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# 2 Mergers and Acquisitions in the U.S. Economy: An Aggregate and Historical Overview

Devra L. Golbe and Lawrence J. White

## 2.1 Introduction

Mergers and acquisitions in the U.S. economy of the 1980s continue to attract a considerable amount of popular, professional, and political attention. Periodic announcements of mergers between large firms (General Electric and RCA), of hostile tender offers (Mesa and Unocal), and of leveraged buyouts (Beatrice) command the media's attention and comment. The entities are large, the announcements are frequent, and the changes can be unsettling, at least to some.

These changes in corporate ownership and structure need to be placed in a proper historical and analytical perspective. The American economy appears to have experienced major merger waves in earlier eras; the 1980s are not the first such period. A better comprehension of the basic forces motivating mergers and acquisitions may help us understand why they occur more frequently at some times than others. Are these events random, or are there systematic relationships that provide explanations for the patterns that are observed?

This paper is both aggregative and historical in approach. That is, we will not be focusing on individual mergers or on

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cross-section studies of such mergers.[1] Instead, we will focus on aggregate numbers (and, where possible, values) of mergers and acquisitions during relatively short time periods (a three-month quarter or a year) and examine the historical patterns of these aggregates. This approach has been (surprisingly, at least to us) relatively neglected,[2] but it should put short-run events in better perspective and provide a useful supplement to the cross-section studies.

The remainder of the paper is organized as follows: Section 2.2 briefly describes the data that are publicly available for conducting historical analyses and their drawbacks and presents the historical patterns that can be constructed from these data. In section 2.3, we turn to the analytical underpinnings of the merger and acquisition process, and we develop hypotheses that can be tested empirically. In section 2.4 we present the preliminary empirical results of this testing. Section 2.5 offers our conclusions.

## 2.2 The Data, Their Drawbacks, and Some Historical Patterns

### 2.2.1 The Data and Their Drawbacks

To obtain a suitable historical perspective on the current wave of mergers and acquisitions, one needs a long, comprehensive, consistent set of data on mergers and their likely determinants. Unfortunately, no such data series on mergers exists, and we must compromise. Indeed, the data problems are sufficiently important that we believe a detailed discussion of the data is necessary.

One data problem is especially pervasive and warrants preliminary discussion. No data series includes *every* merger and acquisition in the economy; all series have a lower limit on dollar size of transactions that are included. For example, one data series discussed below includes only those mergers in which the acquired firm had assets of $10 million or more. This kind of limitation poses two problems. First, it means that smaller transactions are not recorded. If these smaller transactions tend to follow the same pattern as larger transactions, or if they are, in aggregate, relatively unimportant, than little has been lost. Otherwise, the series may be pro-

viding a misleading picture, and since the transactions below the lower limit are not recorded, there is no way to tell.

Second, if the period covered by the time series was one of significant inflation, then the fixed dollar lower limit will artificially increase the number of recorded transactions over time. In essence, the pattern of rising prices through the time period covered by the series will mean that some transactions of a given real size would fall below the fixed cutoff point in the early years and hence not be recorded. In later years, inflation would drive the nominal value of the same transactions above the cutoff point, so that they would be recorded. The longer the time period covered by a series and the greater the inflation, the more substantial is the problem of a spurious increase in the number of recorded transactions.

Our discussion will first focus on the data available for the period after World War II and then discuss the data for the prewar period.

*Post–World War II*

There are three basic sources of time-series data on mergers and acquisitions for the postwar period: the U.S. Federal Trade Commission (FTC), the periodical *Mergers and Acquisitions,* and the annual reports of W. T. Grimm & Co. We will discuss each of these sources, the nature of the data, and their strengths and drawbacks, in turn.

*U.S. FTC.* The FTC collected and published data on mergers in the manufacturing and mining sectors of the U.S. economy for the years 1948–79.[3] One basic data set covered all mergers in which the acquired firm was in the manufacturing or mining sectors, had at least $10 million in assets (book value), and for which information on the acquisition was publicly available.[4] The FTC published annual figures for both the numbers of mergers and the book value of the assets acquired. It also provided the relevant information on each transaction, so that quarterly series on numbers of mergers and their value could be constructed.

A second FTC series also covered the manufacturing and mining sectors, with annual numbers of merger transactions extending from 1940 through 1979 and quarterly numbers ex-

tending from 1940 through 1954.[5] This second series appears to have been more inclusive than the first, since a far larger number of transactions are registered. But unfortunately, the FTC did not indicate the inclusion criteria for this series.

The FTC data have a number of shortcomings: First, they cover only the manufacturing and mining sectors, which declined substantially in relative importance during the 1948–79 period and currently constitute only a quarter of U.S. GNP. Second, the $10 million lower limit clearly created distortions, since the general price level (as measured by the GNP deflator) tripled over the thirty-two years covered by the data. Third, the series excluded acquisitions by an individual or groups of individuals and hence would appear to exclude most leveraged buyouts of divisions or of whole companies. Fourth, the FTC ceased collecting and publishing these data in 1981 (with 1979 as the last year for which data were made available), so the series does not cover the merger wave of the 1980s.

*The periodical* Mergers and Acquisitions. The quarterly issues of the periodical *Mergers and Acquisitions* (*M&A*) list the number of mergers and acquisitions consummated in recent quarters for the entire U.S. economy. Prior to the fourth quarter of 1980, the lower limit for inclusion in the series was a purchase price of at least $700,000; in that quarter the lower limit was raised to $1,000,000. A quarterly series on domestic companies being purchased (either by domestic or foreign companies) extends from the first quarter of 1967 to the present. A series that also includes domestic companies' purchases of foreign companies extends from the fourth quarter of 1972 to the present. Both series include leveraged buyouts.

The *M&A* series have a number of drawbacks. First, they do not extend as far back as the FTC series. Second, the lower limit for inclusion changed abruptly in the middle of the series and, even so, does not properly adjust for the tripling of prices that occurred during the period covered. Third, integrating or splicing the *M&A* series with the FTC series (so as to create a longer overall series that would be up-to-date) cannot be done easily or automatically, since the series cover different universes and have different criteria for inclusion.

*W. T. Grimm & Co.* W. T. Grimm & Co. publishes data on the number of merger and acquisition announcements in the entire U.S. economy. Their published annual series extends from 1963 through the present; their quarterly series extends from the first quarter of 1974 through the present. The lower limit for inclusion is a transaction involving at least a $500,000 purchase price.

The Grimm data have the same problems as the *M&A* data: a limited historical reach, fixed lower limit for inclusion, and difficulties of integration with the FTC data. Also, the Grimm data pertain to announcements rather than completions.

*Pre–World War II*

The major source of merger data for the period 1895–1920 is the study conducted by Ralph Nelson.[6] Nelson's data appear to cover only the manufacturing and mining sectors. The cutoff limits are not explicit; rather, Nelson relies on financial reporting during the period covered. Nelson provides annual and quarterly series[7] for the number of transactions and the book value of the acquired firms.[8]

For the period 1919–39, Willard Thorpe compiled a quarterly series on the number of mergers in the manufacturing and mining sectors, which is reproduced by Nelson.[9] The criteria for inclusion are unclear. The Thorpe series was continued in 1940 by the broad FTC series discussed in the text above, and the two series appear to be consistent and compatible.

In sum, while data series that include the recent history of mergers and acquisitions exist, they do not extend back far enough to provide adequate historical perspective. The FTC data do provide sufficient historical reach, but they end in 1979. Further, they exclude the service sector, an increasingly important part of our economy. The inconsistencies of the more recent data series with the FTC data complicate statistical inference. In the next section, we provide some graphical representations of the historical patterns in mergers and acquisitions.

### 2.2.2 Some Historical Patterns

Having described the data series and their drawbacks, we now present a summary of the historical patterns they suggest.

The graphs below provide some indication of the consistency of the various data sources as well as an historical perspective on mergers and acquisitions.

The FTC data are a basic source for research in merger activity. Figure 2.1 shows the annual FTC data for the number of large mining and manufacturing mergers and for "all" mining and manufacturing mergers (the broader series). As can be seen, the two series suggest similar patterns in merger activity. Both show an increase in the mid-1950s, a more gradual rise in the late 1950s and early 1960s, and then a sharp increase in the late 1960s (the "go-go" years),[10] followed by a steep decline in the early 1970s and another increase in the late 1970s.

It has been argued that it is the value of assets acquired by merger that matters, not just the number of firms. In fact, figure 2.2 indicates that both sets of data suggest similar patterns. Figure 2.2 shows annual data for both the number of mergers and the real value in 1982 dollars[11] of the assets acquired, as measured by the FTC "large firm" series. Movements in the two series are fairly closely correlated, and both series clearly show the peak of the "go-go" years.

As noted above, the major drawback of the FTC data for our purposes is their failure to include data on the current merger wave. In order to place recent experience in perspective, we need to "splice" the more recent data onto an appropriate FTC series. Figure 2.3 shows the annual number of mergers measured by the "broad" FTC series and by the annual series from the periodical *Mergers and Acquisitions* covering the purchases of domestic companies. These two series appear to track each other reasonably well, with both showing the peak in the late 1960s. The *M&A* series clearly indicates the boom of the 1980s.

Similarly, figure 2.4 presents quarterly data for the number of mergers measured by the FTC "large firm" series and by the *M&A* "domestic firm" series. These series, too, appear to track each other well.

Figure 2.5 allows us to compare the quarterly data from current sources. It presents the Grimm quarterly data on the number of mergers, along with the "domestic firm" quarterly series from *M&A* and the more comprehensive quarterly series

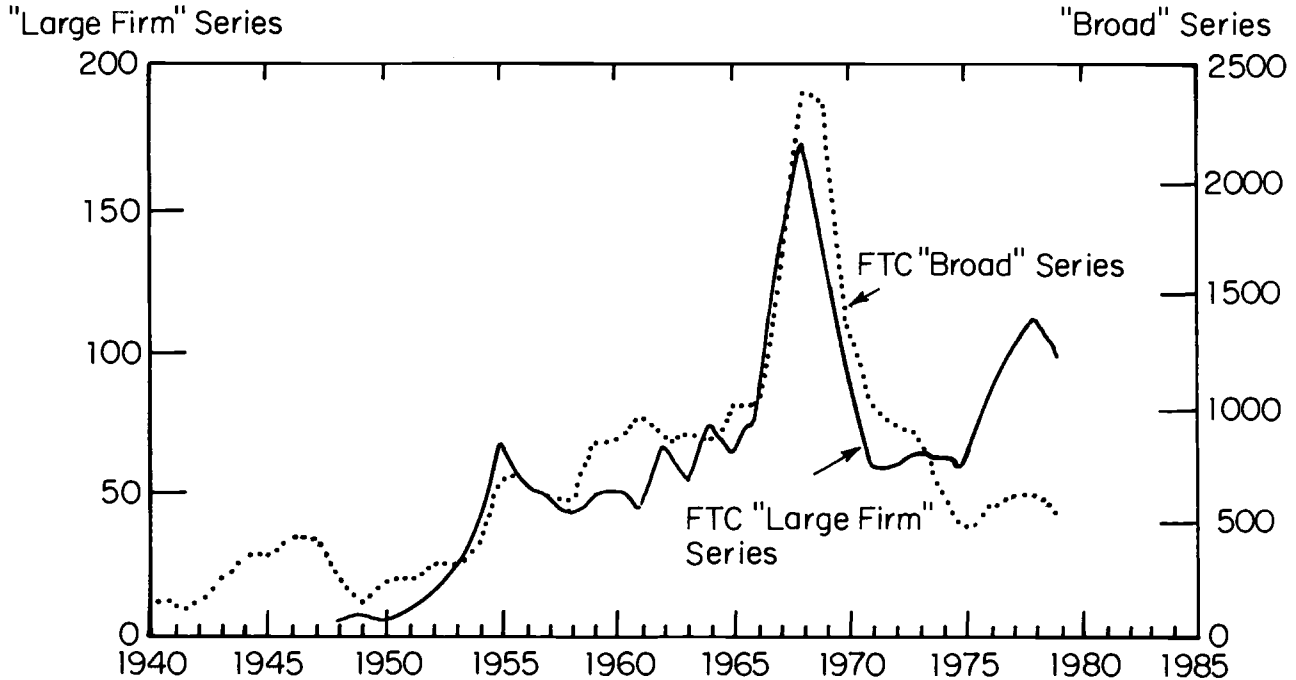


**Fig. 2.1** Annual Number of Mergers and Acquisitions: FTC "Large Firm" and "Broad" Series for Manufacturing and Mining

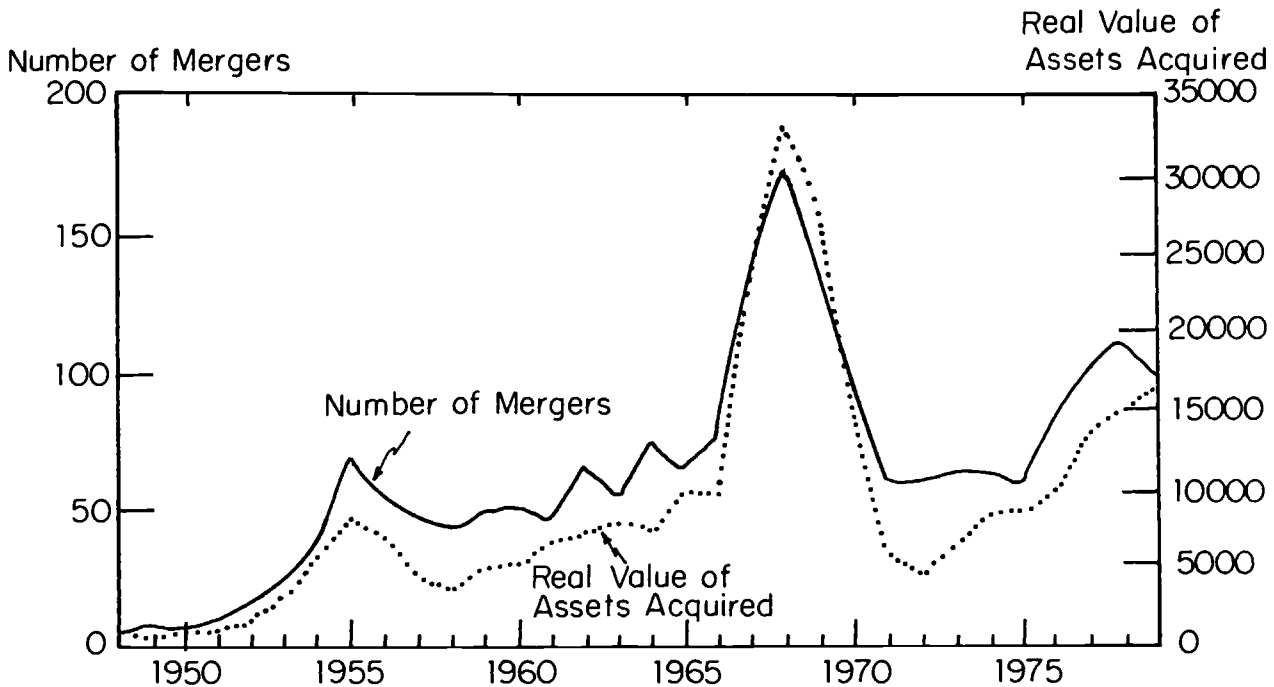


**Fig. 2.2** Annual Number of Mergers and Acquisitions and Real Value of Assets Acquired (in millions of 1982 dollars): FTC "Large Firm" Series for Manufacturing and Mining

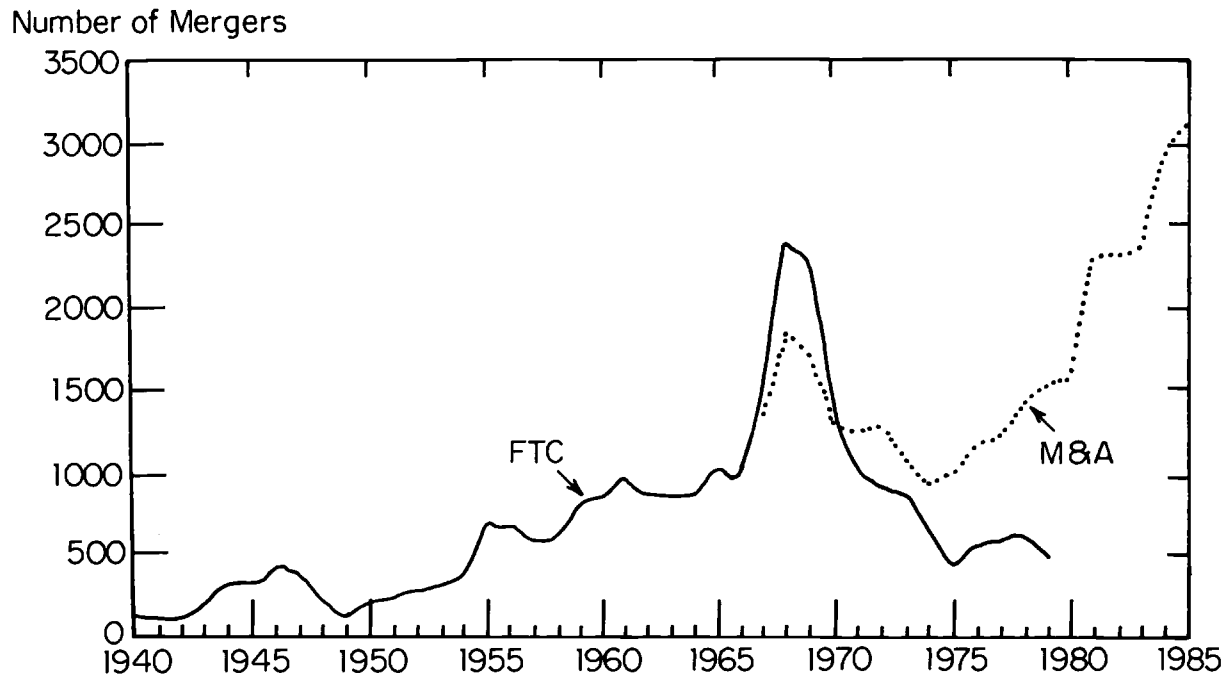


**Fig. 2.3** Annual Number of Mergers and Acquisitions: FTC "Broad" Series and *M&A* "Domestic" Series

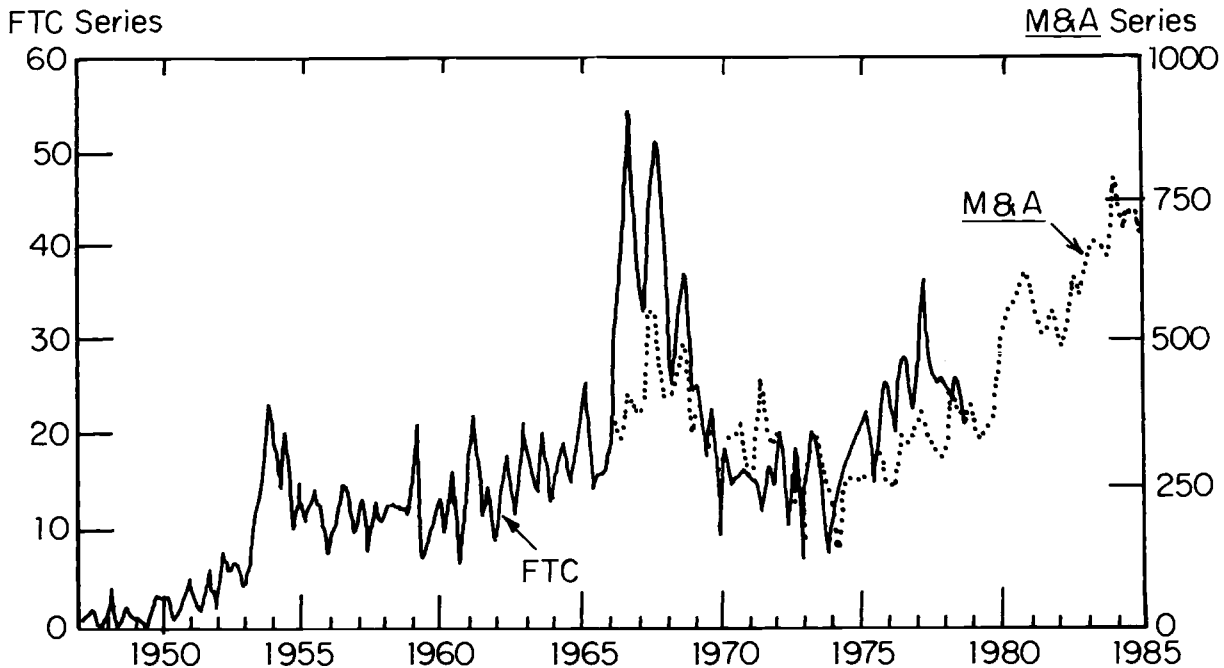


**Fig. 2.4** Quarterly Number of Mergers and Acquisitions: FTC "Large Firm" Series and *M&A* "Domestic" Series

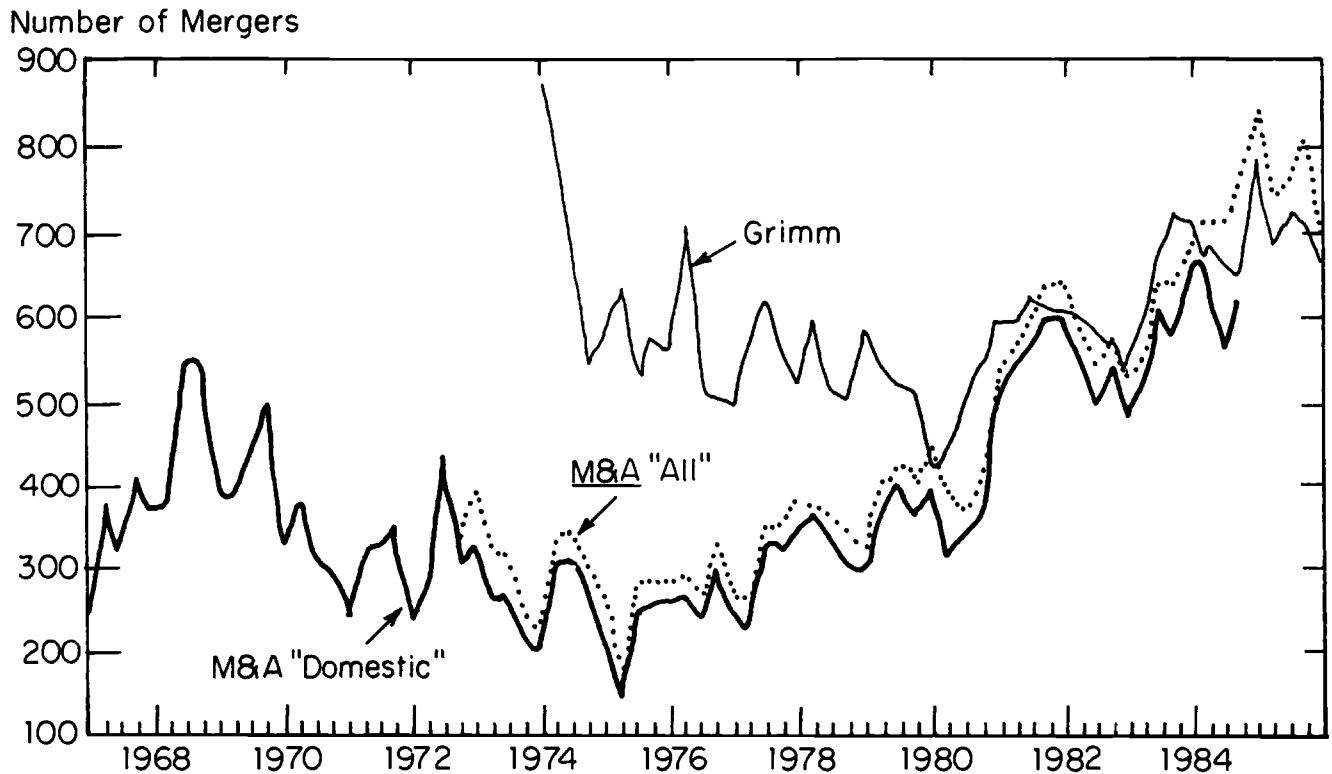


**Fig. 2.5** Quarterly Number of Mergers and Acquisitions: *M&A* "Domestic" Series, *M&A* "All" Series, and Grimm Series

from *M&A*. The two *M&A* series track each other quite well, but the Grimm data diverge markedly from the other two series during the 1970s. The reasons for this divergence are unclear. As was explained above, the Grimm data have a lower cutoff point and pertain to announcements rather than completions. However, it seems unlikely that these differences could account for the divergence.

Finally, a longer perspective is provided in figure 2.6, in which the annual data on the number of mergers from Nelson, from Thorpe-FTC, and from *M&A* "domestic" mergers are all presented. The data show four noticeable peaks or "waves":[12] around the turn of the century, in the late 1920s, in the late 1960s, and in the 1980s.

Thus, the merger wave of the 1980s is not a wholly new phenomenon. Merger activity has been important in earlier periods. Indeed, when placed in the context of the lower real economic activity in these earlier periods, this earlier merger activity was relatively more important. Figure 2.7 provides this context, by dividing the data series shown in figure 2.6 by annual real GNP (in billions of 1982 dollars).[13] In essence, figure 2.7 shows the number of major mergers per billion dollars of real GNP. As can be seen in figure 2.7, the peaks of merger activity at the turn of the century and in the late 1920s were much more important relative to the size of the U.S. economy at the time than was true in the 1980s. Figure 2.8, in which the nominal value of assets acquired is divided by nominal GNP, tells a similar story: the merger wave at the turn of the century was much larger relative to the size of the economy than was the wave of the late 1960s.

## 2.3 Developing Hypotheses

We now turn our attention to the aggregate patterns of mergers and acquisitions described in the previous section. We ask whether there are fundamental economic forces that can explain a significant fraction of the variance in the quarterly or annual aggregate or merger and acquisition activity or whether, instead, this activity is driven largely (or entirely) by factors or elements that are not susceptible to economic analysis.

Our approach (since both authors are economists) is to start

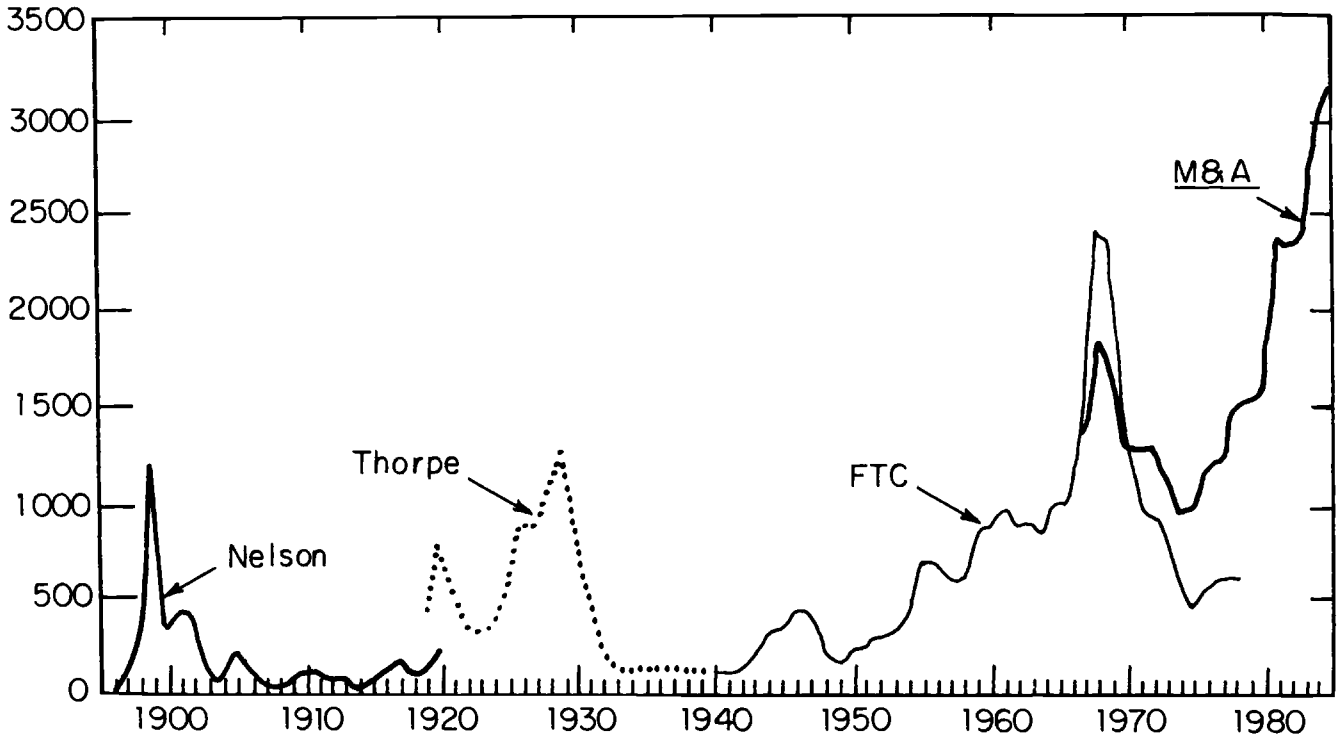


**Fig. 2.6** Annual Number of Mergers and Acquisitions: Nelson Series, Thorpe Series, FTC "Broad" Series, and *M&A* "Domestic" Series

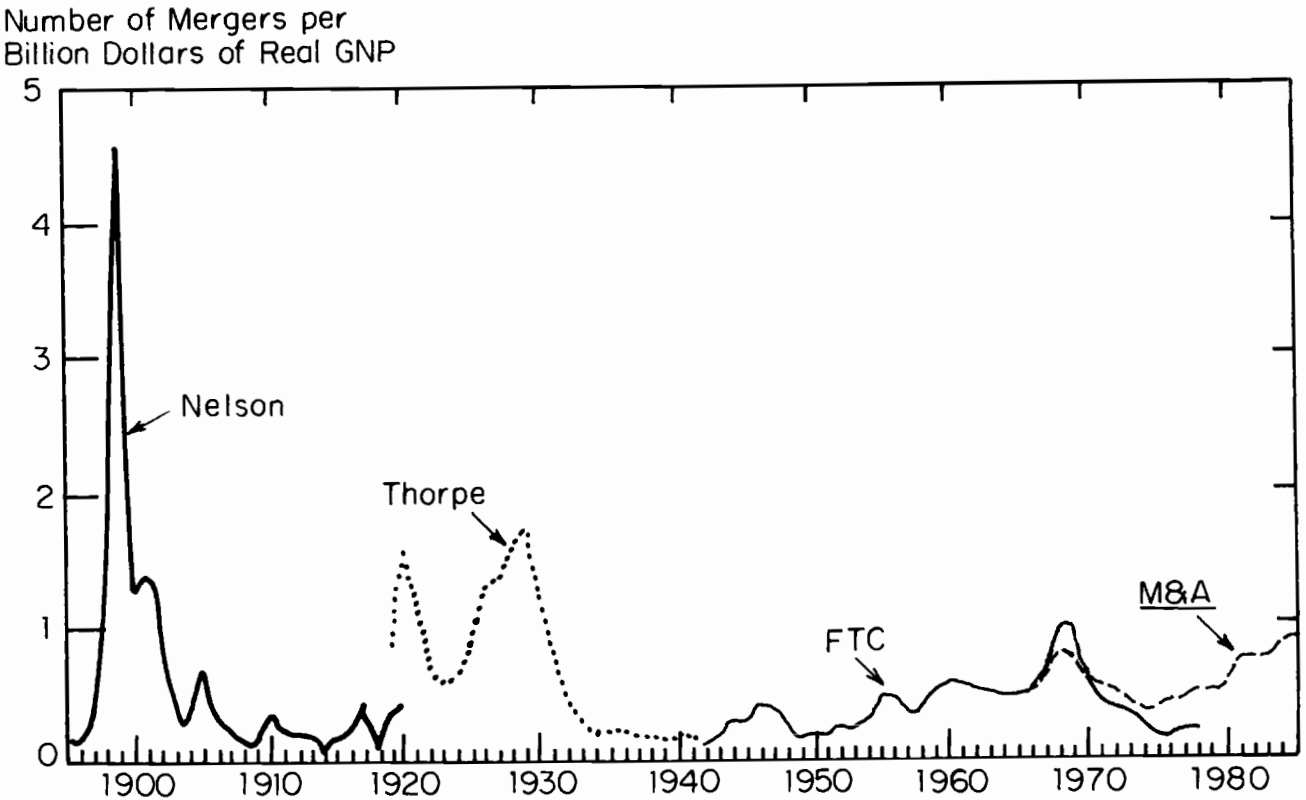


**Fig. 2.7** Annual Number of Mergers and Acquisitions per Billion Dollars of Real GNP (in 1982 dollars): Nelson Series, Thorpe Series, FTC "Broad" Series, and *M&A* "Domestic" Series

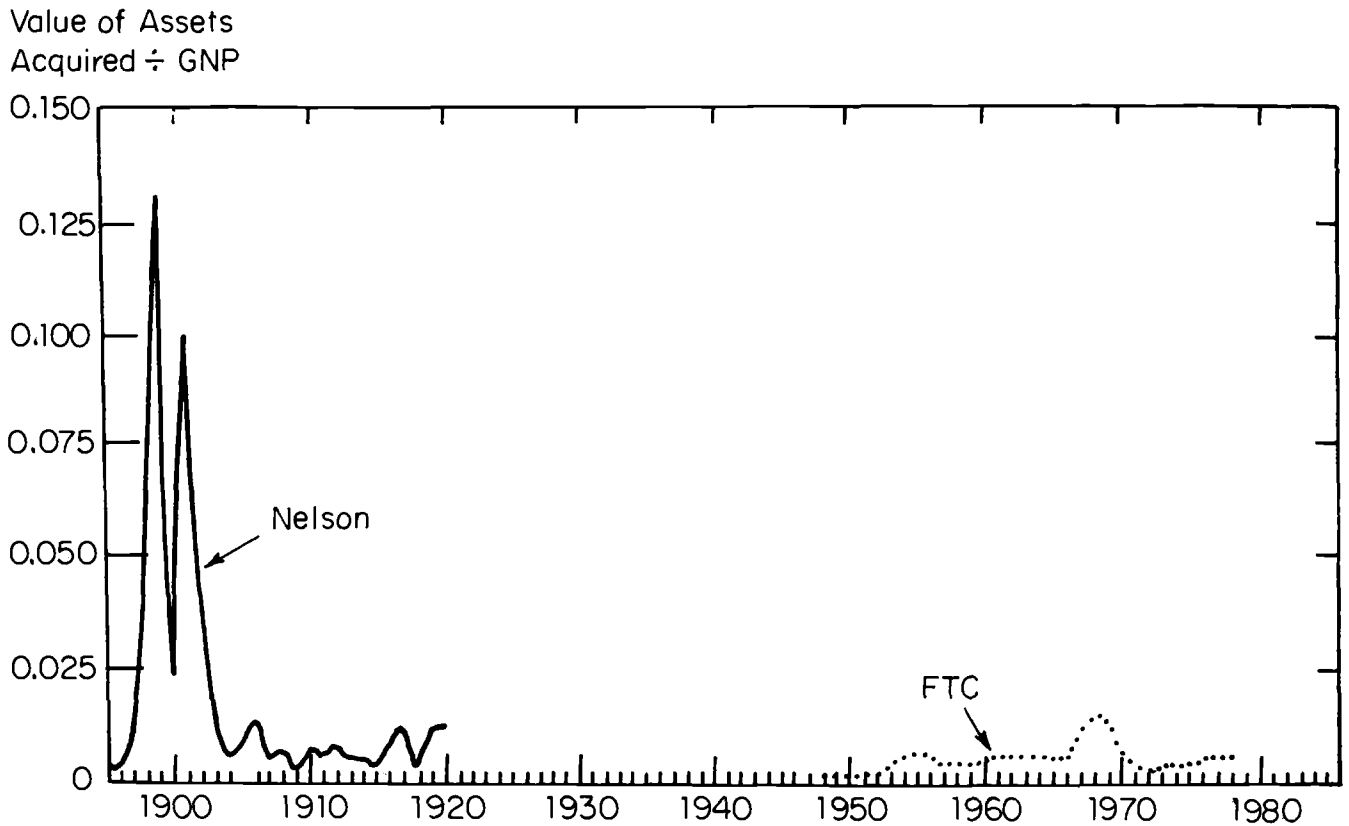


**Fig. 2.8** Annual Value of Assets Acquired Relative to GNP: Nelson Series and FTC "Large Firm" Series

from basic economic principles and develop their implications for merger and acquisition activity. These implications become hypotheses that can be tested through statistical analysis of the relevant relationships among the data series. (A failure to find significant statistical relationships could indicate improper specifications of the hypotheses, poor data for testing, or true randomness in the phenomena being investigated.) In this section we develop the hypotheses; in the following section we report some preliminary efforts at empirical verification.

### 2.3.1 The Determinants of Merger and Acquisition Activity

A merger or acquisition usually constitutes an act of investment by the purchasing firm or individuals. But a merger or acquisition is an *exchange* of *existing* assets (a purchaser pays cash for the plant, equipment, personnel, and goodwill of an existing firm), whereas investment flows (at least, as defined by the GNP accounts) involve the creation of *new* plant and equipment. Consequently, we will focus primarily on the forces that cause individuals or firms to exchange assets among themselves.[14]

Asset exchanges should occur when purchasers believe that current prices for the assets constitute "bargains." One rough indicator of whether a company can be purchased at a "bargain" price would be a comparison of the purchase price with the likely replacement costs of the company's assets.[15] The lower the ratio of the former to the latter (other things being equal), the greater is the bargain, and the greater is the likelihood that some potential purchaser will prefer to buy the company and invest de novo. This ratio of purchase price to replacement cost, when expressed as the ratio of the current stock market value of a company (or of all companies in an industry, a sector, or the entire economy) to its replacement cost, is frequently known as "Tobin's q" or just "q."[16] Thus, the level of q for the economy during a given time period should be an important determinant of the aggregate level of merger and acquisition activity in the same period.[17]

Further, periods during which there are significant amounts of new information or unexpected changes in economic conditions, resulting in greater divergences of opinion among mar-

ket participants as to the future prospects of a company, should be periods of greater aggregate mergers and acquisitions. In essence, when there are greater divergences of opinion, there is a greater likelihood that a prospective purchaser will be more optimistic about a company's future possibilities than will the company's current owner or owners and hence a greater likelihood that a merger or acquisition will occur.

In addition, the real cost of capital (capital costs that have been corrected for expected inflation) should be a determinant of aggregate merger and acquisition activity, since capital costs can influence the timing, financing costs, and expected profitability of these transactions. Tax policy should affect merger and acquisition activity, since various tax policies can affect the prospective profitability of various transactions, and affect it differentially for prospective purchasers and current owners. The overall size of the economy should also affect the level of merger and acquisition activity, since a larger economy will likely have more companies that could possibly merge with each other.

Finally, in the presence of inflation a fixed lower cutoff point for the inclusion of a merger or acquisition into a recorded data series (discussed in section 2.2 above) creates a false impression of an increase in mergers and acquisitions over time. It is necessary to correct for this upward bias over time for any empirical testing of hypotheses.

In summary, then, we expect aggregate merger and acquisitions activity to be related to: the ratio of market value to replacement costs (q); the level of divergence of opinion about future prospects; real interest rates (a proxy for capital costs); tax policy; the size of the economy; and a correction factor for the fixed cutoff point for the inclusion of mergers in data series.

### 2.3.2 Further Considerations of "q"

To the extent that the level of aggregate merger and acquisition activity affects the market value of securities (the numerator of q), there is an interactive or simultaneous relationship between q and the level of merger and acquisition activity; in other words, the level of q affects the level of these transactions, but they, in turn (and simultaneously), affect q.

In order to explain statistically the impact of q on mergers, we must simultaneously consider the determinants of q.

Since q is a measurement of the ratio of prices to costs at one point in time, whereas merger and acquisition activity is measured as a flow over a period of time (a quarter or a year), it is the *change* in q between two points in time that should be affected by the level of merger and acquisition activity during that time period. Further analysis of the components of changes in q between two points in time indicates that other influences—specifically, the level of real GNP, any unexpected changes in real GNP, the level of real interest rates, any unexpected changes in real interest rates, the capital stock at the end of the period, and the value of q at the beginning of the period—should also be important.[18]

Thus, for the purposes of empirical testing of the hypotheses advanced in this section, we need to employ statistical methods that allow for the simultaneous interaction between our two key variables and for the additional explanatory power of the other influences on these two variables.

## 2.4 Some Preliminary Empirical Findings

In this section we report the results of our preliminary efforts to test empirically the hypotheses developed in the previous section.

### 2.4.1 Efforts to Explain the Level of Merger and Acquisition Activity

We focused our attention on a single merger and acquisition data series: the quarterly FTC "large firm" series for 1948–79, which reports the numbers of mergers in the manufacturing and mining sectors in which the assets of the acquired company were at least $10 million and information concerning the merger was publicly available. This series offered us the maximum number of observations and the best overlap with other relevant data series.

As was discussed in section 2.3, periods in which there are greater divergences of opinion about companies' future prospects are also periods in which the level of merger and acquisition activity is likely to be greater. These same conditions

should also cause the volume of trading on stock exchanges to be greater. Thus, we should expect to see a strong positive correlation between the level of merger and acquisition activity and the volume of trading. In fact, the simple correlation between FTC quarterly series and the quarterly volume of trading on the New York Stock Exchange for 1948–79 was $r = 0.52$.[19] Thus, merger and acquisition activity does appear to be driven by the same information and divergence-of-opinion influences that drive stock market trading volume.[20]

The discussion in section 2.3 indicated the other variables that should affect merger and acquisition activity: Tobin's q, real interest rates, tax policy, the general size of the economy, and a correction for the unchanged inclusion cutoff limit. (This last variable, of course, should only affect *reported* merger and acquisition activity.) Tobin's q and tax policy were combined into a tax-adjusted q;[21] as a proxy for capital costs, a real interest rate variable was constructed by subtracting the inflation rate (measured by the percentage change in the GNP deflator) from the interest rate on seasoned corporate Aaa bonds for the same quarter; and the size-of-economy and correction factor variables were proxied together by the level of nominal GNP.

We then applied regression analysis to determine how well these variables performed in explaining the quarterly pattern of mergers and acquisitions. Initially using ordinary least squares regression (which neglects the possible simultaneous relationship between mergers and q, discussed in section 2.3), we found the following results: the tax-adjusted q was positively and significantly related to mergers and acquisitions (contrary to our expectations) as was nominal GNP (consistent with our expectations). Real interest rates were negatively but not significantly related to mergers and acquisitions (consistent with our expectations). The overall explanatory power of the statistical relationship was quite good.[22] Similar results were obtained when two-stage least squares analysis was applied.[23]

### 2.4.2 Efforts to Explain "q"

As was discussed in section 2.3, changes in q from one point in time to another should be related to the following variables:

the level of merger and acquisition activity, real GNP, unexpected changes in real GNP, real interest rates, unexpected changes in real interest rates, the level of q at the first point in time, and the size of the real capital stock at the second point in time.[24]

We applied ordinary least squares analysis to determine how well these variables explained the quarterly pattern of changes in q. We found the following results: The level of merger and acquisition activity and the level of real GNP were both positively but not significantly related to changes in q (the former consistent with our expectations, the latter contrary to them). Unexpected changes in real GNP and real interest rates were both positively and significantly related to changes in q (which was consistent). Unexpected changes in real interest rates and the lagged value of q were both negatively and significantly related to changes in q (consistent). The concurrent level of the real capital stock was negatively (but not significantly) related (consistent). The overall explanatory power of the relationship was good.[25]

Overall, these preliminary results are encouraging. Merger and acquisition activity does not appear to be a random process. Rather, the data indicate that mergers and acquisitions respond to economic influences in some of the ways that we have suggested, although the positive relationship with Tobin's q remains a puzzle. Also, efforts to explain the pattern of changes in q (which are of interest because q itself has a simultaneous and interactive influence on mergers and acquisitions) yielded results that were mostly sensible.

## 2.5 Conclusions

The patterns of merger and acquisition activity are interesting phenomena for economic analysis. A better understanding of these phenomena should improve our knowledge of the operation of capital markets and of the economy in general. In this paper we have described these patterns, developed testable hypotheses, and reported preliminary empirical findings. We have also discussed the criticisms that have been directed at merger and acquisition activity.

We believe that merger and acquisition activity can be largely explained by the theoretical and empirical tools of economic

analysis and that our findings point in a sensible direction. We expect that future work in this area should expand the base of knowledge and understanding about these processes.

## Notes

We would like to thank Charles Larson for his research assistance.

1. For recent cross-section studies, see Harris et al. (1982), Wansley et al. (1983), Hasbrouck (1985), and Knoeber (1986).
2. The only recent work of which we are aware is that of Melicher et al. (1983) and Shugart and Tollison (1984). An older literature can be found in Markham (1955) and Nelson (1959).
3. The last report, covering 1979 and earlier years, is U.S. FTC (1981).
4. Curiously, the FTC published information on the value of acquired assets in mergers including those for which public information was not available, but it did not publish annual data on the numbers of these mergers.
5. The annual data can be found in U.S. Department of Commerce (1976) and various annual issues of the FTC's *Statistical Report on Mergers and Acquisitions*. The quarterly data can be found in Nelson (1959, 167–69).
6. See Nelson (1959).
7. Unfortunately, the annual and quarterly series are not consistent with each other. The annual series appears to be more complete.
8. Nelson describes these as "disappearances" and as "capitalizations," respectively.
9. See Nelson (1959, 166–67).
10. See Brooks (1973).
11. The GNP deflator, with 1982 = 1.0, was used to deflate the nominal dollar series.
12. Shugart and Tollison (1984) argue that the historical pattern of mergers and acquisitions is best described as a first order autoregressive process, with drift, and that their results are inconsistent with a characterization of the pattern as one of waves. Since they never formally define waves nor formally test a wave hypothesis, we are not convinced by their latter claim.
13. Ideally, we would like some measure of the potential number of mergers in any period. Absent a reliable measure of the number of business enterprises, we use GNP as a proxy.
14. A merger or acquisition of a firm usually entails one extra element—control over management—that other exchanges of assets (e.g., purchases of smaller blocks of shares in a company) do not have. For a discussion of the influences on the trading volume of shares of stock, see Epps (1975), Epps and Epps (1976), Verrecchia (1981), Tauchen and Pitts (1983), and Smirlock and Starks (1985).
15. To the extent that replacement costs only encompass physical assets, this type of measure will ignore intangible goodwill.
16. This ratio is frequently associated with the work of economics Nobel prize winner James Tobin. See Tobin (1969).
17. This approach is consistent with recent cross-sectional findings on the characteristics of takeover targets. See Hasbrouck (1985). Since q is the ratio of market value to replacement cost, "bargains" should appear

when market value is low relative to replacement costs, and hence merger and acquisition activity should be negatively related to q. By contrast, Melicher et al. (1983) predict a positive relationship between mergers and stock market prices. They believe that higher stock market prices are indicators of expectations of prosperity and that the latter are conducive to merger activity. Their justification for this latter link, however, is never fully stated.

18. If we let i = 1,2 represent points in time and $q_i = V_i/K_i$, where V is market value and K is replacement costs, then it is easily shown that $\Delta q = q_2 - q_1 = (\Delta V - q_1 \cdot \Delta K)/K_2$. $\Delta K$ is current investment (I), and the influences mentioned in the text (other than $q_1$ and $K_2$) are the behavioral determinants of $\Delta V$ and I.

19. The simple correlation between mergers and the natural logarithm of stock market volume was r = 0.66.

20. It has been suggested that trading volume might be considered as a proxy for these information and divergence-of-opinion influences and thus be used as an explanatory variable for the level merger and acquisition activity. However, Verrecchia (1981) argues that, in general, we cannot infer lack of consensus from trading volume. Hence, we have not included trading volume in the analysis below.

21. This variable can be found in Bernanke et al. (1985).

22. Adjusted $\bar{R}^2$ was 0.74.

23. The additional instruments for the second stage estimation of q were real GNP and the size of the real capital stock, plus the appropriate lagged variables.

24. All variables are on a quarterly basis. The tax-adjusted q and real interest rate were constructed as before. The series for unexpected changes in real GNP and in real interest rates were constructed from first-order Box-Jenkins procedures. See Box and Jenkins (1976). The real capital stock came from the Citibase data file.

25. Adjusted $\bar{R}^2$ was 0.15.

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