malitz (1985) document that the fraction of debt in capital structure is inversely related to R&D/sales at the industry level. The basic notion is that a higher degree of project substitution can take place in R&D expenditures compared to those for plant and equipment. Correspondingly, we expect takeover activity in the 1980s to be greater in industries having low R&D/sales ratios. Hence, to capture the effect of financing innovations across industries, we estimate R&D/sales in 1981 for each industry in our sample.

In developing this empirical proxy, we chose 1981 so as to incorporate all firms in the analysis. Our results are not sensitive to this particular year, as R&D/sales at the industry level is very stable over time. For example, the correlation coefficient between 1977 R&D/sales and 1989 R&D/sales

is 0.97 for the 51 Value Line industries. Other measures of asset tangibility, such as capital expenditures, are not as stable over time. Moreover, capital expenditures mimic cash flows more so than R&D, and thereby pick up performance effects in addition to asset tangibility. Additionally, due to investment-related tax shields, capital expenditures work against the tax advantages of debt financing.

6.3. Regression analysis of takeover activity and specific industry shocks

Table 9 reports the regression analysis of takeover activity and specific industry shocks. Univariate regressions correspond to each of the four shocks and each of the three measures of takeover activity. Multiple regressions incorporate all four shocks.

Panel A of Table 9 reports the results where the dependent variable is the total takeover and restructuring activity in an industry. In the univariate regressions, both deregulation and energy dependence have a positive effect on takeover and restructuring activity: The coefficients are more than two standard deviations different than zero. These results are consistent with the notion that the reorganization prompted by relaxed regulation and volatile oil prices contributes to the takeover wave of the 1980s. Foreign competition, however, does not have a significant effect on takeover and restructuring activity. Although import penetration increases in high-takeover industries such as Textiles and Steel, which are experiencing a general decline in the world market, foreign competition also heightens in low-takeover industries such as Computer Data Processing and Electronics, for which the world market is rapidly expanding. Industry R&D/sales is negatively and significantly related to takeover and restructuring activity, supporting the notion that innovations in financing techniques were important for the takeover and restructuring activity of the 1980s. In the multiple regression, R&D/sales is the only explanatory variable with a coefficient more than two standard deviations different from zero. This is due in part to the fact that some of the deregulated and energy-dependent industries with heavy takeover and restructuring activity also have low levels of R&D/Sales.

Panel B of Table 9 repeats the analysis of specific industry shocks, using takeover attempts as the dependent variable. The results resemble those for total takeover and restructuring activity. In the univariate specifications, both deregulation and R&D/Sales have a significant effect on takeover attempts. The coefficient on energy dependence, however, is no longer more than two standard deviations different from zero. This is because energy-dependent industries such as Oilfield Services and Trucking and Transport Leasing responded to the oil shocks by employing major restructurings and joint ventures, rather than takeovers. As in the prior analysis, foreign competition has no significant effect on takeover attempts. In the multiple regression, both deregulation and R&D/sales have a significant effect on takeover attempts.

Table 9

Regressions of takeover activity on specific industry shocks

This table reports regressions of industry measures of takeover activity on specific measures of industry shocks, including deregulation, energy dependence, foreign competition, and ability to debt-finance. Panel A reports regressions for total takeover and restructuring activity. Panel B reports regressions for takeover attempts. Panel C reports regressions for actual takeovers. Deregulation is a dummy variable for five industries experiencing major federal deregulation: Air transport, Broadcasting, Entertainment, Natural gas, and Trucking & transport leasing. Energy dependence is a dummy variable for energy-related industries and any industry in which energy accounts for 10% or more of input costs as described in Table 12 in the Appendix. Import vulnerability is a dummy variable equal to one for the top third of the industries described in Table 13 that experience the greatest increase in import penetration in the 1980s. R&D/sales (for 1981) proxies for debt-financing ability and is taken from Compustat. Each regression uses 51 observations. *t*-statistics are in parentheses.

Panel A: Total takeover and restructuring activity					
	(1)	(2)	(3)	(4)	(5)
Intercept	46.76 (13.82)	46.89 (13.21)	51.18 (12.24)	59.42 (15.81)	54.92 (11.32)
Deregulation	28.24 (2.61)	—	—	—	17.90 (1.61)
Energy dependence	—	19.26 (2.01)	—	—	4.82 (0.49)
Import vulnerability	—	—	-4.94 (-0.68)	—	2.60 (0.40)
R&D/sales	—	—	—	-6.77 (-4.22)	-5.94 (-3.55)
Adjusted R^2	0.10	0.06	-0.01	0.25	0.27
Panel B: Takeover attempts					
	(1)	(2)	(3)	(4)	(5)
Intercept	37.96 (12.79)	39.25 (12.09)	42.71 (11.49)	48.96 (14.25)	46.58 (10.70)
Deregulation	28.24 (2.98)	—	—	—	23.59 (2.37)
Energy dependence	—	10.75 (1.23)	—	—	-5.62 (-0.64)
Import vulnerability	—	—	-5.94 (-0.92)	—	-0.34 (-0.06)
R&D/sales	—	—	—	-5.64 (-3.84)	-4.98 (-3.32)
Adjusted R^2	0.14	0.01	-0.003	0.22	0.26

Table 9 (continued)

<i>Panel C: Actual takeovers</i>					
	(1)	(2)	(3)	(4)	(5)
Intercept	29.33 (10.82)	30.66 (10.49)	32.59 (9.79)	37.40 (11.65)	35.82 (8.67)
Deregulation	21.37 (2.46)	—	—	—	19.59 (2.08)
Energy dependence	—	5.48 (0.70)	—	—	— 7.28 (- 0.88)
Import vulnerability	—	—	- 3.53 (- 0.61)	—	0.30 (0.06)
R&D/sales	—	—	—	- 4.10 (- 2.99)	- 3.72 (- 2.61)
Adjusted R^2	0.09	- 0.01	- 0.01	0.14	0.16

The analysis of actual takeovers in panel C of Table 9 is nearly identical to the results for takeover attempts. In both the univariate and multiple regressions, deregulation and R&D/sales are significantly related to takeover activity. Energy dependence and foreign competition have no explanatory power for the interindustry variation in actual takeovers.

The regression analysis is consistent with the proposition that takeover activity is affected by industry shocks. The analyses of broad-based shocks to sales and employment and of more explicit proxies for shocks find a significant relation between industry shocks and the takeover and restructuring activity of the 1980s.

Of course, the evidence on industry shocks far from fully explains the interindustry variation in takeover activity during the 1980s. One reason is that the explanatory variables used in the regression analysis are imperfect measures of industry shocks. A case in point is the foreign competition variable. While the variable captures the supply-side effects of imports, it does not account for the overall world demand conditions facing an industry. Hence, the foreign competition proxy used in the regression analysis has no significant relation with industry takeover activity.

Another limitation of the analysis is the absence of a model of the heterogeneous timing of the response to shocks across industries. The 1980s are instead treated as a uniform block of time. We do not attempt to discern why, for example, the broadcasting industry undergoes takeover activity more immediately after deregulation than does the air transport industry. We have sacrificed a finer understanding of the dynamics of the response to a single shock in a particular industry so that we can empirically examine the shock-takeover relation across a broad set of industries.

Finally, the imperfect nature of our proxies for industry shocks questions whether we have accurately depicted the effect of shocks on takeover activity. A case in point is whether the R&D/sales variable, which provides the greatest explanatory power in our regressions, is a suitable proxy for innovations in junk-bond financing. To address this issue, we study the relation between takeover activity and industry measures of R&D/sales during the 1970s.⁷ A univariate regression yields an insignificant coefficient on the R&D/sales variable and an *R*-square of only 0.02. The contrast between the strong relation of R&D/sales and takeover activity during the 1980s with the weak relation in the prior decade, together with our related findings on the breadth of takeover activity at large firms in the 1980s, suggests that R&D/sales is capturing the effect of innovations in junk-bond financing.

7. Summary and implications of the empirical results

This paper studies the takeover and restructuring activity at the industry level during the 1980s takeover wave. We find that the takeover and restructuring activity in a particular industry tends to cluster within a narrow range during the sample period. On average, half of the takeovers and restructurings in an industry take place in one-fourth of the sample period, suggesting that common factors influence the takeovers occurring in an industry. We also document a significant interindustry variation in the rate of takeover and restructuring activity that is directly related to the magnitude of economic shocks borne by industries in the late 1970s and early 1980s, indicating a link between industry shocks and subsequent takeover and restructuring activity. The link is maintained for all surviving firms in an industry, affirming that the relation between industry shocks and takeover activity stems from industry-wide phenomena, rather than being due solely to target firms. We also report evidence that specific shocks such as deregulation and financing innovations contribute to the magnitude of the takeovers and restructurings during the 1980s. Overall, the empirical results suggest that the takeover wave of the 1980s entails an adaptation of industry structure to a changing economy. In the remainder of this section, we discuss some additional implications of the results.

⁷To analyze R&D/sales and takeover activity during the 1970s, we start with the intersection of (1) the 6,278 firms listed in the CRSP files as of December 31, 1972, and (2) the 1,855 firms from Compustat for which R&D/sales data are available as of December 1972. Adding the further requirement of 10 firms per industry obtains a data set of 1,431 firms in 31 industries; these firms account for 50% of the equity value of the overall CRSP data set. We then regress the value-weighted fraction of industry takeover activity in the 1973–79 period on the industry measures of R&D/sales.

7.1. Spillover effects of takeover announcements

Linking industry shocks with takeover activity suggests that the announcement of a takeover at one firm in an industry should be accompanied by a positive revaluation of other industry members. To test this implication, we take the announcement month for each of the 607 firms subject to a takeover or restructuring, and compute the abnormal return for the value-weighted portfolio of firms in the same industry. We employ the standard market model with an estimation period of 60 months, and compute *t*-statistics from the cross-sectional variances of abnormal returns. We find that the value-weighted abnormal return of the other firms in an industry is 0.5% (*t*-statistic = 3.18) in the month of the announcement. The Fama and French (1993) three-factor model yields similar findings. These results concur with Eckbo's (1983) finding of a positive and significant reaction at industry rivals to the announcement of 150 horizontal mergers, and Slovin, Sushka, and Bendeck's (1991) documentation of a positive industry stock price reaction to the announcement of 128 going-private transactions.

These spillover effects of merger announcements are often interpreted by antitrust regulators as evidence of anticipated market power. Our analysis points to a more benign explanation. Since we find that takeovers and restructurings are driven by industry shocks, the positive response to takeover announcements by industry members could represent the anticipation of ongoing restructuring throughout the industry.

7.2. Performance following takeovers

The standard textbook model holds that takeovers should increase value through improved cash flows from factors such as synergy and economies of scale. Empirically, however, the performance effects of takeovers are subject to considerable debate. Compare, for example, Healy, Palepu, and Ruback (1992) with Ravenscraft and Scherer (1987).

If industry shocks are a source of takeover and restructuring activity, then post-takeover performance should not necessarily be expected to improve, especially compared to a pre-shock benchmark or to industry cohorts. For example, the shock of deregulation to an industry such as Air Transport would not have a positive effect on the profits of incumbent firms if compared to the rents in a cartelized environment. Similarly, the shock of foreign competition has not been beneficial to the Apparel industry if compared to a period of heavy trade barriers. Firms consolidating via takeovers in the Apparel industry should not necessarily be expected to improve cash flows, especially since the consolidation takes place soon after the shock of foreign competition.

To measure the change in performance due to merger, researchers benchmark to the corresponding change in industry performance. For mergers driven by

industry shocks, our empirical analysis, however, implies that the benchmark firms are also undertaking mergers, restructurings, and other value improvements in response to the industry shocks. In the Home Appliance industry for example, six of the ten firms were acquired in less than a two-year period. Consequently, while a merger will in fact create value, the industry-adjusted change in performance may indicate otherwise.

Many commentators have linked business failures in the 1990s to prior takeover activity. Although some takeovers are clearly the result of poor management decisions, post-takeover failure can stem from underlying industry shocks. Takeovers induced by negative or even positive shocks cannot be considered the primary cause of the changes in a firm's fortunes. Instead, takeovers and related restructuring activity are the message bearers of the more fundamental changes facing an industry. In such cases, more business failures may occur if takeovers are inhibited. However, conducting such counterfactual analysis suffers from ambiguous benchmarks.

7.3. The timing of takeover waves

The 1980s stand out as one of the most active takeover periods during the past century. Our analysis links the takeover and restructuring activity of that decade to industry shocks. This is consistent with Comment and Schwert's (1995) emphasis on general economic factors, rather than particular state laws and firm-specific poison pills, as being the source of the decline in takeovers at the beginning of the 1990s. Indeed, the recent return of takeover activity documented in Table 1 indicates that the corporate control market is not dead, and that takeovers will continue to cluster in industries that bear shocks of significant magnitude.

Whereas hundreds of takeover studies during the past 20 years have shed light on the role of takeovers in redirecting the investments of specific firms, these studies have been less successful in discerning why takeovers happen in waves. Indeed, Brealey and Myers (1991, p. 923) propose that takeover waves are one of the 10 unexplained puzzles in the field of financial economics. Most prior analyses, in posing macroeconomic variables as the source of takeover waves, have had mixed explanatory success. Our results indicate that future efforts should incorporate industry-level data. Various evidence suggests the fruitfulness of such an approach. Both Nelson (1959) for the turn of the century and Gort (1969) for the 1950s document interindustry differences in the rate of takeover activity. Taggart (1988) points to similar sectoral factors at play during the takeovers of the 1920s. A systematic analysis of the relation between industry shocks and takeover activity during the past century may shed light on the less-than-fully understood phenomenon of takeover waves.

Appendix

Table 10

Cross-sectional frequency of actual takeover occurrences during 1982–90 for CRSP-listed firms

This table reports the occurrence of actual takeovers across a sample of 46 two-digit SIC industries encompassing 3,660 firms taken from the CRSP tapes. Equal reports the fraction of takeover occurrences. Equity reports the fraction of the equity of an industry that was acquired.

Industry	SIC code	Number of firms	Number of takeovers	% takeovers	
				Equal	Equity
Food stores	54	53	32	60.4	56.2
Railroad transportation	40	15	9	60.0	52.8
Textile mill products	22	53	28	52.8	71.3
General merchandise	53	56	27	48.2	23.6
Miscellaneous retail	59	56	26	46.4	65.8
Stone, clay, glass, concrete	32	62	28	45.2	41.5
Hotels	7	35	15	42.9	44.9
Motor freight transportation	42	31	13	41.9	21.8
Non-building construction	16	17	7	41.2	27.1
Apparel	23	69	28	40.6	60.7
Furniture & home furnishings	57	15	6	40.0	6.4
Food products	20	122	48	39.3	29.6
Paper products	26	54	21	38.9	21.4
Transportation services	47	13	5	38.5	7.9
Transportation equipment	37	95	36	37.9	15.5
Personal services	72	16	6	37.5	12.3
Eating & drinking places	58	64	24	37.5	22.5
Building materials	52	16	6	37.5	52.4
Apparel & accessory stores	56	32	12	37.5	35.9
Air transportation	45	40	15	37.5	30.0
Primary metal	33	91	34	37.4	19.0
Rubber & plastic products	30	62	23	37.1	23.8
Health services	80	45	16	35.6	53.3
Motion pictures & video	78	30	10	33.3	56.3
Miscellaneous manufacturing	39	65	21	32.3	50.9
Medical & photographic equipment	38	214	69	32.2	16.5
Fabricated metal products	34	156	50	32.1	38.0
Building construction	15	25	8	32.0	16.3
Amusement & recreation services	79	22	7	31.8	49.5
Furniture & fixtures	25	33	10	30.3	17.6
Machinery, except electrical	35	328	96	29.3	20.5
Chemicals	28	182	51	28.0	19.2
Wholesale trade, durables	50	119	33	27.7	13.7
Communications	48	58	16	27.6	13.3
Printing & publishing	27	77	21	27.3	10.1
Business services	73	219	59	26.9	30.9

Table 10 (continued)

Industry	SIC code	Number of firms	Number of takeovers	% takeovers	
				Equal	Equity
Wholesale trade, nondurables	51	54	13	24.1	15.8
Electrical machinery	36	339	81	23.9	14.4
Lumber & wood products	24	44	10	22.7	17.3
Petroleum refining	29	45	10	22.2	28.7
Leather	31	24	5	20.8	3.7
Oil & gas extraction	13	389	82	20.6	35.3
Metal mining	10	67	10	14.9	18.4
Engineering & misc. services	89	34	5	14.7	44.2
Special-trades construction	17	14	2	14.3	39.0
Coal mining	12	10	1	10.0	6.8
All firms		3,660	1,133	31.0%	27.7%

Table 11

Industry sales and employment shocks, 1977–81

This table reports values for sales and employment growth and sales and employment shocks over the 1977–81 period for 51 Value Line industries. The data are sorted based on the sales shock variable. Sales growth is the real growth in sales between 1977 and 1981 for each industry, computed as $\ln(\text{Sales } 1981/\text{Sales } 1977)$, where sales values are put in real terms using the GNP deflator. Sales shock is the absolute value of the difference between an industry's sales growth and the average industry sales growth of 18.12% for the full sample of 51 industries. Employment growth is the growth in the number of employees between 1977 and 1981 for each industry, computed as $\ln(\text{Employment } 1981/\text{Employment } 1977)$. Employment shock is the absolute value of the difference between an industry's employment growth and the average industry employment growth of 10.40% for the full sample of 51 industries. Industry members are taken from firms listed on Value Line in the fourth quarter of 1981. Sales and employment data are taken from Compustat.

Industry	Sales growth	Sales shock	Employment growth	Employment shock
Medical services	100.70%	82.58%	99.03%	88.63%
Mfg. housing & rec. vehicles	-42.52	60.64	-29.26	39.66
Petroleum producing	64.54	46.42	-6.25	16.65
Tire & rubber	-15.84	33.96	-26.59	36.99
Natural gas	50.98	32.85	16.77	6.37
Textiles	-11.40	29.52	-16.51	26.92
Oilfield services	42.30	24.18	23.24	12.83
Integrated petroleum	41.47	23.35	18.15	7.74
Original equipment auto parts	-4.88	23.01	-3.74	14.14
Coal, uranium, geothermal	41.01	22.88	5.30	5.11

Table 11 (continued)

Industry	Sales growth	Sales shock	Employment growth	Employment shock
Apparel	- 1.77	19.90	- 7.93	18.34
Home appliances	- 0.65	18.77	- 14.39	24.79
Replacement auto parts	1.61	16.52	8.06	2.35
Hotels & gaming	34.62	16.50	30.35	19.94
Paper & paper products	3.45	14.68	- 4.66	15.07
Packaging & containers	4.18	13.94	- 4.49	14.90
Construction machinery	4.45	13.67	- 1.66	12.06
Air transport	30.88	12.75	18.23	7.82
Toys & school supplies	30.55	12.43	15.54	5.13
Integrated steel	5.71	12.42	- 5.70	16.11
Industrial services	30.13	12.01	22.01	11.60
Publishing	29.37	11.24	16.50	6.09
Broadcasting	8.25	9.88	15.17	4.76
Metals & mining	8.33	9.80	- 0.41	10.82
Food processing	8.57	9.55	15.03	4.63
Grocery stores	9.18	8.94	17.60	7.20
Basic chemicals	26.79	8.67	12.17	1.76
Diversified chemicals	9.58	8.55	12.33	1.93
Entertainment	10.43	7.69	4.22	6.18
Retail stores	11.27	6.85	5.20	5.20
Trucking & transport leasing	12.38	5.74	7.04	3.36
Machine tool	23.71	5.58	12.83	2.42
Health care & hosp. supply	23.47	5.35	15.59	5.19
Machinery	13.45	4.68	5.49	4.92
Metal fabricating	22.40	4.28	12.69	2.28
Electrical equipment	13.59	4.17	7.43	2.97
Computer data processing	22.23	4.11	23.49	13.09
Retail stores, special lines	22.03	3.91	24.66	14.25
Fast food & restaurants	21.97	3.84	29.78	19.38
Multiform	15.30	2.82	9.68	0.72
Drugstores	20.75	2.62	25.71	15.31
Precision instruments	20.60	2.48	10.60	0.20
Specially chemicals	15.95	2.17	10.56	0.16
Drugs	16.29	1.83	6.28	4.13
General steel	19.92	1.79	- 2.89	13.30
Aerospace & defense	19.64	1.52	12.61	2.21
Building	16.66	1.47	8.46	1.94
Electronics	19.53	1.41	20.82	10.42
Shoes	16.85	1.27	23.43	13.03
Toiletries & cosmetics	17.89	0.23	18.07	7.67
Office equipment & supplies	18.04	0.08	14.99	4.58
Average	18.12%	13.44%	10.40%	11.63%

Table 12

Energy dependence by industry

This table reports the dependence of an industry on energy inputs for the 51 Value Line industries. Energy fraction is the fraction of an industry's inputs comprised of energy inputs. Data are for 1982, and are taken from the *1982 Benchmark Input-Output Accounts of the United States*, U.S. Department of Commerce, December 1991, and 'Benchmark Input-Output Accounts for the U.S. Economy, 1982', *Survey of Current Business*, Volume 71, July 1991. Energy inputs are defined as those coming from Coal (industry # 7), Crude petroleum (industry # 8), and Petroleum refining (industry # 31). The Value Line industries are matched with the industries used in the input-output tables via primary and secondary SIC codes.

Value Line industry	Input-output industry	Energy fraction
Integrated petroleum	Petroleum refining	73.92%
Natural gas	Gas production & distribution (utilities)	35.33
Air transport	Air transportation	25.26
Coal, uranium, geothermal	Coal	15.78
Trucking & transport leasing	Motor freight transportation & warehousing	10.07
Metals & mining	Iron & ferroalloy ores	7.08
Basic chemicals	Chemicals & selected chemical products	5.73
Diversified chemicals	Chemicals & selected chemical products	5.73
Specialty chemicals	Chemicals & selected chemical products	5.73
General steel	Primary iron & steel manufacturing	4.74
Integrated steel	Primary iron & steel manufacturing	4.74
Paper & paper products	Paper & allied products	3.74
Oilfield services	Crude petroleum & natural gas	3.63
Petroleum producing	Crude petroleum & natural gas	3.63
Building	New construction	3.41
Drugstores	Retail trade	2.26
Grocery stores	Retail trade	2.26
Retail stores, special lines	Retail trade	2.26
Retail stores	Retail trade	2.26
Hotels & gaming	Hotels & lodging places	1.57
Textiles	Broad & narrow fabrics, yarn & thread mill	1.42
Drugs	Drugs	1.31
Publishing	Printing & publishing	1.31
Tire & rubber	Tire & inner tubes	1.22
Machine tool	Metalworking machinery & equipment	1.20
Toys & school supplies	Games, toys & children's vehicles	1.16
Electrical equipment	Electrical industrial equipment	1.10
Metal fabricating	Fabricated structural metal	1.09
Toiletries & cosmetics	Toilet preparations	1.08
Health care & hosp. supply	Surgical & medical instruments	1.08
Apparel	Apparel	1.00
Packaging & containers	Glass containers	0.98
Precision instruments	Scientific & controlling instruments	0.95
Original equipment auto parts	Motor vehicle parts & accessories	0.74
Replacement auto parts	Motor vehicle parts & accessories	0.74
Multiform	Miscellaneous machinery	0.72

Table 12 (continued)

Value Line industry	Input-output industry	Energy fraction
Mfg. housing & rec. vehicles	Mobile homes	0.72
Medical services	Hospitals	0.71
Computer data processing	Electronic computing equipment	0.69
Office equipment & supplies	Office, computing & accounting machines	0.66
Industrial services	Other business services	0.65
Machinery	General industrial machinery & equipment	0.63
Entertainment	Motion pictures	0.57
Food processing	Food & kindred products	0.50
Aerospace & defense	Aircraft	0.48
Electronics	Electronic components & accessories	0.43
Construction machinery	Construction machinery & equipment	0.43
Fast food & restaurants	Eating & drinking places	0.36
Home appliances	Household appliances	0.25
Shoes	Shoes, except rubber	0.21
Broadcasting	Radio & TV broadcasting	0.11

Table 13

Change in the import penetration ratio

This table reports the interindustry variation of the change in the import penetration ratio between the 1977–81 and 1982–89 periods for the 51 Value Line industries. The import penetration ratio is the ratio of imports divided by new supply. Import avg. 1977–81 is the average of the import penetration ratio for the 1977–81 period. Import avg. 1982–89 is the average of the import penetration ratio for the 1982–89 period. Change is the difference between the import penetration ratios in the 1982–89 and 1977–81 periods. Import data are taken from SIC industries found in various editions of the *U.S. Industrial Outlook* and *U.S. Commodity Exports and Imports as Related to Output*, both compiled by the U.S. Department of Commerce. Value Line and SIC industries are matched using primary and secondary SIC codes.

Value Line industry	SIC industry	Import avg. 1977–81	Import avg. 1982–89	Change
Shoes	Footwear, except rubber	31.18%	55.84%	24.66%
Machine tool	Machine tool, metal cutting	18.04	34.94	16.90
Apparel	Apparel	15.40	29.71	14.31
Construction machinery	Construction machinery	4.90	14.48	9.57
Office equipment & supplies	Office equipment	18.02	26.38	8.35
Computer data processing	Electronic computing	4.70	12.63	7.93
Orig. equip. auto parts	Motor vehicle parts	8.80	14.96	6.16
Replacement auto parts	Motor vehicle parts	8.80	14.96	6.16
Home appliances	Household appliances	8.56	14.11	5.55
Electronics	Electronic components	13.90	19.35	5.45

Table 13 (continued)

Value Line industry	SIC industry	Import avg. 1977–81	Import avg. 1982–89	Change
Tire & rubber	Tire & inner tubes	11.40	16.55	5.15
Machinery	General industrial machinery	4.24	8.80	4.56
Multiform	General industrial machinery	4.24	8.80	4.56
General steel	Steel mill products	11.50	15.80	4.30
Integrated steel	Steel mill products	11.50	15.80	4.30
Electrical equipment	Electrical equipment	5.88	10.00	4.12
Textiles	Textile mill products	4.50	7.28	2.78
Basic chemicals	Chemicals & allied products	4.30	6.53	2.23
Diversified chemicals	Chemicals & allied products	4.30	6.53	2.23
Specialty chemicals	Chemicals & allied products	4.30	6.53	2.23
Precision instruments	Measuring & controlling devices	3.78	5.80	2.02
Toys & school supplies	Games, toys & children's vehicles	19.84	21.80	1.96
Packaging & containers	Glass containers	0.92	2.60	1.68
Drugs	Drugs	4.86	6.50	1.64
Toiletries & cosmetics	Toilet preparations	0.92	2.55	1.63
Aerospace & defense	Aircraft	3.80	5.43	1.63
Integrated petroleum	Petroleum refining	7.40	8.91	1.51
Metal fabricating	Fabricated structural metal	0.68	1.86	1.18
Food processing	Food & kindred products	3.86	4.73	0.87
Paper & paper products	Paper & allied products	7.20	7.95	0.75
Health care & hosp. supply	Surgical & medical instruments	5.60	6.34	0.74
Air transport	Air transportation	0.00	0.00	0.00
Broadcasting	Communication	0.00	0.00	0.00
Building	Building construction	0.00	0.00	0.00
Drugstores	Miscellaneous retail	0.00	0.00	0.00
Entertainment	Motion pictures	0.00	0.00	0.00
Fast food & restaurants	Eating & drinking places	0.00	0.00	0.00
Grocery stores	Food stores	0.00	0.00	0.00
Hotels & gaming	Hotels & lodging places	0.00	0.00	0.00
Industrial services	Business services	0.00	0.00	0.00
Medical services	Health services	0.00	0.00	0.00
Mfg. housing & rec. vehicles	Mobile homes	0.00	0.00	0.00
Natural gas	Electrical, gas & sanitary services	0.00	0.00	0.00
Retail stores	General merchandise	0.00	0.00	0.00
Retail stores, special lines	Miscellaneous retail	0.00	0.00	0.00
Trucking & transport leasing	Motor freight transport & warehouse	0.00	0.00	0.00
Coal, uranium, geothermal	Coal	0.28	0.28	– 0.01
Oilfield services	Oil & gas field machinery	1.02	0.98	– 0.04
Publishing	Printing & publishing	0.84	0.56	– 0.28
Metals & mining	Metal & mining	15.84	12.31	– 3.53
Petroleum producing	Crude petroleum & natural gas	41.18	26.91	– 14.27

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