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The effects of mergers: an international comparison

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Abstract

This paper analyzes the effects of mergers around the world over the past 15 years. We utilize a large panel of data on mergers to test several hypotheses about mergers. The effects of the mergers are examined by comparing the performance of the merging firms with control groups of nonmerging firms. The comparisons are made on profitability and sales. The results show that mergers on average do result in significant increases in profits, but reduce the sales of the merging firms. Interestingly, these post merger patterns look similar across countries. We also did not find dramatic differences between mergers in the manufacturing and the service sectors, and between domestic and cross-border mergers. Conglomerate mergers decrease sales more than horizontal mergers. By separating mergers into those that increase profits and those that reduce them and by then examining the patterns of sales changes following the mergers, we determine the effects of mergers on efficiency and market power. Our results suggest that those mergers that decrease profits and efficiency account for a large proportion. However, we can also identify mergers that increase profits by either increasing market power or by increasing efficiency. The first conclusion seems to be a more likely explanation for large companies, whereas the latter is likely to be true for small firms.
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1. Introduction

The past century saw five great merger waves—one at its beginning, and successive waves at the ends of the 1920s, 1960s, 1980s and 1990s. While much of the earlier merger activity was confined to North America and Great Britain, the most recent wave has engulfed all of the major industrial countries of the world. And, as befits a global economy, it has been composed of an increasing percentage of cross-border acquisitions. What have been the causes of these great bursts of merger activity? What have been their effects? In this paper we focus largely on the second question, but the answers that we give to it will also shed light on the first. We confine our analysis to mergers taking place in the last two decades, but include in it mergers from around the world including also cross-border acquisitions.

The hypotheses as to why mergers[1] occur can be grouped into three broad categories. Of these, the first two presume that the managers of the merging companies seek to maximize profits or shareholder wealth. Under this assumption any merger must be expected to either increase the market power of the merging companies or reduce their costs. The third set of hypotheses includes those that posit other managerial goals than profits, as say the growth of the firm, or quasi-irrational behavior as might occur because managers are overcome by hubris.

From the point of view of the theory of the firm, it is important to determine whether mergers are best explained by one of the hypotheses from the third category, or by a hypothesis that presumes profit maximization. If *all* mergers are consistent with profit maximization, then corporate governance structures can be assumed to be designed in such a way as to align shareholder and managerial interests. If, on the other hand, a large fraction does not appear to increase shareholder wealth, corporate governance structures must be assumed to be deficient in bringing about such an alignment. We attempt to determine whether mergers increase market power or efficiency by examining their impacts on company sales and profits. In this way, we seek to determine to what extent mergers fall into each of these three categories.

The paper proceeds as follows. In the following section we present some predictions regarding the effects of mergers. Section 3 describes the methodology used to determine the effects of mergers. Our data base is described in Section 4. Sections 5 and 6 present our overall findings and those that are specific to the question of whether mergers increase efficiency or market power. In Section 7 we compare our findings with those previously reported in the literature. The sample is divided according to the mergers' effects on market power and efficiency in Section 8. Conclusions are drawn in the final section.

[1] We shall not distinguish between mergers and takeovers, but rather simply refer to all as mergers.

2. Predictions

We would like to derive predictions regarding the consequences of mergers from a model, which is applicable to all forms of mergers, to all industries and in all countries. Unfortunately, we know of no *generally accepted* model of firm behavior that meets these criteria. The most commonly used oligopoly model in industrial organization—the Cournot model with identical firms and homogeneous products—has the awkward feature of predicting that no horizontal mergers take place, even when they raise industry profits.[2] Nevertheless, both economic theory and our economic intuition allow us to make some predictions about the effects of mergers on sales and profits.

The term 'market power' connotes the ability to control price. Any merger that *increases* a firm's market power must, therefore, increase its ability to control (raise) the price of its products. If the firm faces a downward sloping demand schedule, and it takes advantage of its increase in market power by raising price, both its output and sales will fall, if it is maximizing profits, as it will then be operating in the elastic portion of its demand schedule.[3]

Of the three types of mergers, increases in market power are perhaps most likely to follow horizontal mergers, but are also possible with vertical and conglomerate mergers. Conglomerate mergers can increase the degree of *multimarket contact* between the merging firms and their rivals. High multimarket contact raises the costs of cutting price in any given market and thus can facilitate more cooperative behavior thereby effectively increasing the merging firm's market power.[4]

A vertical merger can also increase multimarket contact, if the merging companies' rivals are also vertically integrated. A vertical merger can also increase market power by raising entry barriers and thus effectively lowering the merging firm's elasticity of demand. Thus, we hypothesize that an increase in market power is a possible consequence of all three types of mergers. For any merger that increases market power, we predict an increase in profits and a decline in sales.

A merger is said to have increased the efficiency of the merging firms, if it reduces their costs. A fall in marginal costs should cause a profit-maximizing company to lower its price and thus lead to an increase in both sales and profits.[5]

If mergers take place because managers pursue growth rather than profits, or out

[2] See Salant et al. (1983).

[3] We find the assumption that firms in our sample face negative sloped demand schedules reasonable because: (1) they do not tend to operate in atomistically competitive industries, (2) many do sell differentiated products, and (3) even firms selling seemingly homogeneous products like cement differ from their rivals in terms of location, speed of delivery and similar factors that give them some control over price.

[4] For a development and testing of the theory of multimarket contact, see Scott (1993).

[5] A merger might increase efficiency without changing marginal costs by, say, reducing fixed costs. In this case we should expect an increase in profits and no change in sales. We shall not test separately for this case.

Table 1
Possible consequences of mergers

	$\Delta\Pi > 0$	$\Delta\Pi < 0$
$\Delta S > 0$	1 Efficiency increase	3 Market power reduction (?)
$\Delta S < 0$	2 Market power increase	4 Efficiency decline

of managerial hubris, neither efficiency nor market power need change. We shall, however, hypothesize that these sorts of mergers lead to declines in efficiency because of the transaction costs of bringing two companies together. We thus predict for mergers that decrease efficiency decreases in both profits and sales.

The various possible consequences of mergers are depicted in Table 1. Since all horizontal mergers eliminate competition between the merging companies, any horizontal merger that meets our test for an increase in efficiency must do so because its *net* effect is to increase efficiency. The same can, of course, be said for the other types of mergers. All of our tests are thus of the net effects of mergers. In addition to the three possible consequences already discussed, the table includes a fourth—profits decline, but sales increase. Since this outcome is the mirror image of cell 2, we have labeled it 'Market power reduction,' but the question mark indicates our uncomfortableness with this categorization. No profit-maximizing manager would undertake a merger because she wanted to increase the amount of competition her firm faces. Sales increases coupled with profit declines might be observed, if the managers were sales or growth maximizers. Thus, both the motivation behind and the consequences of mergers falling into cell 3 are more difficult to identify than for the other three cells.

3. Methodology

To determine whether a merger has increased profits or not, we must predict what the profits of the two merging firms would have been in the absence of the merger. Determining this counterfactual is one of the most difficult aspects in empirical investigations of the effects of mergers. Even if we observe a 20% increase in profits after a merger, it might be a failure because the two firms' profits would have increased by 40% had they not merged. Most studies that try to address the counterfactual problem do so by choosing a benchmark group of firms and predicting that the performance of the merging firms would have followed that of the benchmark group. In event studies the benchmark group is usually the companies in the market portfolio, in studies like ours that use accounting data, the benchmark firms have been chosen from the same industry(ies) as that (those) of

the two merging firms.[6] We adopt the same methodology and assume that the merging companies' profits and sales would have changed in the same way as the median firm's profits and sales in their respective two-digit ISIC industries changed.[7]

We chose the two-digit level of aggregation as opposed, say, to the four-digit level, because in many countries our samples of possible benchmark companies were too small to be able to identify a nonmerging company for every four-digit industry. Although a two-digit industry's performance will track one of its four-digit industries with some error, we see no reason to expect a systematic bias from this choice of benchmark. Moreover, it has the possible advantage of not being contaminated by the merger itself, as would occur if the merger systematically changed the sales or profits of all other firms in the merged company's four-digit industry(ies).

Consider first the problem of predicting the merging companies' sales. Define: S_{Gt+n} as the sales of the acquiring company in year $t+n$; S_{Dt} as the sales of the acquired company in year t; S_{Ct+n} as the predicted sales of the combined company in year $t+n$; S_{IGt+n} as the sales of the median firm in the industry of the acquiring company in year $t+n$; and S_{IDt+n} as the sales of the median firm in the industry of the acquired company in year $t+n$.

The predicted sales for the combined company in year $t+n$ is estimated as follows:

$$S_{Ct+n} = S_{Gt-1}\frac{S_{IGt+n}}{S_{IGt-1}} + S_{Dt}\frac{S_{IDt+n}}{S_{IDt}} \tag{1}$$

The sales of the acquiring company are projected relative to its sales in the year prior to the merger, the sales of the acquired company are projected relative to its sales in the year of the merger.

It often happens, of course, that companies make several acquisitions over short spans of time. To allow for this possibility we amend Eq. (1) to take into account mergers occurring after time t. If, for example, a firm made one acquisition in t and another in $t+2$, then the amended formula for predicting S_{Ct+n} would look like the following (for $n \geqslant 2$)

[6] See the studies in Mueller (1980a), McDougall and Round (1986), Ravenscraft and Scherer (1987), and Healy et al. (1992).

[7] Our control group excludes firms that made mergers in the period $t-1$ to $t+5$, where t is the year of the merger. In the small fraction of cases where no control group was available for the respective industry and country or country group, we take the median firm in the whole manufacturing/service sector of the respective country/country group. We also tried using the firms at the first and third quartiles of the distribution of firm sizes rather than the median, and matching merging firms to the nearest quartile. This did not produce a substantive change in our findings, so we report only the one set of results.

$$S_{Ct+n} = S_{Gt-1}\frac{S_{IGt+n}}{S_{IGt-1}} + S_{Dt}\frac{S_{IDt+n}}{S_{IDt}} + S_{Dt+2}\frac{S_{IDt+n}}{S_{IDt+2}} \tag{2}$$

Many firms both acquire and sell assets. We also need to account for the effects of spin- and sell-offs on the merging companies' sales. We do so by treating these sales symmetrically to acquisitions. Namely, we subtract the sales of any part of a company sold or spun-off during the 5 years after a merger, again scaling the sales of the spun-off unit by the changes in sales for the median firm in its industry.

If, for example, a firm made one acquisition in year t, another in year $t+2$ and spins or sells off a company in year $t+3$, the final formula for predicting S_{Ct+n} would then be (for $n \geqslant 3$)

$$S_{Ct+n} = S_{Gt-1}\frac{S_{IGt+n}}{S_{IGt-1}} + S_{Dt}\frac{S_{IDt+n}}{S_{IDt}} + S_{Dt+2}\frac{S_{IDt+n}}{S_{IDt+2}} - S_{St+3}\frac{S_{ISt+n}}{S_{ISt+3}} \tag{3}$$

where S_{St+3} denotes the sales spun or sold off by the acquiring company in year $t+3$ and S_{ISt+n} is the sales of the median firm in the industry of the divested company in year $t+n$.[8]

Our methodology for determining the effects of mergers on sales is to compare the predicted value for the merged company's sales in year $t+n$ after adjusting for all mergers and spin-offs as obtained using Eq. (3) with the actual level of sales of this company.

Projecting the levels of profits is a little more difficult, because they can take on negative and zero values. Taking ratios of profits at different points in time may introduce significant errors. We shall, therefore, use changes in the ratios of profits to total assets to predict changes in the profits of the merging companies. Define: Π_{Gt+n} as the profits of the acquiring company in year $t+n$; Π_{Dt} as the profits of the acquired company in year t; Π_{Ct+n} as the predicted profits of the combined company in year $t+n$; Π_{IGt+n} as the profits of the median firm in the industry of the acquiring company in year $t+n$; Π_{IDt+n} as the profits of the median firm in the industry of the acquired company in year $t+n$; K_{Gt+n} as the assets of the acquiring company in year $t+n$; K_{Dt} as the assets of the acquired company in year t; K_{IGt+n} as the assets of the median firm in the industry of the acquiring company in year $t+n$; and K_{IDt+n} as the assets of the median firm in the industry of the acquired company in year $t+n$.

We can now compute the projected change in the returns on the acquirer's assets from year $t-1$ to $t+n$ using again the changes observed for the median (in terms of profitability) company in its industry. Call this projected change $\Delta_{IGt-1,t+n}$.

[8] Two biases might occur: If sales data are missing on additional mergers from t to $t+5$ we underestimate projected sales, if sales data are missing on spin- or sell-offs from t to $t+5$ we overestimate projected sales. Additional mergers occur more often than divestitures, while divestitures are larger on average. Thus, the two biases potentially offset each other.

$$\Delta_{IGt-1,t+n} = \frac{\Pi_{IGt+n}}{K_{IGt+n}} - \frac{\Pi_{IGt-1}}{K_{IGt-1}} \tag{4}$$

If the median firm in the acquirer's industry earned a 0.10 return on assets in $t-1$, and a 0.11 return in $t+n$, then we would predict that the acquiring firm's returns on assets would increase by 0.01.

Defining $\Delta_{ID\ t,t+n}$ for the acquired firm's industry analogously to $\Delta_{IG\ t-1,t+n}$ gives us the following formula for predicting the profits of the combined company in year $t+n$.

$$\Pi_{Ct+n} = \Pi_{Gt-1} + \frac{K_{IGt+n}}{K_{IGt-1}} K_{Gt-1}\, \Delta_{IGt-1,t+n} + \Pi_{Dt} + \frac{K_{IDt+n}}{K_{IDt}} K_{Dt}\, \Delta_{IDt,t+n} \tag{5}$$

The profits of the combined company in year $t+n$ are predicted to be the profits of the acquirer in $t-1$, plus the predicted growth in its profits from $t-1$ to $t+n$, plus the profits of the acquired firm in t, plus the predicted growth in its profits from t to $t+n$. Eq. (5) can be modified to take into account additional acquisitions and spin-offs in the same way that Eq. (1) was. Thus, if we take the same example from above where a firm made one acquisition in year t, another in year $t+2$ and spins or splits off a company in year $t+3$, the final formula for predicting Π_{Ct+n} is then (for $n \geqslant 3$)

$$\begin{aligned}\Pi_{Ct+n} = {} & \Pi_{Gt-1} + \frac{K_{IGt+n}}{K_{IGt-1}} K_{Gt-1}\, \Delta_{IGt-1,t+n} + \Pi_{Dt} + \frac{K_{IDt+n}}{K_{IDt}} K_{Dt}\, \Delta_{\mathrm{IDt,t+n}} \\ & + \Pi_{Dt+2} + \frac{K_{IDt+n}}{K_{IDt+2}} K_{Dt+2}\, \Delta_{IDt+2,t+n} - \Pi_{St+3} - \frac{K_{ISt+n}}{K_{ISt+3}} K_{St+3}\, \Delta_{\mathrm{ISt+3,t+n}}\end{aligned} \tag{6}$$

where $\Pi_{S\ t+3}$ are the profits spun or sold off in year $t+3$, K_{ISt+n} are the assets of the median firm in the industry of the spun- or sold-off company in year $t+n$, K_{St+3} are the assets of the spun- or sold-off company in year $t+3$, and $\Delta_{ISt+3,t+n}$ is the projected change in the returns on the spun- or sold-off company's assets from year $t+3$ to $t+n$.[9]

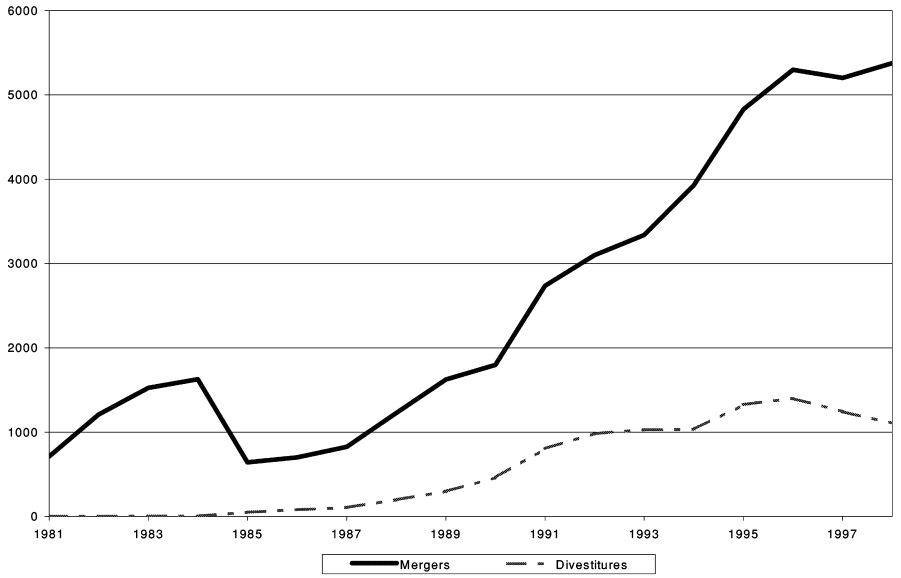
4. Data description

Our principal source of data is the *Global Mergers and Acquisitions* database of *Thompson Financial Securities Data* (*TFSD*). This company collects merger and

[9] Again, two biases occur which potentially offset each other: If the relevant profits data on additional mergers undertaken from t to $t+5$ are missing and taken over profits are positive (which they are on average), we underestimate projected profits. If the relevant profits data on divestitures undertaken from t to $t+5$ are missing and spun or sold off profits are positive (which they are on average), we overestimate projected profits.

spin-off data using a variety of sources such as financial newspapers, Reuters Textline, the Wall Street Journal, Dow Jones, etc. The database covers all transactions valued at US$1 million or more. We define a merger as a transaction where more than 50% of the equity of a target firm is acquired.[10] During the period 1981 to 1998, there were 69 605 announcements of such mergers. Our data for the United States begin in the late 1970s, for all other countries in the mid-1980s. Fig. 1 presents the total number of deals by completion year.

Table 2A summarizes the characteristics of completed mergers (see also Table 2B). From the nearly 70 000 announced mergers across the world, nearly 45 000 mergers were actually completed with almost half of these taking place in the United States. For the full sample, horizontal mergers make up 42% of all mergers, conglomerate mergers 54% and vertical mergers only 4%. To be defined as a vertical merger at least 10% of the sales (purchases) of the primary four-digit industry to which one of the merging companies belongs must go to (come from) the industry to which the other belongs. We use the 1992 input–output table for the US economy to make this determination. Horizontal mergers are defined as



Source: SDC Thompson Financial Securities

Fig. 1. The Number of Completed Mergers and Divestitures, 1981–1998. Source: SDC Thompson Financial Securities.

[10] Symmetrically we define a spin- or sell-off as a transaction where more than 50% of the equity are disposed off. We use the term 'divestitures' interchangeably.

Table 2A
Summary statistics on mergers and acquisitions from around the world from 1981 to 1998

Period:	Until 1990	1991/92	1993/94	1995/96	1997/98	Whole period
United States of America						
Number of deals	8194	1965	2840	3782	4367	21 148
Average deal value (Mn $)	238.2	102.8	137.6	217.0	408.7	246.7
Cross border	3.4%	11.7%	13.9%	16.0%	16.7%	10.6%
Horizontal	39.6%	47.4%	48.7%	49.3%	48.9%	45.2%
Vertical	5.8%	4.9%	3.8%	2.8%	2.8%	4.3%
Conglomerate	54.6%	47.7%	47.5%	47.9%	48.3%	50.5%
United Kingdom						
Number of deals	1,180	501	790	1138	1108	4717
Average deal value (Mn $)	217.3	113.1	60.6	135.0	212.1	158.3
Cross border	35.0%	30.3%	26.8%	27.4%	29.0%	29.9%
Horizontal	31.6%	35.9%	34.7%	37.8%	41.2%	36.3%
Vertical	4.7%	5.0%	3.5%	4.3%	3.6%	4.2%
Conglomerate	63.7%	59.1%	61.8%	57.9%	55.2%	59.5%
Continental Europe						
Number of deals	986	2125	1996	2359	2129	9595
Average deal value (Mn $)	393.4	186.1	159.2	220.4	414.1	285.9
Cross border	53.8%	24.2%	26.6%	33.3%	39.8%	33.5%
Horizontal	37.0%	43.8%	37.5%	35.8%	39.6%	38.9%
Vertical	4.8%	3.5%	3.3%	3.2%	3.4%	3.5%
Conglomerate	58.2%	52.7%	59.2%	61.0%	57.0%	57.6%
Japan						
Number of deals	172	88	61	151	174	646
Average deal value (Mn $)	513.2	456.0	198.1	783.3	169.4	464.9
Cross border	80.8%	72.4%	59.0%	34.4%	28.2%	52.6%
Horizontal	33.7%	29.5%	36.1%	35.1%	42.0%	35.9%
Vertical	4.7%	0.0%	3.2%	2.0%	4.0%	3.1%
Conglomerate	61.6%	70.5%	60.7%	62.9%	54.0%	61.0%
Australia/New Zealand/Canada						
Number of deals	671	425	549	766	821	3232
Average deal value (Mn $)	354.6	68.5	61.6	118.8	142.5	156.0
Cross border	37.9%	22.6%	32.4%	27.7%	27.9%	30.0%
Horizontal	43.8%	43.3%	47.5%	40.1%	44.6%	43.7%
Vertical	4.8%	1.9%	3.7%	3.1%	3.4%	3.5%
Conglomerate	51.4%	54.8%	48.8%	56.8%	52.0%	52.8%
Rest of the World						
Number of deals	371	553	831	1728	1779	5262
Average deal value (Mn $)	276.2	150.0	87.5	101.9	143.3	128.3
Cross border	49.6%	25.7%	32.8%	25.0%	26.5%	28.5%
Horizontal	34.8%	36.2%	34.7%	36.7%	40.1%	37.3%
Vertical	6.4%	4.3%	2.7%	3.2%	3.5%	3.6%
Conglomerate	58.8%	59.5%	62.6%	60.1%	56.4%	59.1%

Table 2A. Continued

Period:	Until 1990	1991/92	1993/94	1995/96	1997/98	Whole period
	All Mergers					
Number of deals	11 574	5657	7067	9924	10 378	44 600
Average deal value (Mn $)	256.5	129.3	114.7	181.9	313.4	220.0
Cross border	15.5%	21.2%	23.0%	24.2%	25.5%	21.7%
Horizontal	38.6%	43.4%	42.1%	41.7%	44.2%	41.7%
Vertical	5.5%	4.0%	3.5%	3.1%	3.2%	4.0%
Conglomerate	55.9%	52.6%	54.4%	55.2%	52.6%	54.3%

The database is the *Global Mergers and Acquisition* database of *Thompson Financial Securities*. It covers all transactions with a value of at least US $1 million. *Continental Europe* includes Austria, Belgium, Germany, Denmark, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, The Netherlands, Norway, Sweden, Portugal, Switzerland and Island. The *Rest of the World* sample includes more than 100 other countries. *Deal value* is defined as the total consideration paid by the acquirer excluding fees and expenses. The dollar value (deflated by the US-CPI with base year 1995) includes the amount paid for all common stock, common stock equivalents, preferred stock, debt, options, assets, warrants and stake purchases made within 6 months of the announcement date of the transaction. Liabilities assumed are included in the value if they are publicly disclosed. If a portion of the consideration paid by the acquirer is common stock, the stock is valued using the closing price on the last full trading day prior to the announcement of the terms of the stock swap. *Cross-border* mergers are mergers where the acquiring and acquired companies stem from different nations. *Horizontal* mergers are defined as mergers between two companies with sales in the same primary four-digit SIC industry. *Vertical* mergers are mergers where at least 10% of the sales (purchases) of the primary four-digit industry to which one of the companies belongs must go to (come from) the industry to which the other belongs. We use the 1992 US input–output table. *Conglomerate* mergers consist of all mergers which are neither horizontal nor vertical.

Table 2B
Characteristics of acquiring and target companies

	Number of Obs.	Sales		Profits		Profit rate	
		Acquirer Mn $	Target Mn $	Acquirer Mn $	Target Mn $	Acquirer	Target
United States of America	1967	1997.5	318.0	102.26	9.78	0.029	0.019
United Kingdom	379	2162.1	329.7	110.53	10.89	0.066	0.039
Continental Europe	172	4644.2	729.6	169.86	24.58	0.035	0.033
Japan	16	4349.1	876.1	165.10	26.47	0.011	0.030
Australia/N.Zealand/Canada	172	1940.8	391.9	93.45	15.53	0.024	0.027
Rest of the World	47	2132.4	443.0	157.64	22.88	0.052	0.013
All mergers	2753	2198.0	355.3	108.25	11.53	0.034	0.023

The sample includes those mergers where we have all the relevant data for year *t*. Sales are average sales in million 1995 USD, profits are average profits before interest and taxes in million 1995 USD. The profit rate is profits before interest and taxes divided by total assets.

mergers between two companies with sales in the same primary four-digit industry. Conglomerate mergers consist of all mergers which are neither horizontal nor vertical. It is interesting to note that a greater fraction of mergers in the United States appears to be horizontal than for any other area/country category. Despite the step-up in antitrust enforcement under the Clinton Administration, a greater fraction of mergers between 1993 and 1998 was horizontal in nature than from before 1990. In some years the proportion is nearly 50%. Roughly one-fifth of the mergers are cross-border transactions (22%). An upward trend in cross-border mergers is apparent in Table 2, and is confirmed by a regression of the fraction of mergers in a country which are cross-border on time. The upward trend is particularly pronounced for EU countries, which may reflect the greater integration of EU economies over the 1990s as a result of the Single Market Program.[11] Japanese companies undertake relatively few mergers compared to other countries, with a much higher fraction of these (53%) being cross-border deals. To arrive at comparable real values, we first convert all variables to USD and deflate by the US-Consumer Price Index with base year 1995. Thus, the average deal value was 220 million 1995-USD.[12]

The samples used for our analysis are much smaller than the numbers in Table 2A,B suggest due to missing data for relevant variables. Acquiring company balance sheet and market data for the years $t-1$ to $t+5$ relative to the merger year t stem from the *Global Vantage/Compustat* database. Out of the 45 000 completed mergers of Table 2 we could match 17 863 to one of these databases. Some acquiring companies acquire more than one target in a given year, and since our balance sheet information for acquiring companies is on a yearly basis, we aggregate the relevant variables of these targets. This further reduces the merger sample to 14 269 merger years.[13]

[11] Call CB the fraction of mergers in a country which are cross-border mergers, Y the year in which the mergers took place, and $Y-\text{EU}$ an interaction between Y and a 1/0 dummy for whether the country was an EU-member or not. A regression using data for the 1990s yielded the following results (t-statistics under the coefficients):

$$\underset{}{\text{CB}} = \underset{7.33}{0.25} + \underset{1.65}{0.008\,Y} + \underset{2.30}{0.007Y - \text{EU}},\ R^2 = 0.06$$

The upward time trend for EU countries was almost twice that for all other countries, a difference that was significant at the 1% level. (We did not include data for the 1980s in the regression, since our data from before 1990 for countries other than the USA contain a disproportionate fraction of large, and therefore also cross-border mergers.)

[12] A table summarizing the characteristics of divestitures is available upon request. In short, our database covers 9659 completed divestitures worldwide from 1981 to 1998, 31.4% of these were cross-border deals, 37.0% horizontal, 4.3% vertical, and 58.7% conglomerate. The average deal value was $181 million.

[13] We could match 6616 divestitures to these databases aggregated to 4666 divestiture years.

Table 3A
Effects of mergers for full sample

Years after the merger	Number of observations	Difference in Mn $	Profits		Difference in Mn $	Sales	
			p-value	% Positive		*p*-value	% Positive
$t+1$	2704	5.91	0.062	57.0	−214.16	0.000	51.5
$t+2$	2274	11.11	0.009	57.2	−382.81	0.000	49.5
$t+3$	1827	10.79	0.056	54.8	−549.59	0.000	46.4
$t+4$	1517	19.68	0.007	57.8	−633.46	0.000	46.3
$t+5$	1250	17.81	0.046	57.6	−714.04	0.000	44.6

On average, acquiring firms are present over a time period of 15 years in our databases. During this period acquiring firms make 2.25 acquisitions and divest 0.83 companies on average. Missing data and the elimination of outliers (we drop the left and right 1% tail of the distribution) reduces the sample to the numbers reported in Table 3A.[14] We have attempted to make our samples as large as possible and thus do not limit ourselves to balanced panels, companies making only one merger or the like.

Table 2B presents means of the distributions of sales, profits and profit to assets ratios for the acquired and acquiring companies in our sample. Profits are measured before interest and taxes (COMPUSTAT item 18), net sales are item 12, and total assets are item 6. Again all variables are deflated by the Consumer Price Index with base year 1995.

On average the acquired companies are just 16% of the size of the companies which buy them and make only around a tenth of the profits. In the United States, the United Kingdom and Continental Europe the acquired firms are less profitable than their buyers, in Japan, Australia, Canada, and New Zealand they are more profitable. In the rest-of-the-world subsample, the acquired companies are much less profitable than their buyers.[15]

5. Overall results

5.1. Full sample

In this section we present the main results for our full sample and for different subsets of mergers to see whether mergers on average have increased profits and sales or reduced them. In the following section we look more closely at the mergers that have increased profitability to see whether the changes appear to be due to increases in efficiency or market power.

[14] In Tables 3–9 we drop the left and right 1% of the distribution in each (sub)sample.

[15] Summary statistics on divestitures (available upon request) reveal that divested units are larger and less profitable than acquired firms.

Table 3A presents our findings for the full sample of companies. The size of the sample declines as we move away from the date of the merger because companies disappear from the data set.[16] The profitability numbers consist of the difference in year $t + n$ between the actual profits of the combined firm and its projected profits in this year. Thus a negative number implies a decline in profits. The mean difference between actual and projected profitability is positive in all 5 years after the mergers, and is significant in every year at the 10% level, or better. The $17.8 million constitutes a difference between actual and projected profits of 8.2 (0.20)% of the profits (assets) of the average acquirer in the sample in year $t + 5$.

The results for sales are again the difference between the actual and projected values for the combined companies. The mean difference in sales is negative in every year and continuously increases in absolute value through year 5. Five years after the mergers, the average acquiring firm had sales that were $714 million lower than their projected value. This constitutes a difference between actual and projected sales of 14.5% of the sales of the average acquirer in the sample in year $t + 5$. The last column in each set of results gives the fraction of the sample for which the change was positive. While a majority of mergers led to higher actual profits than those predicted, the reverse was true for sales.

5.2. Results by country

Table 3B reports the comparable figures by country or country group. The United States makes up a substantial fraction of the overall sample and so it is not surprising to find the pattern of results for it resembling that of the full sample as just discussed. Profits are higher than predicted in every post-merger year, although only three of the five differences are significant at the 10% level for the US. Actual sales are significantly less than predicted in every post-merger year. In percentage terms we predict that mergers increase profits by 8.1% (0.17%) of the profits (assets) of the average acquirer in the USA and decrease sales by 14.8% 5 years after the merger.

Essentially the same pattern can also be observed for the United Kingdom. Actual profits are greater than projected profits in all 5 years, although the difference is statistically significant in only the first post-merger year. Actual sales fall short of their projected values in all 5 years after the mergers, with all of the declines significant at conventional levels.

The pattern of results for Continental Europe is very similar to that for the USA and UK. The differences between actual and projected profitability are all positive, but the only significant difference is for the fourth post-merger year. Sales fall

[16] Remember our last year is 1998, thus mergers having taken place in 1993 are the last mergers for which we have data until year $t + 5$, mergers having taken place in 1994 are in our sample only up to year $t + 4$, mergers of year 1995 up to year $t + 3$ and so on.

Table 3B
Effects of mergers by country/country groupings

Years after the merger	Number of observations	Profits			Sales		
		Difference in Mn $	*p*-value	% Positive	Difference in Mn $	*p*-value	% Positive
United States of America							
$t+1$	1950	3.735	0.307	57.0	−174.495	0.000	52.8
$t+2$	1641	12.457	0.013	58.1	−324.825	0.000	49.8
$t+3$	1272	10.490	0.133	55.6	−524.798	0.000	46.6
$t+4$	1067	16.654	0.054	57.9	−595.367	0.000	45.5
$t+5$	889	17.388	0.098	58.7	−730.236	0.000	44.3
United Kingdom							
$t+1$	362	15.440	0.061	65.7	−263.828	0.001	48.6
$t+2$	322	14.902	0.135	59.3	−445.977	0.000	48.9
$t+3$	297	12.545	0.287	52.2	−468.442	0.002	45.4
$t+4$	233	4.729	0.777	55.8	−380.410	0.050	47.0
$t+5$	181	24.149	0.201	53.6	−545.682	0.043	43.5
Continental Europe							
$t+1$	178	18.831	0.233	53.9	−568.403	0.001	47.3
$t+2$	140	16.015	0.462	55.7	−1106.104	0.000	46.2
$t+3$	122	19.191	0.457	53.3	−972.056	0.006	47.9
$t+4$	108	81.284	0.016	60.2	−1461.227	0.002	48.5
$t+5$	87	42.345	0.361	58.6	−666.390	0.272	54.2
Japan							
$t+1$	20	−36.826	0.342	35.0	−238.893	0.652	61.1
$t+2$	19	−63.507	0.276	21.1	378.774	0.474	56.3
$t+3$	19	18.149	0.660	42.1	396.802	0.284	52.9
$t+4$	16	4.031	0.934	43.8	−70.744	0.900	56.3
$t+5$	15	−41.621	0.740	73.3	−2328.611	0.187	46.2
Australia/New Zealand/Canada							
$t+1$	165	−3.275	0.801	45.5	−175.353	0.130	47.9
$t+2$	129	−27.001	0.093	45.6	−357.068	0.087	51.2
$t+3$	101	−9.984	0.640	55.4	−686.854	0.014	44.6
$t+4$	79	5.862	0.858	54.3	−962.244	0.016	48.1
$t+5$	66	−33.577	0.308	47.0	−805.393	0.121	39.4
Rest of the world							
$t+1$	42	26.539	0.296	51.2	−346.740	0.106	45.2
$t+2$	35	71.808	0.086	61.8	−237.196	0.174	42.9
$t+3$	25	44.931	0.377	65.2	−880.127	0.018	40.0
$t+4$	22	93.866	0.153	89.5	−577.552	0.223	50.0
$t+5$	15	115.937	0.250	64.3	−281.547	0.390	46.7

'Difference in Mn $' is the difference between actual and projected profits or sales as obtained by Eqs. (3) and (6) in 1995 million USD. A positive number therefore implies that the merger increased profits or sales, a negative number implies that the merger decreased profits or sales. '*p*-value' is the probability that the observed differences are zero (two-sided test). '% Positive' is the percentage of positive differences between actual and projected values.

short of their projected values in every year and four of the five differences are statistically significant at the 5% level.

The results for Japan are somewhat different than those already discussed. Three of the five profit comparisons are negative, while sales are greater than predicted for the first time in two of the five post-merger years. Our sample for Japan is quite small, however, and none of the differences is statistically significant.

The results for Australia, New Zealand and Canada resemble those for the US, UK and Continental Europe in so far as actual sales fall short of predicted sales in all five post-merger years with three of the short falls being significant at the 10% level or better. The post-merger profit differences are also generally insignificant, as was the case for the UK and Western Europe, although in the case of Australia, New Zealand and Canada the post-merger profits of the merging firms tend to be less than those predicted for them, and one of these differences is significant at the 10% level.

The pattern of results for the remaining countries also resembles that for the US, UK and Continental Europe. Profit differences are positive in all 5 years, but are usually insignificantly different from zero. Sales differences are again consistently negative, although only one of these is statistically significant

Thus, the results by country and country group tend by and large to resemble one another. Differences between actual and projected profits tend to be positive but often are not significantly different from zero. Differences between actual and projected sales tend to be negative and often significantly so.

The lack of significant differences in results across countries can be further illustrated through an analysis of variance. Table 4 reports the results from a regression of the differences between actual and projected profits and sales on country category dummies for year $t+5$. An intercept has been included and the

Table 4
Analysis of variance in year $t+5$ by country categories

Country/country group	Profits		Sales	
	Difference in Mn $	*t*-value	Difference in Mn $	*t*-value
Average	17.8	2.00	−714.0	6.63
USA	−0.4	0.33	−16.2	0.70
UK	6.3	0.38	168.3	1.13
Continental Europe	24.5	0.37	47.6	0.55
Japan	−59.4	0.85	−1615.0	1.83
Aus/NZ/Can	−51.4	1.32	−91.4	0.45
Rest of the world	98.1	1.26	432.5	0.63
Adjusted R^2	−0.0006		0.0003	
Number of observations	1250		1250	

'Average' denotes the overall average value of the difference of actual and projected profits or sales. All other coefficients are differences from this average.

country dummies constrained to sum to zero, so that the coefficient on a country dummy represents the difference between its mean and that for the full sample (Suits, 1984).

For the full sample, the mean difference between actual and predicted profits in year $t + 5$ is positive and significant at the 5% level. No country category's mean is significantly different from that of the full sample. The mean difference between actual and predicted sales is negative and significant at the 1% level. All country means are insignificantly different from the sample mean except for Japan, whose mean difference in sales is significantly less than the sample mean, although only at the 10% level.

5.3. Results by sector and type of merger

In Table 5A,B we have separated mergers into the manufacturing and service sectors, and then within these divided them into horizontal, vertical and conglomerate mergers. Mergers in the manufacturing sector tend to be less profitable than in the service sector. All 15 entries in the service sector are positive, while six of the 15 are negative in the manufacturing sector. The differences between actual and predicted sales are uniformly negative except for vertical mergers in the service sector, where two of the differences are positive.

Table 6 presents the results for an analysis of variance conducted in much the same way as in Table 4. Coefficients on the merger categories represent differences from the intercept. In year $t + 5$, horizontal mergers in manufacturing are significantly more profitable than the average merger in manufacturing, which had a near zero difference between its actual and projected values (Panel A). Vertical mergers in manufacturing are significantly (at the 10% level) less profitable, on the other hand. In contrast, all three categories of mergers are equally profitable in the service sector (Panel B). The difference between actual and projected profits for the average merger in the service sector is significantly higher than for the average merger in manufacturing.[17]

Although actual sales fall short of predicted sales in all three categories for the manufacturing sector, the shortfall is significantly smaller for horizontal mergers. Thus, within the manufacturing sector, horizontal mergers appear to be considerably more successful than conglomerate and vertical mergers with respect to their effect on both profits and sales.

Within the service sector, vertical mergers exhibit the best performance in terms of sales, although the small number of vertical mergers makes the difference statistically insignificant. Horizontal mergers still produce smaller shortfalls between actual and projected sales than do conglomerate mergers.

Thus, we conclude that mergers in the service sector are generally more successful than those in manufacturing, at least as far as their effects on

[17] Test results are available from the authors upon request.

Table 5
Effects of mergers by sector

Years after after the merger	Number of observations	Profits			Sales		
		Difference in Mn $	*p*-value	% Positive	Difference in Mn $	*p*-value	% Positive
Panel A. Effects of mergers in the manufacturing sector by category							
Horizontal mergers							
$t+1$	411	−8.006	0.370	51.3	−180.323	0.002	47.1
$t+2$	352	3.130	0.761	57.1	−288.936	0.000	44.9
$t+3$	274	15.924	0.252	56.9	−466.510	0.001	48.2
$t+4$	233	41.933	0.007	60.5	−467.476	0.002	46.6
$t+5$	193	41.751	0.017	56.5	−195.891	0.268	43.2
Vertical mergers							
$t+1$	66	31.234	0.270	55.4	−84.619	0.637	53.0
$t+2$	53	−11.697	0.702	42.6	−42.079	0.897	49.1
$t+3$	47	−52.549	0.112	38.3	−397.957	0.343	46.8
$t+4$	43	−71.252	0.231	43.2	−773.660	0.152	55.8
$t+5$	34	−88.254	0.340	51.4	−989.052	0.188	50.0
Conglomerate mergers							
$t+1$	877	8.133	0.175	55.8	−411.540	0.000	45.5
$t+2$	761	12.253	0.115	54.5	−605.256	0.000	44.3
$t+3$	641	7.833	0.409	52.3	−768.647	0.000	42.0
$t+4$	541	8.567	0.494	52.7	−735.062	0.000	42.6
$t+5$	475	−5.879	0.674	52.4	−824.688	0.000	42.9
Panel B. Effects of mergers in services by category							
Horizontal mergers							
$t+1$	775	12.177	0.017	60.0	−44.617	0.369	61.7
$t+2$	624	14.211	0.093	59.5	−189.847	0.009	59.8
$t+3$	470	5.772	0.627	55.5	−316.710	0.004	52.1
$t+4$	368	22.877	0.088	63.1	−492.849	0.001	50.0
$t+5$	287	39.167	0.038	65.7	−545.498	0.007	52.3
Vertical mergers							
$t+1$	22	23.377	0.248	50.0	−234.462	0.399	45.5
$t+2$	19	9.967	0.543	52.6	−11.693	0.919	42.1
$t+3$	17	38.608	0.031	64.7	48.534	0.929	41.2
$t+4$	15	11.566	0.781	73.3	−376.665	0.338	50.0
$t+5$	8	104.254	0.013	100.0	933.507	0.588	50.0
Conglomerate mergers							
$t+1$	550	0.716	0.914	59.8	−178.648	0.016	50.7
$t+2$	465	14.446	0.095	60.6	−406.578	0.001	48.4
$t+3$	374	26.555	0.034	59.1	−584.358	0.000	46.0
$t+4$	309	33.924	0.059	59.9	−735.722	0.000	47.2
$t+5$	247	36.059	0.100	59.5	−1112.637	0.000	40.1

The *manufacturing* sector includes all firms with SIC codes smaller than 4000, the *service* sector includes those firms with SIC codes greater than or equal to 4000. See also the note to Table 3.

Table 6

Category	Profits		Sales	
	Difference in Mn $	*t*-value	Difference in Mn $	*t*-value
Panel A. Analysis of variance in year t + 5 in the manufacturing sector by merger categories				
Average	3.1	0.27	−660.0	5.19
Horizontal	38.7	2.07	464.1	2.25
Vertical	−91.4	1.82	−329.1	0.59
Conglomerate	−9.0	1.13	−164.7	1.87
Adjusted R^2	0.0066		0.0045	
Number of observations	702		702	
Panel B. Analysis of variance in year t + 5 in services by merger categories				
Average	38.7	2.75	−782.1	4.87
Horizontal	0.5	0.03	236.6	1.56
Vertical	65.5	0.57	1715.6	1.31
Conglomerate	2.6	0.17	−330.5	1.88
Adjusted R^2	−0.0031		0.0051	
Number of observations	542		542	

'Average' denotes the overall average value of the difference of actual and projected profits or sales. All other coefficients are differences from this average. See also the note to Table 5.

profitability are concerned, and that horizontal mergers have more favorable effects on sales than do conglomerate mergers in both sectors, and on profits in manufacturing.[18]

5.4. The effects of cross-border mergers

Table 7 breaks the sample into cross-border and domestic mergers. We have at most 429 observations on cross-border mergers, and so the results for domestic mergers look a lot like those for the full sample. The same can more or less be said for the cross-border mergers. Mean differences between actual and projected profits are positive in all five post-merger years, but are significantly different from zero in only one of them. Mean differences between actual and projected sales are negative and significant in all five post-merger years. We tested for differences in the effects of cross-border mergers that were related to the origin of either the acquiring or target company, but did not find any significant differences. Cross-border acquisitions by (of) UK companies did not generate significantly larger

[18] We also tested for significant differences in the effects of mergers depending on the industry of the acquiring companies. Almost no significant differences were found. The most interesting exceptions were for the chemicals and insurance industries. Mergers in these industries were followed by profit increases significantly above the sample mean, and sales declines below the mean. The patterns of profits and sales changes following mergers in the chemicals and insurance industries strongly resemble those that we associate with market power increases.

Table 7
Effects of domestic and cross-border mergers

Years after the merger	Number of observations	Profits			Sales		
		Difference in Mn. $	*p*-value	% Positive	Difference in Mn. $	*p*-value	% Positive
Cross-border mergers							
$t+1$	429	16.136	0.121	58.3	−385.824	0.000	48.1
$t+2$	336	15.727	0.170	58.3	−555.023	0.000	47.3
$t+3$	286	3.886	0.803	53.8	−871.451	0.000	44.9
$t+4$	236	37.202	0.050	66.1	−785.575	0.002	47.0
$t+5$	183	41.826	0.132	62.8	−867.729	0.022	46.2
Domestic mergers							
$t+1$	2288	3.986	0.214	56.8	−182.953	0.000	52.1
$t+2$	1940	10.305	0.025	57.0	−353.158	0.000	49.9
$t+3$	1544	12.067	0.046	55.0	−490.591	0.000	46.6
$t+4$	1281	16.454	0.036	56.3	−605.429	0.000	46.1
$t+5$	1064	13.689	0.141	56.7	−687.170	0.000	44.4

See the note to Table 3.

changes in sales and profits than was true for other cross-border acquisitions, and the same was true for all other countries.

6. Results: market power and efficiency

Mergers that increase the efficiency of the merging firms should increase both their profits and their sales. Mergers that increase market power should increase profits and reduce sales. A merger which reduces efficiency should reduce both profitability and sales. In this section we attempt to increase our understanding of the causes and effects of mergers, by dividing our sample into subsets of mergers that either increase or reduce profitability.

Panel A1 of Table 8 reports the results for all mergers for which post-merger profitability changes are greater than those of the matching industries, while Panel A2 reports the figures for the mergers that reduced profitability relative to the control group. The mean difference between actual and projected sales is negative and significant in every post-merger year. The difference between actual and projected profits in year $t+5$ is more than $150 million for profitable mergers, a difference of 70.0% (1.70%) of the actual profits (assets) of the average acquirer in the sample in year $t+5$. The difference between actual and projected sales in $t+5$ is $−475 million, −9.6% of the sales of the average acquirer in $t+5$. This is the pattern we expect for mergers that increase market power, and thus we conclude that the *average* profitable merger in our sample would appear to have increased market power.

Table 8
Tests for efficiency and market power effects

Years after the merger	Number of observations	Profits	Sales	*p*-value
		Difference in Mn. $	Difference in Mn. $	
Panel A1. Mergers with profits changes above zero				
$t+1$	1512	76.129	−92.148	0.013
$t+2$	1276	97.129	−247.630	0.000
$t+3$	981	117.517	−328.543	0.000
$t+4$	857	140.957	−399.243	0.000
$t+5$	706	152.181	−475.338	0.000
Panel A2. Mergers with profits changes below zero				
$t+1$	1192	−83.419	−368.936	0.000
$t+2$	998	−99.076	−555.640	0.000
$t+3$	846	−113.522	−805.902	0.000
$t+4$	660	−139.492	−937.575	0.000
$t+5$	544	−157.147	−1023.821	0.000
Panel B1. Mergers with profits changes in top quartile				
$t+1$	661	160.825	−191.652	0.017
$t+2$	557	205.372	−554.697	0.000
$t+3$	447	240.393	−600.628	0.000
$t+4$	368	299.393	−821.384	0.000
$t+5$	305	323.198	−817.953	0.004
Panel B2. Mergers with profits changes in lower quartile				
$t+1$	664	−144.851	−666.086	0.000
$t+2$	558	−171.933	−903.308	0.000
$t+3$	450	−205.304	−1424.606	0.000
$t+4$	377	−239.140	−1501.687	0.000
$t+5$	308	−269.075	−1631.660	0.000
Panel C. Horizontal mergers with profits changes above zero				
$t+1$	664	70.810	−20.014	0.684
$t+2$	558	91.082	−157.492	0.048
$t+3$	410	113.251	−249.082	0.030
$t+4$	367	125.995	−252.037	0.058
$t+5$	294	148.933	−238.859	0.183
Panel D. Vertical mergers with profits changes above zero				
$t+1$	47	132.926	−192.295	0.451
$t+2$	33	115.225	174.208	0.641
$t+3$	29	84.576	287.980	0.499
$t+4$	28	137.429	153.551	0.705
$t+5$	25	161.787	710.515	0.240
Panel E. Conglomerate mergers with profits changes above zero				
$t+1$	796	77.713	−146.062	0.008
$t+2$	680	101.754	−344.146	0.000
$t+3$	539	122.894	−424.531	0.000
$t+4$	457	153.935	−551.364	0.001
$t+5$	384	154.530	−735.240	0.000

Table 8. Continued

Years after the merger	Number of observations	Profits	Sales	*p*-value
		Difference in Mn. $	Difference in Mn. $	
Panel F. Horizontal mergers with profits changes below zero				
$t+1$	519	−79.689	−182.776	0.002
$t+2$	416	−97.804	−316.613	0.000
$t+3$	334	−116.183	−522.617	0.000
$t+4$	235	−117.672	−843.660	0.000
$t+5$	185	−130.796	−669.969	0.003
Panel G. Vertical mergers with profits changes below zero				
$t+1$	41	−87.076	−41.590	0.770
$t+2$	39	−106.117	−210.288	0.504
$t+3$	35	−121.891	−749.439	0.140
$t+4$	29	−244.293	−1477.246	0.038
$t+5$	17	−380.079	−2583.682	0.065
Panel H. Conglomerate mergers with profits changes below zero				
$t+1$	627	−86.521	−544.284	0.000
$t+2$	539	−99.820	−763.271	0.000
$t+3$	471	−111.278	−1016.108	0.000
$t+4$	392	−144.490	−949.741	0.000
$t+5$	336	−160.265	−1138.591	0.000

Not surprisingly, actual sales for companies undertaking unprofitable mergers (Panel A2) fall way below their projected values. We predict that had the acquiring firms not undertaken these mergers they would have had 72.3% more profits and 20.8% more sales than they actually had in year $t+5$. These mergers are unsuccessful in both dimensions and imply that they lowered efficiency.

In Panel B1 of Table 8 the results are reported for the highest quartile of mergers ranked by the difference between actual and projected profits. The average profit changes are roughly three times as large as those in Panel A1. Mean actual sales continue to fall short of their projected values in every year after the mergers. All sales comparisons are highly significant. In Panel B2 of Table 8 the results are reported for the lowest quartile of mergers ranked by changes in profits. These mergers appear as unmitigated disasters.

Panels C, D and E in Table 8 divide mergers with changes in profitability above the matching industries into the horizontal, vertical and conglomerate categories. The first thing to note is that all three categories of successful mergers exhibit roughly similar increases in profitability. The mean differences between actual and projected profits tend to get larger as one moves away from the mergers, and fall roughly in a range from $150 to $160 million in year $t+5$.

The mean differences between actual and projected sales for companies undertaking profitable horizontal and conglomerate mergers are negative in all 5

years following the mergers. Thus, the average merger falling in both categories appears to result in an increase in market power. In contrast the mean difference between actual and projected sales for firms undertaking vertical mergers is negative only in year one. Although none of the other four entries is statistically significant, the results for profitable vertical mergers are *weakly* consistent with their increasing efficiency.

Panels F, G and H in Table 8 parallel C, D and E for mergers that lowered profitability. All 15 post-merger sales comparisons are negative, with all differences for horizontal and conglomerate mergers being statistically significant, as were two for vertical mergers. The average unprofitable merger fits the pattern we anticipate for efficiency reducing mergers regardless of what type of merger it is.

One might expect mergers between small firms to be more likely to increase efficiency by creating economies of scale and scope, while mergers between large firms would be more likely to increase market power. These conjectures would lead us to expect sales increases following profitable mergers between small companies, and sales decreases following profitable mergers between large companies. Our final test for the effects of mergers splits our sample into small and large acquirers, and profitable and unprofitable mergers.[19]

The results of these tests are reported in Table 9. The mean differences between actual and projected sales are positive and significant in all five post-merger years for the small firms making profitable mergers (Panel A). These differences suggest that profitable mergers of small firms increase sales by around \$150 million or 25.0% relative to the average small acquirer's size in year $t+5$, while profits nearly double. This pattern accords with our prediction for efficiency enhancing mergers and is the first time that actual sales have exceeded their projected values on average in each of the five post-merger years. These results strongly suggest that these mergers increased the efficiency of the merging firms.

In contrast mean differences between actual and projected sales are negative and significant in all five post-merger years for the large firms making profitable mergers. These differences suggest that profitable mergers of large firms decrease sales by around \$1 billion or 10.7% relative to the average large acquirer's size in year $t+5$, while the change in profits is 60.7% of the profits of the average large acquirer in $t+5$. These differences accord with our prediction for market power enhancing mergers. The average profitable merger among small firms appears to increase their efficiency, the average profitable merger by a large firm appears to increase its market power.

The results of Panel B of Table 9 are for the firms, which undertook unprofitable

[19] The full sample was first divided into 'small' and 'large' companies using the median sales of acquiring firms in year $t-1$ as the dividing line. These two samples were then subdivided on the basis of whether profits were greater or less than their projected values. 'Large' firms have average sales (profits) of \$5713 (264) million and 'small' firms have average sales (profits) of \$341 (18.1) million in year $t-1$. The average deal value of transactions involving 'large' acquirers is \$667 million, while the average deal value involving 'small' acquirers is \$103 million.

Table 9

Years after the merger	Number of observations	Profits	Sales	*p*-value
		Difference in Mn. $	Difference in Mn. $	
Panel A. Mergers with profits changes above zero by size				
I. Small Firms				
$t+1$	766	20.440	54.953	0.000
$t+2$	642	27.947	72.190	0.000
$t+3$	476	36.465	83.328	0.001
$t+4$	418	40.155	129.245	0.000
$t+5$	349	47.001	148.724	0.002
II. Large Firms				
$t+1$	746	133.310	−243.194	0.001
$t+2$	634	167.294	−571.486	0.000
$t+3$	505	193.925	−716.762	0.000
$t+4$	439	236.070	−902.450	0.000
$t+5$	357	255.298	−1085.415	0.000
Panel B. Mergers with profits changes below zero by size				
I. Small Firms				
$t+1$	610	−28.854	−59.829	0.001
$t+2$	514	−30.951	−88.808	0.000
$t+3$	453	−43.943	−128.520	0.009
$t+4$	356	−55.022	−105.590	0.004
$t+5$	288	−53.384	−65.567	0.215
II. Large Firms				
$t+1$	582	−140.806	−692.914	0.000
$t+2$	484	−171.866	−1051.408	0.000
$t+3$	393	−194.135	−1586.702	0.000
$t+4$	304	−239.117	−1911.873	0.000
$t+5$	256	−274.339	−2101.856	0.000

The full sample was first divided into 'small' and 'large' companies using the sales median of acquiring firms in year $t-1$ as the dividing line. These two samples were then subdivided on the basis of whether profits were greater or less than their projected values.

mergers. Here we see consistent declines in post-merger sales for both size classes. Unprofitable mergers by both small and large companies tend to be the result of reduced economic efficiency.

7. Comparisons with previous results in the literature

The results reported above with respect to the effects of mergers on profitability and sales are broadly consistent with those obtained by others. In a recent survey of the literature Mueller (1997) summarized the results from 20 studies drawn

from 10 countries over the post-World War II period that generally followed the methodology that we have employed here to determine the effects of mergers on profitability, namely compared actual post-merger profits with those predicted using a control group.

The most ambitious of all of the studies in terms of sample size, time span, and care in handling the data was that of Ravenscraft and Scherer (1987) for the United States. They concluded that the profitability of acquired firms declined after they were acquired. On the other hand, Healy et al. (1992) found a significant increase in the pre-tax cash flows of the companies involved in the 50 largest mergers between 1979 and 1984 implying that the largest mergers in the US during the early 1980s did increase either the market power or the efficiency of the merging firms.[20] Our results suggest that the profit increases that Healy et al. observed were mostly due to increases in market power.

The largest study of mergers in the UK (Meeks, 1977) concluded as did Ravenscraft and Scherer that mergers reduced the profitability of the merging companies. Other studies for the UK have, however, reached the opposite conclusion (Cosh et al., 1980). Although the preponderance of evidence for the UK suggests that mergers tend to reduce profitability (Hughes, 1989), not all studies have reached this conclusion.

No distinct pattern emerges in the studies from other countries. Profit increases were observed in Canada (Baldwin, 1995, Chapter 10) and Japan (Ikeda and Doi, 1983), profit decreases in Holland (Peer, 1980) and Sweden (Ryden and Edberg, 1980). In all other countries the differences were statistically insignificant. Where mergers seem to result in profit increases in one country (e.g., Germany), they result in declines in another (e.g., France). Thus, our overall finding that the actual post-merger profits of merging companies are in many cases insignificantly different from their predicted values is in general accordance with the findings of previous studies. Where we perhaps differ from them is that we have observed a greater preponderance of positive and significant profit changes following mergers.

Our findings with respect to post-merger changes in sales for the surviving firms also accord with the main results reported in the literature. Since we project a merging company's sales using the median sales of a non-merging company in the same industry, one might expect that relative declines in sales will translate into declines in market shares. Three studies of the effects of mergers on market shares exist. Goldberg (1973) observed insignificant changes in market shares for a sample of 44 advertising intensive firms over an average of 3.5 years following their undertaking a merger. Mueller (1985) observed significant *declines* in market shares for a sample of 209 manufacturing companies over an average of 11 years following the mergers. Baldwin and Gorecki (1990) found significant declines in market shares for plants acquired in horizontal mergers, but no significant changes

[20] Ravenscraft and Scherer also reported that 'mergers among equals'—which is to say between two large firms—were more profitable than the average merger in their sample.

for plants acquired in other sorts of mergers. They concluded that their results were consistent with the mergers having increased market power.

Nine studies that measured changes in the growth rates of merging firms following the mergers using either their industries or matched non-merging firms as control groups found either that the mergers produced no significant change in growth rates [see McDougall and Round (1986) for Australia; Kumps and Wtterwulghe (1980) for Belgium; Jenny and Weber (1980) for France; Cable et al. (1980) for Germany; Ryden and Edberg (1980) for Sweden; Cosh et al. (1980) for the United Kingdom; and Amel and Rhoades (1989) for acquired US banks], or significant declines [Peer (1980) for Holland and Mueller (1980b) for the United States]. Thus, no study of which we are aware has found significant increases in either the internal growth rates of merging companies or their market shares following their acquisitions, and several have reported significant declines. Our general finding of smaller sales for merging companies than are projected using the sales changes of the median nonmerging firm in the merging companies' industries is consistent with these results from the literature.

8. A categorization of mergers according to their effects on market power and efficiency

We begin this paper by stating that mergers can be divided into three broad categories: those that increase profits by increasing market power, those that increase profits by increasing efficiency and those that reduce profits and efficiency. In Table 1 we categorized these and the other logically possible consequence of mergers. Table 10 summarizes the results of our study by reporting the fractions of mergers that fall into each of the four categories. The first entry in each sell gives the percentage of all acquisitions by small companies falling into this cell, the second entry is for large acquirers, and the third is for all mergers regardless of size. Cell 1 reveals that 29.1% of the mergers in our sample resulted in increases in both sales and profits, and thus met our criterion for efficiency increasing mergers. A larger fraction of mergers by small firms (34.7%) satisfied our criterion for an efficiency-increasing merger than was true for large firms (23.4%) (difference significant at the 1% level).

Roughly the same fraction of mergers reduced efficiency (cell 4) as increased it. Here, however, there was no difference related to size. Small firms were just as likely to undertake a merger that reduced both profits and sales as were large firms.

A slightly smaller fraction of mergers met our criteria for a market power increase than did so for an efficiency increase. As one expects, large firms accounted for a significantly larger fraction of market power increasing mergers (34.8%) than did small companies (20.4%). Thus, some 85% of the mergers in our sample fall into the three main categories 'efficiency increasing', 'efficiency

Table 10
Classification of mergers by firm size in year $t+5$ (Percent of mergers)

		$\Delta\Pi>0$	$\Delta\Pi<0$
		1	3
	Small	34.7	17.5
$\Delta S>0$	Large	23.4*	12.7*
	All	29.1	15.1
		2	4
	Small	20.4	27.4
$\Delta S<0$	Large	34.8*	29.1
	All	27.6	28.2

$\Delta\Pi>0$ ($\Delta\Pi<0$) denotes that the mergers resulted in a profit increase (decrease) relative to year t and relative to industry and country peers. $\Delta S>0$ ($\Delta S<0$) denotes that the mergers resulted in a sales increase (decrease) relative to year t and relative to industry and country peers. The first number in each cell is for small firms (total sales less than the median in year $t-1$), the second number in each cell is for large firms (total sales more than the median in year $t-1$), and the third number in each cell is the overall proportion. A * denotes that the proportion of small firms is significantly different from the proportion of large firms at the 1% level, two-sided test.

reducing' or 'market power increasing', and they are divided roughly equally across them.

These comparisons leave out the somewhat puzzling cell 3. As we noted in Section 2, this pattern of effects—sales rise and profits fall—is what one might expect of firms whose managers were size or growth maximizers. It is also what one would expect if the mergers led to a decrease in market power using the same logic that we employ to determine increases in market power. Even if one uses this logic to classify mergers in cell 3 as socially beneficial, however, the fraction of beneficial mergers in our study (44.2) falls short of the fraction that is harmful because they either increase market power or reduce efficiency.[21]

[21] Of course, some of the differences between actual and projected profits and sales that we record are small and *economically* insignificant. Thus, some of the mergers falling into each category might be judged to have resulted in small and insignificant increases in market power, etc. An alternative way to proceed would be to define an additional category—no significant difference—where significant difference is interpreted as an economically meaningful difference between the actual and projected values. We made such a classification using a one percentage point difference in profits relative to assets and a 10% difference in sales as our criteria for significant difference. Using these criteria, 3% of the mergers fell into the no difference category for both profits and sales, and 60% of all remaining mergers fell into the three main categories identified in Table 1, with the division among them remaining roughly equal—20% in each cell. Thus, one's judgement as to the *relative* proportions of socially beneficial and harmful mergers is not affected by introducing an additional, no-difference category.

9. Conclusions

We believe that the present study is the first to determine the effects of mergers on efficiency and market power by first separating mergers into those that increase profits and those that reduce them, and then examining the patterns of sales changes following the mergers. Most previous studies have judged the consequences of mergers by examining their average effects on either the profits or sales of the merging companies. As the previous section suggests, our results using these tests are broadly consistent with what others have found. We find that 56.7% of all mergers result in higher than projected profits, but almost the same fraction of mergers results in lower than projected sales after 5 years. Both mean differences are significantly different from zero. Thus, using profits as the measure of success would lead one to conclude that the average merger was a success, using sales one would reach the opposite conclusion. By basing our judgement of the welfare effects of mergers upon criteria that look at both the sales and profits changes following mergers, we have been able to resolve this ambiguity. We predict profit increases and sales declines for mergers that increase market power. More than a fourth of all mergers exhibit this pattern, and this helps to explain why mergers look more successful, when one examines post-merger profits than for post-merger sales. If one categorizes mergers that increase market power or that reduce efficiency as welfare reducing, then a majority of the mergers taking place around the world over the last 15 years appear to be welfare reducing.

Our study is the largest cross-national comparison of the effects of mergers to date. In this respect one of our most interesting findings is how similar the post-merger patterns of profit and sales changes look across the different countries. We also did not find significant differences between domestic and cross-border mergers. Although individual mergers can have quite different consequences in terms of efficiency and market power, their effects do not appear to depend on the country origins of the merging companies.

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