

THE US ANTITRUST SYSTEM AND RECENT TRENDS IN ANTITRUST ENFORCEMENT

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Abstract. This paper provides a survey of recent research on the US antitrust system. First we provide an overview of the US antitrust system, describing the roles of the US Department of Justice, the Federal Trade Commission and case law. Second, we provide a new econometric trend analysis on the enforcement of US antitrust law, showing that (1) enforcement demonstrates some trend behavior, as well as comovement with business cycles; (2) the time series of antitrust cases demonstrates two distinct episodes, which we characterize as 'pre-deregulation' and 'post-deregulation'; (3) the time series of government antitrust filings leads the time series of private antitrust filings. Finally, we describe recent economic research relevant to the area of antitrust and the impact of this research on US antitrust policy.

Keywords. US antitrust system; Antitrust enforcement; Time-series analysis

1. Introduction

This paper provides a survey of recent research on the US antitrust system and introduces econometric trend analysis on US antitrust enforcement that, to our knowledge, has not been performed before. The paper begins with a summary of antitrust law as it has evolved in the US over the past hundred years. This historical perspective is presented in section two. The paper is specifically written for non-specialists; we do not assume that the reader is fully conversant with the institutional framework of the US system. Recent trends in the number of

antitrust cases filed in the US and the statistical properties of these trends are presented in section three. The laws governing price-fixing; monopolization and price discrimination; horizontal mergers; and vertical mergers and restrictions are reviewed in sections four through seven. Each section discusses, in addition to the relevant laws, relevant economic concepts and definitions. We spend considerable time on the impact of the level of antitrust enforcement on the economy to set the stage for our discussion of how economists have formulated models to explain strategic behavior in the presence of regulatory restraint. New developments in economic research relevant to antitrust are presented in Section 8. The summary and conclusions of the paper are provided in Section 9.

2. Major antitrust laws of the United States

The first federal antitrust law of the United States, the Sherman Act (15 USC 1 *et seq.*), was passed in 1890. It has two main provisions: Section 1 of the Sherman Act outlaws any 'contract, combination, ... or conspiracy, in restraint of trade ...', e.g. price fixing; Section 2 of the law prohibits monopolization. It should be noted here that, while firms' attempts to monopolize an industry are proscribed by the Sherman Act, the act of holding a monopoly position is not itself illegal. In 1914, two other pieces of legislation were enacted: the Clayton Act (15 USC 12 *et seq.*) and the Federal Trade Commission (FTC) Act (15 USC 41 *et seq.*). The Clayton Act, together with its amendments discussed below, forbids price discrimination (including discrimination in rebates and discounts), mergers, tying arrangements and exclusive dealing or boycotts. The FTC Act established an independent Federal Trade Commission and gave it the authority to make and enforce policies regulating 'unfair methods of competition' and deceptive trade practices. The above three statutes, together with a few significant amendments, constitute the core of the US antitrust law.

Since its enactment in 1914, three amendments to the Clayton Act have significantly affected the scope of antitrust law in the US. In 1936, the Robinson-Patman Price Discrimination Act amended Sections 2 and 10 of the Clayton Act (15 USC 13 and 21). As we discuss in more detail later, Robinson-Patman is anti-discriminatory in name only, being frequently at loggerheads with the economic notion of price discrimination. The effect of Robinson-Patman has diminished substantially in recent years, as Hovenkamp (1985) notes, since 'the Department of Justice has not enforced the Act since 1977, and the Federal Trade Commission has all but abandoned it as well'.

In 1950, the Celler-Kefauver Antimerger Act amended Section 7 of the Clayton Act (15 USC 18), tightening the notion of cross-ownership among firms. Prior to Celler-Kefauver, many firms had successfully circumvented the original Clayton language by taking advantage of the fact that, while stock transactions among competitors were prohibited, asset transactions were not. Economic theory (as we will see in the section on recent economic research) does not provide a clear message to policymakers regarding the welfare effects of increased market concentration. To the extent that increased market concentration facilitates

explicit or tacit collusion, Section 7 as amended probably enhances welfare. However, to the extent that it prevents marginal cost-reducing mergers from occurring, it may also decrease welfare. Section 7 and the Celler-Kefauver amendment should therefore be viewed as embodying one, not universally held, view of the relationship between market concentration and welfare. As a result, this legislation may sometimes have undesirable consequences.¹

Finally, in 1976, the Hart-Scott-Rodino Antitrust Improvements Act (15 USC 18a; Section 7a of the Clayton Act) significantly altered the roles of the Department of Justice (DOJ) and the FTC in antitrust enforcement. As a result of this amendment, any merger which occurs between firms of sufficient size is now subject to formal review by the DOJ or the FTC.^{2,3} As Coate and Kleit (1996) note, this formal review has had the simultaneous effects of changing the role of the DOJ and FTC in US antitrust policy from one of law enforcement to one of regulation, and of increasing the importance of the agencies' Joint Merger Guidelines.⁴ The Guidelines were first issued in 1968 and have been subsequently reissued in 1982, 1984, and 1992. While it has been argued that Hart-Scott-Rodino merely codified rules already in place at the DOJ and FTC, a GAO report (US General Accounting Office, 1990) on the Antitrust Division, citing the Division's policy manual, suggests that the new law in fact had a significant impact on the process by which cases came to the attention of the two enforcement bodies:

... until 1978, the Division investigated proposed mergers identified through the complaints of attorneys, citizen information, or reports in the trade press. This often made it difficult for the Division to investigate proposed mergers fully before they were consummated ... This 'premerger notification program' became effective in 1978 upon promulgation of regulations in accordance with the act. (pp. 11–12)

Moreover, as indicated above, the Merger Guidelines have been changed many times since their inception. The fact that, in contrast, the thresholds for review were codified as law and stand unchanged as of this writing therefore seems significant.

The main provisions of the six antitrust laws mentioned above are laid out in Table 1.

It is important to note that the antitrust statutes only proscribe certain business practices, they do not set out the goals of federal antitrust policy. The position that the only economic goal of antitrust policy should be to promote economic efficiency now has many adherents among economists, judges and practitioners. The current attitude of the Supreme Court toward the role of antitrust legislation in protecting individual firms is adequately expressed in *Spectrum Sports v. McQuillan* (506 US 447, 458 1993),

The purpose of the [Sherman] Act is not to protect businesses from the working of the market; it is to protect the public from the failure of the market. The law directs itself not against conduct which is competitive, even severely so, but against conduct which unfairly tends to destroy competition itself.

Table 1. Main provisions of the antitrust laws.

Legislation	Main Provisions
Sherman Act (1890)	Outlaws 'contract, combination, ... or conspiracy, in restraint of trade' and acts of monopolization.
FTC Act (1914)	Established an independent commission with the power to make and enforce rules forbidding unfair or deceptive trade practices.
Clayton Act (1914)	Forbid specific practices — price discrimination, tying agreements or exclusive dealing, mergers of stock involving competitors, and interlocking directorates — which might tend to lessen competition. Law could be enforced by either the Department of Justice or by the FTC.
Robinson-Patman Act (1936)	Amended the Clayton Act on price discrimination where the effect may be injury to competition involving either the grantor or recipient of the discriminatory price.
Celler-Kefauver Act (1950)	Amended the Clayton Act, forbidding any merger (of stock or assets) between any two firms (whether actual competitors or not) where the effect may lessen competition.
Hart-Scott-Rodino Act (1976)	Amended the Clayton Act, requiring explicit review by the Department of Justice or FTC of any merger between sufficiently large firms.

Historically, however, federal antitrust policy has had a variety of social and political goals in addition to its economic goal. As Hofstadter (1965) notes

The goals of antitrust were of three kinds. The first were economic: the classical model of competition confirmed the belief that the maximum of economic efficiency would be produced by competition, and at least some members of Congress must have been under the spell of this intellectually elegant model, insofar as they were able to formulate their economic intentions in abstract terms. The second class of goals was political; the antitrust principle was intended to block private accumulations of power and protect democratic government. The third was social and moral; the competitive process was believed to be a kind of disciplinary machinery for the development of character, and the competitiveness of the people — the fundamental stimulus to national moral — was believed to need protection (pp. 199–200).

Both the DOJ and the FTC are statutorily responsible for enforcing US antitrust laws. While all criminal cases are the province of the DOJ, the division of merger cases between the two bodies is typically along industry lines: the FTC has acquired expertise in the areas of professional services, food and energy; the DOJ

typically handles cases in the areas of telecommunications, computers and chemicals. The allocation of cases has shifted over time, however, as both industry expertise and staff availability has changed. The agencies have recently developed joint guidelines in the area of health care.

The fact that the DOJ (an executive branch agency) and FTC (an independent commission) share responsibility for the enforcement of US antitrust laws is, in part, a consequence of a national desire to reduce the influence of the President on antitrust enforcement. Thus, the federal antitrust system reflects the more general system of checks and balances among the three branches of US government. The President controls antitrust policy to the extent that he or she nominates both the Attorney General and the commissioners of the FTC. On the other hand, each FTC commissioner serves for a seven-year term, no more than three commissioners may be from the dominant political party, and both FTC commissioners and the Attorney General must be approved by Congress. Moreover, Congress controls the FTC's budget.⁵ The FTC is therefore less influenced by presidential policies, increasing the independence of the federal antitrust enforcement system. Of course, private firms and consumers can (and do) also file antitrust suits and most states have their own collections of antitrust laws.

The judicial branch also plays a role in antitrust through an accumulated body of case law. As Posner (1976) notes, the federal antitrust statutes are brief and readable, while containing very little contextual information which would allow one to correctly interpret the most important operative phrases (e.g. 'restraint of trade' and 'substantially lessen competition'). Therefore, the case law provided by years of judicial interpretation of the federal antitrust laws plays an extremely important role in the federal antitrust system. In deciding the legality of a firm's conduct in the marketplace, two principles have guided the US courts. The *per se* rule, which continues to apply to pricing fixing and certain types of vertical restrictions, means that, if a firm is found to have engaged in one of these activities, the activity cannot be defended on other grounds (e.g. efficiency). The rule of reason, on the other hand, examines an activity as it functions in the marketplace. Horizontal mergers are now subject to the rule of reason, and the current Merger Guidelines are quite clear regarding what sorts of 'extenuating circumstances' the FTC and DOJ will take into account before deciding to bring a case. Currently, the rule of reason also applies to cases involving monopolization and price discrimination.

The distinction between the two rules lies principally in the evidentiary burden each imposes on the parties to the litigation. Under the *per se* rule, the plaintiff need only demonstrate that the defendant engaged in proscribed conduct. Under the rule of reason, on the other hand, the plaintiff must further argue that this conduct actually harmed the plaintiff or society. As an example, under the *per se* rule, a proven price fixing arrangement between two competitors which failed to raise the market price would be judged to be illegal on its face, and the defendants found guilty. Alternatively, if price fixing were subject to the rule of reason, the fact that the defendants collectively failed to raise the market price might lead to their acquittal.

Penalties for violations of US antitrust law vary between the DOJ and FTC. As mentioned above, the DOJ is responsible for all criminal prosecutions under the Sherman Act, which is the only US antitrust statute which carries criminal penalties (up to 3 years in prison). Civil remediation sought by the DOJ in antitrust cases (under either the Clayton or Sherman Acts) is in the form of fines plus attorney's fees up to a specified statutory limit (currently \$350 000 for an individual and \$10 million for a corporation). The FTC's jurisdiction is arguably slightly more broad, in that all 'unfair methods of competition' fall under its purview. It is, however, also significantly more limited in the remediation it may seek. Pursuant to Section 5 of the FTC Act, the FTC may seek only a 'cease and desist' order against the offender. For penalties in private antitrust claims, the US has adopted the 'treble damages' doctrine, under which a defendant convicted of violating the antitrust laws must pay the plaintiff three times the amount of actual damages plus attorney's fees.

3. Recent trends in US antitrust enforcement

In this study, we consider US antitrust enforcement over the years 1942–1995. As a starting point, Table 2 indicates the number of cases brought, both US and private, as a function of time. Data are taken from Viscusi, *et al.* (1995, p. 65) with supplemental years provided by the US Department of Justice, Antitrust Division. Clearly, the number of cases brought has fluctuated significantly over recent years. Because our concern is with the effect of enforcement on this time series, we will briefly survey antitrust enforcement over the years 1942–1995, identify a few alternative causes for the observed variation in the number of cases brought, and conclude with three stylized facts characterizing the impact of enforcement on antitrust filings.

In its over 100 years of antitrust history, the United States has undoubtedly had the toughest and most vigorously enforced antitrust statutes in the world. The periods 1900–1910 and 1935–1950 were particularly favorable to stronger antitrust legislation. In discussing the enforcement of these laws, we will concentrate primarily on the FTC. As an executive branch, the DOJ's enforcement of antitrust has largely followed the political leanings of the executive branch. Between 1942 and 1950, both the FTC's jurisdiction and authority expanded. The jurisdiction of the FTC expanded in 1938 with the passage of the Wheeler-Lea Amendment to the FTC Act, which entitled the FTC to rule on marketing and advertising practices. More importantly, however, the authority of the FTC expanded over this period as a consequence of several favorable court decisions and a 1950 action by Congress defining each day a firm stood in violation of a cease-and-desist order by FTC to be a separate violation. Finally, some of the increased power of the FTC may be attributed to the stability of the composition of the Commission over this period. The composition of the Commission did not change from 1935 to 1945, and four of the members served on until nearly 1950. A detailed account of the activities of the FTC over this period may be found in Wagner (1971).

Table 2. Number of private and government antitrust cases in the United States — 1942–1995.

Year	Number of Private Cases	Number of Government Cases	Year	Number of Private Cases	Number of Government Cases
1942	70	35	1971	1445	60
1943	40	24	1972	1299	80
1944	50	12	1973	1152	54
1945	27	20	1974	1230	40
1946	68	18	1975	1375	56
1947	64	33	1976	1504	51
1948	78	19	1977	1611	47
1949	162	39	1978	1435	42
1950	157	42	1979	1234	50
1951	209	37	1980	1457	39
1952	261	20	1981	1292	60
1953	212	16	1982	1037	29
1954	163	21	1983	1192	21
1955	209	33	1984	1100	24
1956	227	30	1985	1052	30
1957	188	38	1986	838	39
1958	270	33	1987	758	27
1959	250	23	1988	654	28
1960	228	60	1989	639	19
1961	378	42	1990	452	20
1962	266	39	1991	650	31
1963	283	49	1992	488	18
1964	317	59	1993	545	18
1965	443	38	1994	695	22
1966	444	35	1995	773	34
1967	536	39			
1968	659	48			
1969	740	43			
1970	877	52			

In 1950, the jurisdiction of both the DOJ and FTC increased with the passage of Celler-Kefauver. The antitrust enforcement bodies now had the authority to investigate both stock and asset transactions among firms. During the 1960s, under the leadership of Chairman Paul Rand Dixon, the FTC began a concerted effort to improve its relationship with the business community. In part, this came in the form of reduced enforcement. Toward the end of the decade, however, analyses by a group closely associated with Ralph Nader and by the American Bar Association concluded that the FTC had allowed itself to become mired in detail and that significant reform would be necessary to renew the effectiveness of the Commission as an antitrust enforcer. In 1969, Caspar Weinberger took over this reform, dropping a number of cases and significantly reorganizing the FTC. The 1950s and 1960s also brought changes to the Department of Justice. The Eisenhower Administration was heavily influenced by John M. Clark's somewhat

questionable theory of 'workable competition', culminating, as Peritz (1996) notes, in the *Report of the Attorney General's National Committee to study Antitrust Laws* in 1955. Clark's work is widely recognized to be problematic, in part because nearly every possible market structure could be shown to be 'workably' competitive. As such, it was at odds with the significantly more interventionist theory of monopolistic competition. In the late 1960's, the Antitrust Division's policy again underwent a revision when Don Turner brought economists Kenneth Elzinga, Leonard Weiss and Oliver Williamson in to review the Department's antitrust enforcement policy.

In 1980, the level of US antitrust enforcement was dramatically relaxed. One element of the Reagan agenda was to reform antitrust, to reduce what was regarded as government hostility toward firms. In addition, the Reagan and Bush administrations believed that antitrust reform would both stimulate the economy and increase the competitiveness of US firms. Getting the FTC to abandon its perceived social policy agenda — protecting small business and preserving low levels of market concentration for its own sake — in favor of an economic policy agenda encouraging efficiency, was viewed as a special goal. An important step in this direction was the appointment of two economists, James C. Miller III and George W. Douglas, as commissioners. Also important was the appointment of William Baxter, an attorney with a background in economics, as chief of the Antitrust Division of the Department of Justice. The change in regime is adequately expressed by a 1982 interview with Baxter in the *Wall Street Journal*, where he is quoted as saying, 'the only goal of antitrust is economic efficiency'. (*Wall Street Journal*, March 4, 1982, p. 28.)

The Clinton Administration initially moved toward a tougher antitrust policy, although recently has somewhat reversed course. Anne Bingaman, the chief of the Antitrust Division during Clinton's first term in office, took on many big cases in the high-tech, retailing and medical insurance industries. For example, during this period the DOJ began an investigation of Microsoft, on the basis of a series of claims of 'unfair methods of competition'. In the period following 1994, however, when Republicans took control of Congress, we have again seen some relaxation in the government's review of merger activity, although the prosecution of unfair business practices appears to be largely unchanged (e.g. the recent Intel, Microsoft and Toys-R-Us cases). In fact, Bingaman's successor, Joel Klein, recently said that he will aim to reduce government regulation of business (*Business Week*, October 7, 1996, p. 36).

While the vigor with which the US has pursued enforcement of its antitrust statutes is certainly a major factor in the number of antitrust cases brought, there are nonetheless many other factors affecting antitrust filings.

One noticeable trend in US antitrust enforcement is that it is increasingly impacted by competition and trade policies of other countries. Trade friction between the US and Japan, the US and China, and the US and the EU makes news almost every day. We often hear countries complaining that their trading partners are not providing fair access to their domestic markets. Martin (1994) drew the following interesting analogy between state antitrust laws in the United States

before the passage of the Sherman Act and national competition policies today:

In the national US economy of the late nineteenth century, it was straightforward for national corporations to play one state against another and neutralize state antitrust policies. In the world economy of the late twentieth century, it is straightforward for world corporations to play one nation against another and neutralize national competition policies. (p. 561)

In his recent book, entitled 'Competition Policies for an Integrated World Economy', Scherer (1994, Chapter 5) urges for the establishment of an International Competition Policy Office within the new World Trade Organization in order to coordinate competition policies of different countries, and to resolve potential conflicts between competition policies and trade policies. The new chief of the Antitrust Division of the Justice Department, Joel Klein, claims that he is willing to cooperate with other countries to fight global cartels (*Business Week*, October 7, 1996, p. 36). In the future, domestic antitrust policy must clearly keep an eye to the international market in which it operates.

Second, the expected penalty from violating the antitrust laws depends not only on the likelihood of getting caught, but also on the punishment meted out to those who do. Since the fines imposed on corporations convicted of violating the antitrust laws have gone up substantially, one would expect somewhat fewer violations, and fewer cases. Third, the fact that the economy is one and three-quarters times as large as it was twenty years ago is certainly significant. Fourth, the government's burden in proving recent cases is likely to be larger than the number of filings alone would indicate, because firms use increasingly sophisticated economic and econometric theory in defending their claims. Fifth, the budgets of both the DOJ and FTC are subject to political forces which vary over time. Like most other government organs, consequently, they have been forced to trim or reorient many of their programs in the face of reduced federal funding since 1980.⁶ Finally, the number of corporate amnesty programs has increased enormously.

The time series of (post-War) government and private antitrust cases demonstrate some key stylized facts or common features which we summarize as follows:⁷

1. The level of enforcement activity, as evinced by the time series for either the number of government or the number of private cases, displays both trend behavior and possible comovement with business cycles.
2. Another feature is that these series appear to correspond to two distinct episodes. It has previously been argued that both the FTC and DOJ underwent a major review and reorganization in the late 1960's. Defining the years prior to and following 1970 to be two distinct periods, we find that during the first period, both government and private case filings experienced an upward trend. Moreover, this upward movement is reasonably well characterized as a linear trend rather than a constant growth curve. During the second period, the two series depict a downward linear trend. Based on this finding, and on the history of antitrust enforcement described above, one is tempted to refer to the first period as 'pre-deregulation' and to the second as 'post-deregulation'.

3. The third stylized fact is that the time series on government filings leads the time series on private filings, but that these two series are both reasonably well approximated as an integrated process of order one, that is, a first-difference transformation of each series produces a stationary process. Furthermore, a specific linear combination of the time series of government and the time series of private antitrust filings appears to form a stationary process. That is, a cointegration or an equilibrium relation between these two series has some empirical support. In layman's terms it appears that the quantity of private filings, unsurprisingly, serves as a response function to the quantity of government filings.

3.1. Trends in the number of antitrust cases

In this section, we document the first two of the three stylized facts described above, those related to trends in the number of government and private cases over the post-War period, 1942–1995. The time plot of the number of government and private cases for the full sample period, 1942–95, as well as each of the two sub-periods 1942–69 and 1970–95 are given in Figures 1, 2 and 3. While there is no visible deterministic trend in either the series of government or of

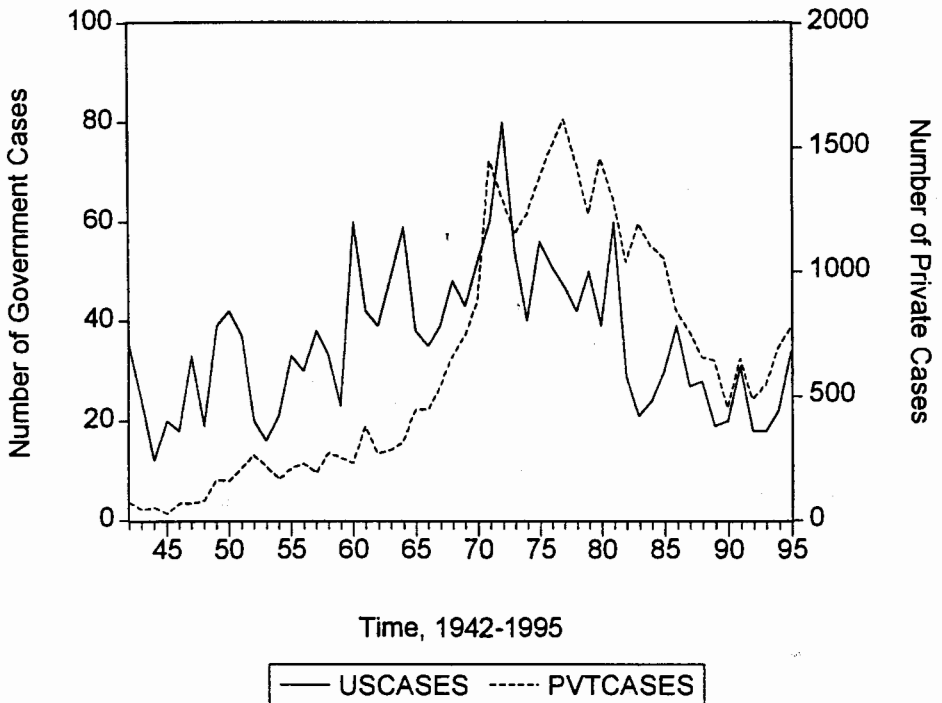


Figure 1. Time plot of the number of government and private cases, 1942–1995.

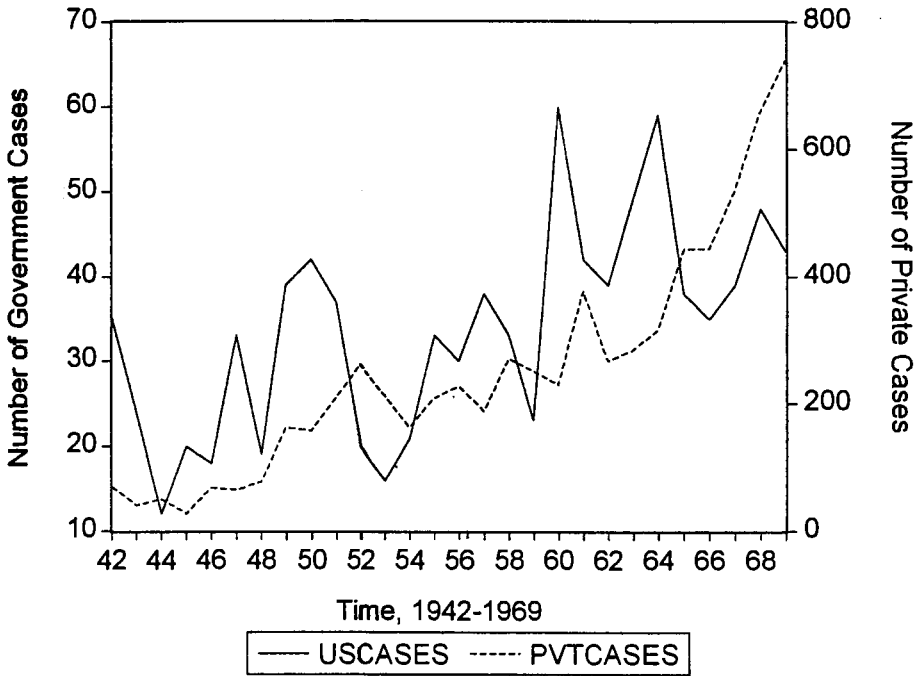


Figure 2. Time Plot of the number of government and private cases, 1942-1969.

private cases for the full sample when the post-War period is viewed as an outcome of a homogeneous stochastic process, support for an upward trend in each series during the years 1942-69 does exist. Also, there is evidence for a downward trend in each series during the years, 1970-95. In view of this, one plausible premise is that the number of antitrust filings in each of the two sub-periods corresponds to a distinct regime or episode. As indicated above, these two episodes roughly correspond to the 'pre-deregulation' and 'post-deregulation' eras. While it is difficult to be sure, the pre-deregulation philosophy may have been largely based on a market failure view of the economy, which legitimized a variety of tough antitrust enforcement initiatives toward smaller units. In contrast, the post-deregulation era began with a reexamination of the market failure philosophy once it became clear that not every remedial measure under the market failure philosophy would necessarily produce the desired outcome. Failure to attain the desired outcome might occur because of rent seeking activities by the interest groups or because of poor incentives in the government, or a combination of the two. Such failures are collectively known as government failure as opposed to market failure.

An alternative display of the trend information from Figures 1, 2 and 3 may be found in Figures 4, 5 and 6, scatter plots of the number of government and private antitrust cases. Time is depicted in these figures by joining the points which

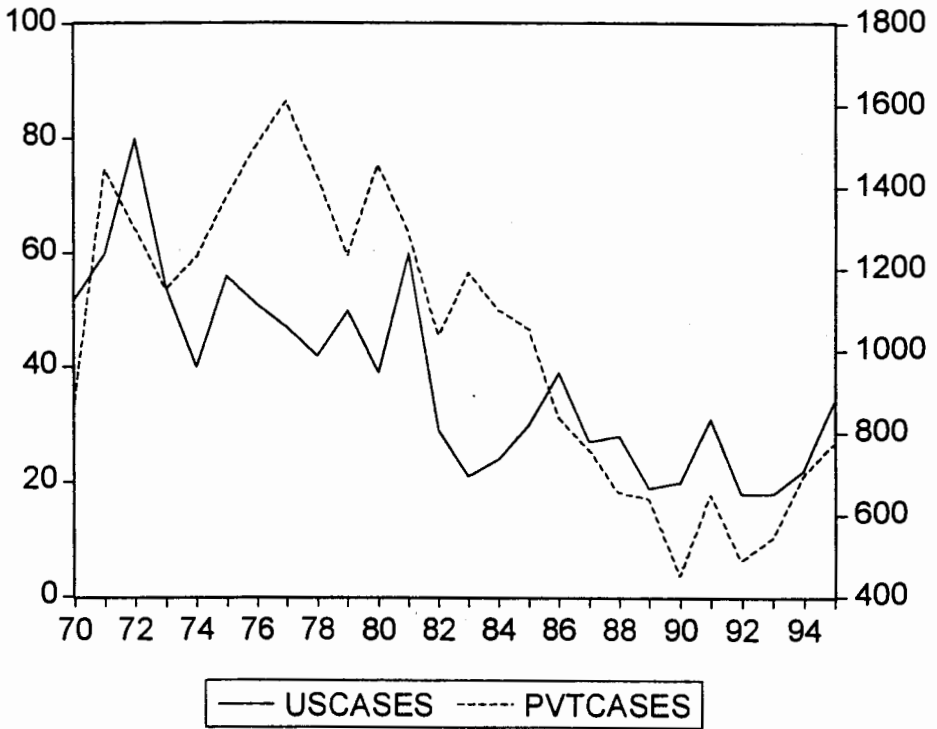


Figure 3. Time plot of the number of government and private cases, 1970–1995.

correspond to successive years. Once again it is evident from these figures that during the two episodes the association between the two series is positive but the trends experienced a reversal from a positive one to negative one. The scatter plots show two characteristics of two series. The strength of the correlation or association between the two series is 0.69, which is fairly high. Second, while there is approximately a linear relation between the two series during the two episodes individually, the association between these two series is perhaps more complex for the full post-War sample period.

The visual inspection of Figures 2 and 3 indicates that the number of government cases' series lead the number of private cases by about one year. Moreover, since the trends in the two series for the post-War period were influenced by a variety of political, social, technological and economic factors besides the regulatory/deregulatory environment, they can be parsimoniously characterized as a unit root process following the seminal analysis of Nelson and Plosser (1987) for macroeconomic variables. We present some formal pretesting evidence to show that these time series can be characterized as difference stationary (DS) instead of trend stationary (TS) processes, since this characterization cannot be made by examination of the plots. The visual time plot of the first difference of the two series shown in Figure 7 certainly suggests that each of

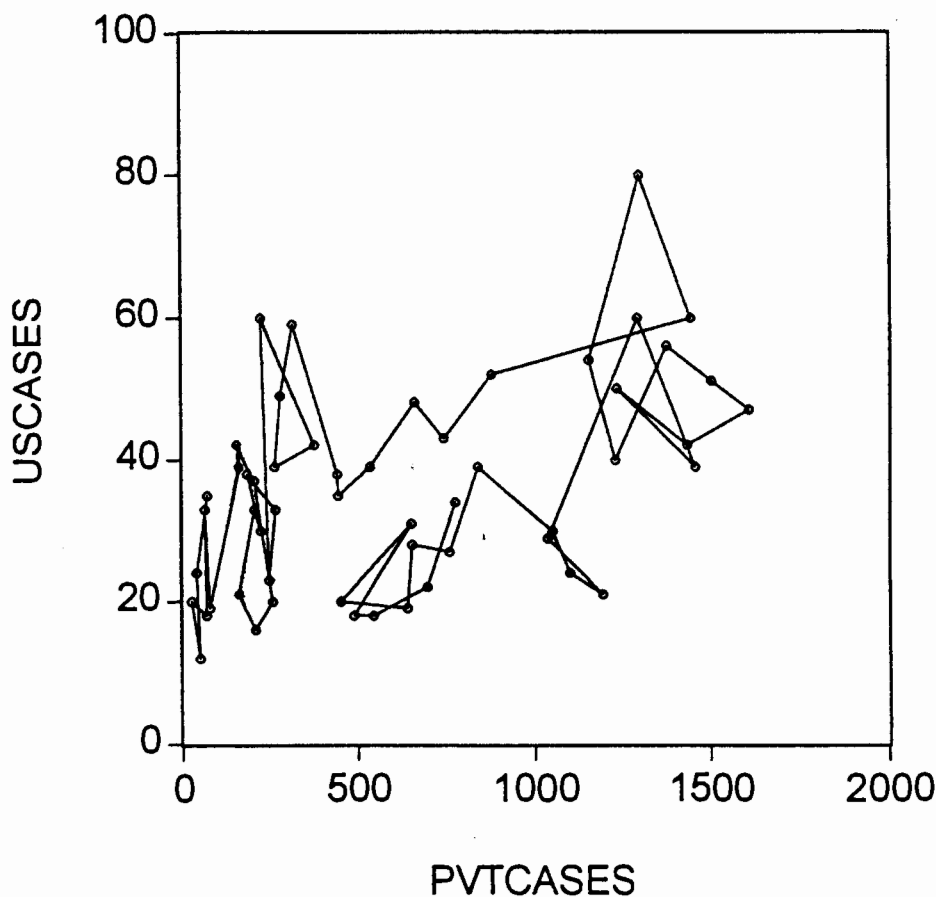


Figure 4. Scatter plot of the number of government and private cases, 1942–1995.

the two series is integrated of order one. The sample correlation of the detrended or first-differenced series for the entire sample is 0.084, which is positive and low. The sample correlations of the two detrended series for the sample periods 1942–69 and 1970–95 are -0.145 and 0.181 respectively. This sample evidence suggests that the detrended time series of government and private caseloads are weakly related. Furthermore, the first six autocorrelations of the number of government (private) cases are $0.61(0.95)$, $0.45(0.89)$, $0.40(0.85)$, $0.40(0.79)$, $0.31(0.71)$, and $0.24(0.64)$. The first six autocorrelations of the first difference of the number of government (private) cases are $-0.27(-0.04)$, $-0.10(-0.07)$, $-0.01(0.20)$, $0.14(0.14)$, $-0.06(0.03)$, and $-0.05(0.24)$. While these sample correlograms are consistent with the DS hypothesis, they do not enable one to distinguish a DS from a TS process.

This motivates the application of a formal unit root test such as the augmented Dickey-Fuller (ADF) test. The conventional ADF test, assuming an intercept and

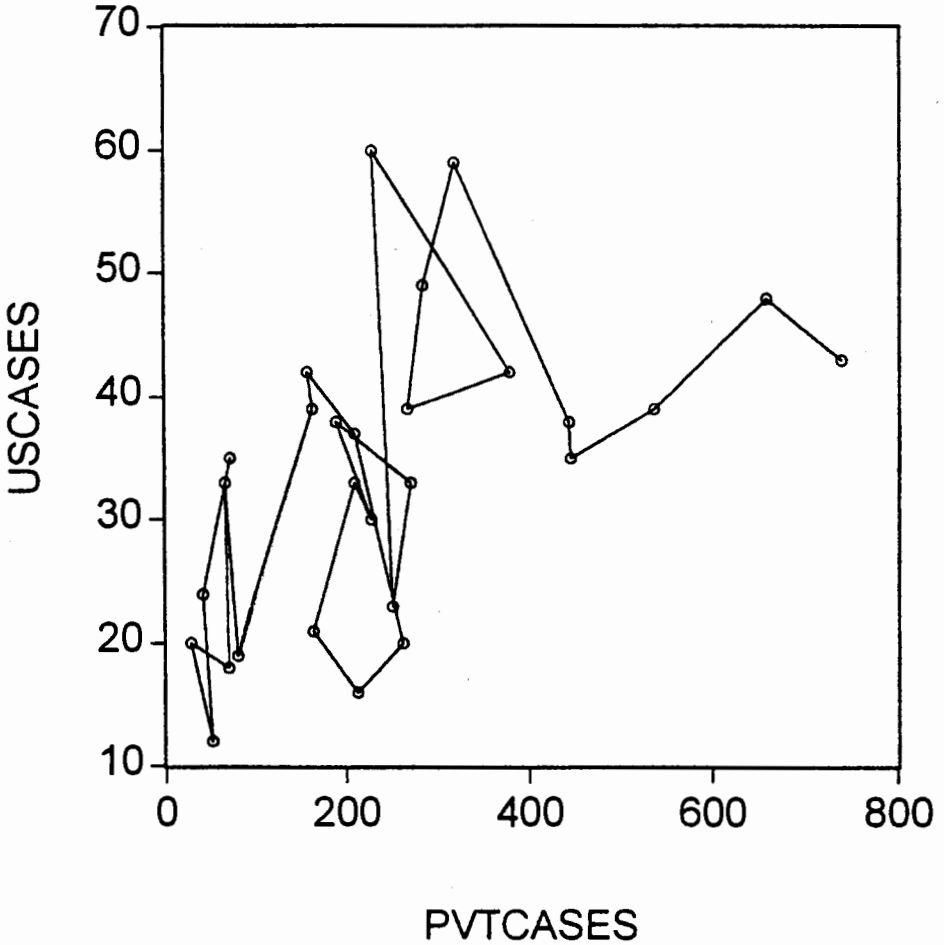


Figure 5. Scatter plot of the number of government and private cases, 1942-1969.

six lags does not reject the unit root hypothesis at a 1% significance level. This result is robust to the choice of the lag length. Specifically, assuming up to six lags and selecting the lag order according to the use of *t*- and *F*-tests on the lag augmentation as per results in Ng and Perron (1995), the ADF test statistics for the government and private cases had values of -1.63 for a lag of six and -2.24 for a lag of three, respectively. The critical values for the ADF test statistic for the sample size of 54 for a 1% significance level is -2.59 . The use of the above sample-based method of lag selection is argued to yield minimal size distortion and power comparable to the Schwarz criterion. Given that the conventional ADF test has low power to reject the null if the variable involved structural breaks, and that there may be a structural break in the antitrust cases' series, which can invalidate the conventional unit root test, we could apply the test procedure in Perron (1989)

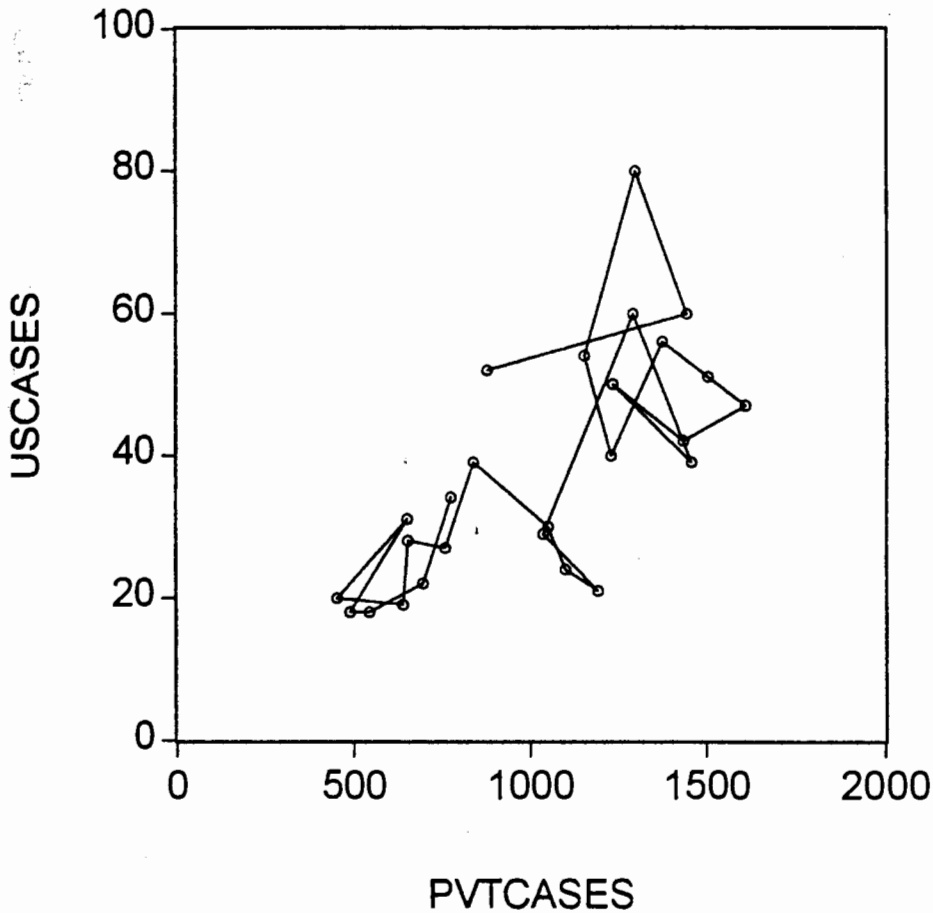


Figure 6. Scatter plot of the number of government and private cases, 1970–1995.

which allows for one structural break in the intercept and a change in the slope of the deterministic trend component in the series at a known break point in 1969. Since such a test is biased in favor of the alternative (trend stationarity) because the break point is chosen after inspecting the data, we instead apply the modified procedure in Zivot and Andrews (1992), which treats the break point as an unknown parameter to be estimated from the data. The use of this modified test of a unit root against the alternative of trend stationarity with one break in the level and slope in the series yielded a t-statistic for government and private antitrust cases of -4.77 for three lags and -4.44 for six lags.

In implementing this test, the unknown lag-order, k , needed to be determined. Work on sample based lag-order selection procedures by Hall (1994) and Ng and Perron (1995) suggests the use of t- and F-tests on the lag augmentation parameter. These tests are better in the sense that they cause less size distortion

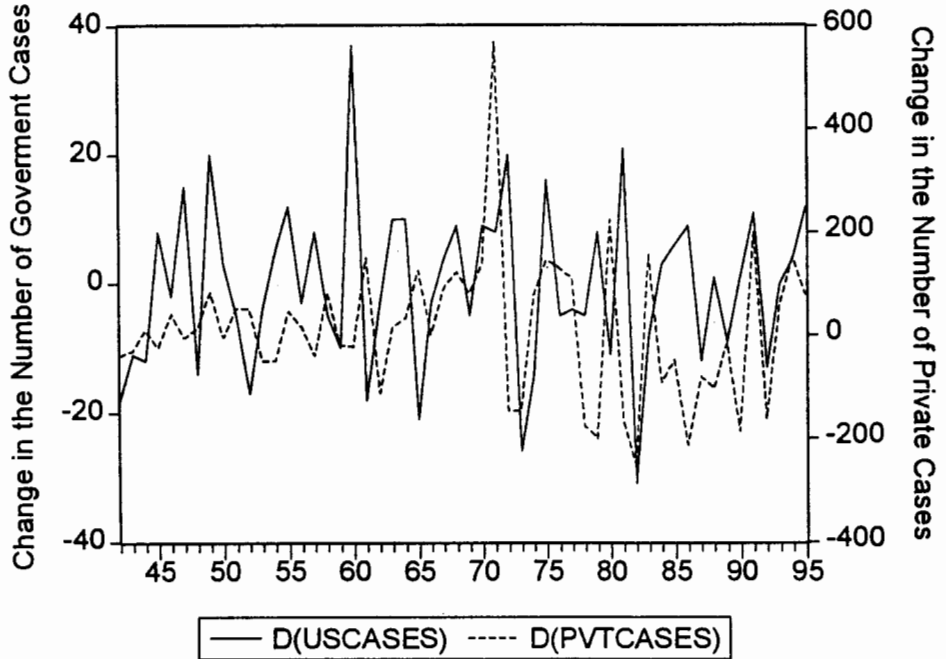


Figure 7. Time plot of the first differences of government and private cases, 1942–1995.

and are of comparable power in testing for a unit root. The lag lengths reported earlier are based on the use of this sample-based procedure. The asymptotic critical value for the t-test for a unit root, using this modified procedure, is -4.82 for a 10% significance level. Perron's test or its modification fails to reject the null of a unit root in each of the antitrust series. The hypothesis of a unit root in the first differences is rejected for both antitrust cases series, so we conclude that the antitrust series are integrated of order one:

3.2. *Cointegration relation between the number of government and private cases*

We now document the last of the three stylized facts mentioned above: the cointegration between the time series of government cases and that of private cases. There are several methods of testing the hypothesis that the cointegration rank is at most one between two variables. The maximum likelihood approach as developed by Johansen (1988) (and his subsequent papers) is most widely used in applied work. The use of this test procedure required selecting an appropriate specification of the vector autoregressive (VAR) model and the lag length that seems to correspond to the data in hand. The plot of the data in Figures 1, 2 and 3 suggested that an intercept in the cointegration relation and no intercept in the VAR, and a lag length of two would be reasonable. The result of the cointegration rank test is given in Table 3 for the trace test statistic the null of the rank is two.

The first line in the table presents the results for the test of the null hypothesis that the rank r is less than equal to zero; that is there is no cointegration relation. The null hypothesis of no cointegration is rejected at a 5% significance level according to the critical values of the trace test statistic shown in the second last column of Table 3. The second row in the table tests the null hypothesis that there is at most one cointegrating vector. This hypothesis is not rejected.

Table 3. Co-integration trace test for the antitrust cases — 1942–1995.

Eigenvalue	Likelihood Ratio	Hypothesized Number of Cointegrations (r)	5% Critical Values
0.25	17.61	None*	15.41
0.04	2.38	Almost 1	3.76

* The null hypothesis is $r < 0$ against the alternative of one. The likelihood test indicates 1 cointegrating equation at 5% significance level between the two variables, $100 \times$ U.S. cases (US) and the private cases (PVT).

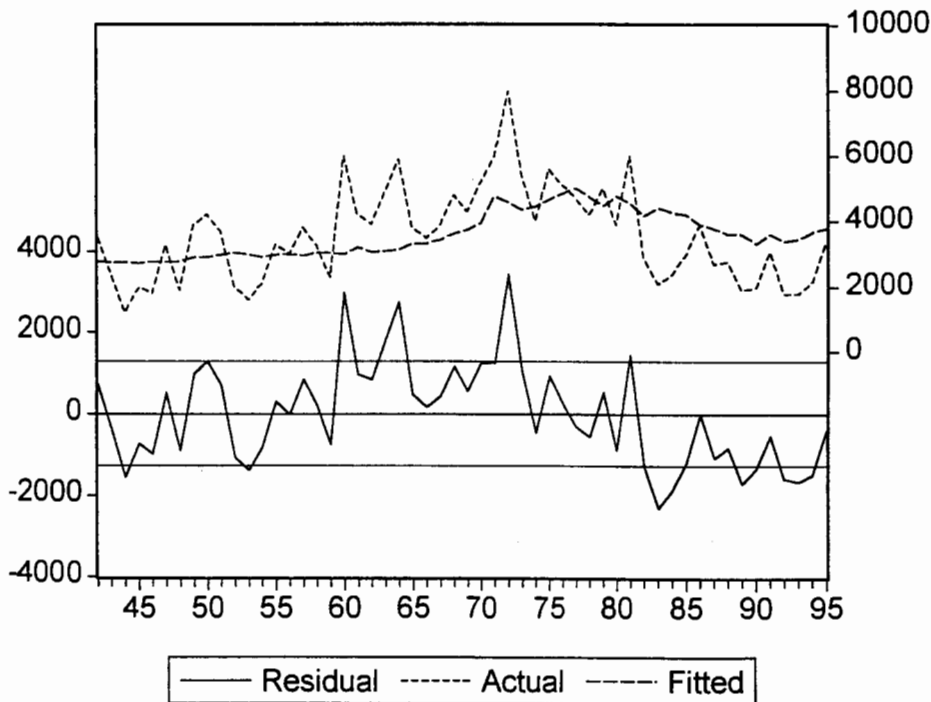


Figure 8. The actual number of government cases times 100, fitted values from the cointegration regression on the number of private cases and the residuals.

The estimated cointegrated relationship is $US (\times 100) = 2653.89 + 1.48 PVT$, where US and PVT represent the number of government and private antitrust cases. The standard error of the estimate of the coefficient of private antitrust cases is 0.46. This is comparable to the estimated value of the Engle-Granger (1989) cointegration relation, which is $US (\times 100) = 2685.86 + 1.44 PVT$. The estimated standard errors for the intercept and slope coefficients are 287.10 and 0.366, respectively. The actual and fitted values of $US(\times 100)$ from the Engle-Granger (1987) regression are plotted in Figure 8 along with the residuals. These do not indicate any problem with a cointegration relation.

In this section we have presented and documented three stylized facts regarding trends in the number of antitrust cases in the US during the post-War period. Evidence suggests that the time series for government cases and the time series for private cases are integrated of order one, and thus shocks such as changes in operating environment or exit and entry in the industries due to technological change produce a common stochastic shock to government and private filings. We now examine specific forms of anticompetitive behavior and how antitrust law has dealt with each one.

4. Price-fixing

Section 1 of the Sherman Act prohibits price-fixing, which refers to the act of a group of competitors conspiring to raise prices. Firms are deemed to have violated the law if they have attempted to fix prices (say, by making telephone calls or having secret meetings in a hotel), even if the conspiracy did not result in an agreement (formal or informal), or an agreement was reached but no harm was done to consumers. The act of attempting to fix prices is *per se* illegal, illegal in its own right.

By fixing prices, firms avoid mutually harmful competition, increasing their joint profits. Even after the passage of the Sherman Act, price-fixing violations were still uncovered frequently. Early, and famous, price-fixing cases include the well known railroad and steel cartels. A recent example is the conviction of Archer Daniels Midland, Inc. (ADM) which on October 14, 1996, admitted that it had conspired with two of its competitors in raising the prices of lysine and citric acid. The fine in this case was \$100 million, by far the largest ever obtained by the Justice Department in a criminal price-fixing case (see The Dallas Morning News, Tuesday, October 15, 1996).⁸ Moreover, a few of the individuals involved in the case face the possibility of time in jail. In Dallas, Texas, in 1995 a federal district judge fined Mrs. Baird's Bakeries, Inc. \$10 million in addition to five years probation and 2500 hours of community service for a price-fixing violation.⁹

The fact that fixing prices is beneficial to colluding firms does not imply that firms can collude without difficulty. A well-known problem is the 'instability' of price-fixing agreements. Suppose that firms A and B each earn a profit of \$100 under normal competition. If they both raise prices, each will earn \$150. But if firm A honestly sticks to the higher price levels that they have agreed upon, then firm B can receive even greater profits by charging a lower price to 'steal'

customers from firm A. If both 'cheat' on the price fixing agreement, then they are back to the original situation of normal competition. Due to such strong incentives to cheat, a cartel agreement is said to be inherently unstable.

One way to mitigate the incentive problem is for firms to use a 'most favored customer' clause or other form of low price guarantee. Under the 'most favored customer' policy, a firm guarantees its current customers that they will be reimbursed the difference between the current price and the lowest price offered in the future (up to some specified date). For instance, in the late 1960s and the early 1970s the two manufacturers of turbine generators, General Electric and Westinghouse, offered a price-protection policy effective during the six months following a sale.¹⁰ A contract with a 'most favored customer' clause has the effect of discouraging cheating on a cartel agreement because it significantly increases the cost of lowering prices in the future. If the firm does lower its price, it not only loses money on that sale, but also must reimburse all past customers to whom it has made the low price guarantee. For this reason, the US government intervened to halt this practice by GE and Westinghouse. Recent research (Arbatskaya, 1998) suggests that some forms of low price guarantees may preclude, in violation of the Clayton Act, potential entrants from entering an industry.

Another way of fixing prices that is worth mentioning is 'bid rigging'. Purchase decisions are often made through a process of soliciting competitive bids from prospective suppliers. Bid rigging occurs when firms agree to avoid competition by deciding in advance which firm will win the contract. Prior to their aforementioned price-fixing activities, GE and Westinghouse (among other firms) were also involved in a highly publicized bid-rigging case. Investigators discovered a pattern of bids for electrical equipment in which one firm would bid high, one low, and two firms would bid equally. Using this pattern, the firms enforced an agreement to divide the market so that GE received 42% market share and Westinghouse received 38%.¹¹ We now discuss in detail some of the case law governing price-fixing, and Section 1 of the Sherman Act more generally.

Cases filed under section 1 of the Sherman Act

Chicago Board of Trade v. United States, 246 US 231 (1918)

In *Chicago Board of Trade*, the central issue was whether this group of 1600 brokers, commission merchants, dealers, manufacturers and others had acted in restraint of trade when they imposed a 'call' rule requiring all transactions undertaken after normal operating hours to be executed at the close-of-market price. Justice Brandeis, in delivering the opinion of the Court, noted the effect of the 'call' rule to be that,

Before the adoption of the rule, members fixed their bids throughout the day at such prices as they respectively saw fit; after the adoption of the rule, the bids had to be fixed at the day's closing bid on the call until the opening of the next session.

Because the board had no control over the market price, it argued, it could not be restricting competition in the futures market, nor could it be guilty of price-fixing. The government, for its part,

...made no attempt to show that the rule was designed to or that it had the effect of limiting the amount of grain shipped to Chicago; or of retarding or accelerating shipment; or of raising or depressing prices; or of discriminating against any part of the public; or that it resulted in hardship to any one.

Consequently, the government's case relied upon the Court's application of the *per se* rule against price-fixing to a restriction that impinged only marginally on the range of contracts available to any individual trader. In reversing the lower court's ruling against the board, the Court noted that every contract is effectively a restraint on trade, binding the buyer and seller to a bilateral transaction. Therefore, a better test of the law is to 'consider the facts peculiar to the business to which the restraint is applied; its condition before and after the restraint is imposed; the nature of the restraint and its effect, actual or probable'. As a result, the rule of reason was affirmed in considering combinations in restraint of trade.

United States v. Socony-Vacuum Oil Co., Inc., 310 US 150 (1940)

The allegation in Socony-Vacuum was that the company, acting in concert with other major oil refiners attempted to raise and maintain the Midwest Spot market prices by purchasing gasoline 'in concert' from smaller independent refiners. By purchasing gasoline in concert, the larger refiners did not officially congregate and plan to manipulate prices. They all simply participated in the same manner without directly communicating with each other. By placing the excess in storage, which reduced the spot market supply, they thereby increased the market price.

Proving the case for a combination in restraint of trade among so many agents was extremely difficult. Justice Douglas notes in the opinion of the Court that

The alleged conspiracy is not to be found in any formal contract or agreement. It is to be pieced together from the testimony of many witnesses and the contents of over 1000 exhibits, extending through the 3900 printed pages of the record.

Added to this, however, is the fact that the government was aware of, and arguably supportive of, the industry's actions during the initial period of the antitrust violations. Under the National Recovery Act of the Great Depression, the industry had established a Tank Car Stabilization Committee, whose purpose was to stabilize market prices for refined crude to 'normal' levels. The content of communications between the industry's committee and the federal government's Petroleum Administrative Board (PAB) is in dispute. However in March, 1935 the PAB (in accordance with the Connally Act of 1935) approved a request for the major manufacturers of gasoline to reduce their output by roughly 1.5 million barrels. It also issued a memo generally supportive of the Stabilization

Committee's conclusions, which recommended both output restrictions and purchases of surplus gasoline to stabilize prices.

Applying the *per se* rule against price-fixing from *US v. Trenton Potteries* (273 US 392, 1927), the district court had convicted twelve of the 24 major oil refiners. The court of appeals had reversed the decision, applying the rule of reason from *Appalachian Coals, Inc. v. US* (288 US 344, 1933). The Supreme Court reversed the decision of the appellate court, in the process repudiating its decision in *Appalachian Coals* and affirming the *per se* rule with respect to price-fixing. In arriving at its decision, the Court found significant that the buying programs were accompanied by an immediate and sustained increase in gasoline prices. The refiners, the Court concluded, caused or substantially contributed to these price increases through their buying program.

Socony-Vacuum plays a significant role in the antitrust case law. It clarified the Court's position on price-fixing by eliminating the ambiguity brought about by the *Appalachian Coals* decision.¹² The *per se* rule toward price fixing has since been, perhaps, the most unambiguous aspect of the antitrust case law.

Catalano, Inc. v. Target Sales, Inc., 446 US 643 (1980)

This case is a relatively recent one involving price-fixing. The Supreme Court decided that the respondent, Target Sales, was guilty of price-fixing *per se* under Section 1 of the Sherman Act. What makes this case interesting is that the defendant never fixed prices; rather, it and its competitors jointly nullified the practice of extending credit to their buyers.

Target Sales was a wholesale beer distributor in California. Prior to this case, Target, as well as its competitors, would extend free credit to the retailers that purchased from them. The credit would last up to the 30 and 42 day limits allowed by California state law. Target Sales entered a horizontal agreement with the other beer distributors to end the practice of extending free credit. In fact, they decided that they would only sell to those who paid cash in advance or upon delivery for the beer. *Catalano Inc.*, the plaintiff, brought the action to the District Court for the Eastern District of California alleging Target Sales and its competitors had violated the Sherman Act. *Catalano* contended that it was *per se* price fixing, but the court decided that fixing credit terms does not necessarily contravene the antitrust laws and therefore denied *Catalano's* petition to declare the case *per se* illegal on the basis of price fixing. The case was appealed to the United States Court of Appeals for the Ninth Circuit. Here again the Appeals Court upheld the District Court's decision, but added on some reasoning to the decision. The Appeals court said that such a horizontal agreement might actually be conducive to competition by removing a barrier to sellers wanting to enter the market and by increasing the visibility of prices. The decisions of the lower courts were reversed by the Supreme Court which argued that the practice of Target Sales and its competitors was a form of price-fixing, and therefore was a violation of the Sherman Act. Price-fixing is 'plainly anticompetitive' and can never be defended by claims that it increases competition.

Kiefer-Stewart Co. v. Seagram & Sons, Inc., 340 US 211 (1951)

This case was first heard in the federal district court in Indiana in 1950. Kiefer-Stewart Co., a wholesale liquor company, complained that Seagram and Calvert Co., two affiliated liquor producers, had agreed or conspired to sell liquor only to those Indiana wholesalers who would resell at prices fixed by Seagram and Calvert, and sought treble damages under the Sherman Act. Evidence was shown that the defendants had fixed maximum prices above which the wholesalers could not resell. Seagram refused to sell to the plaintiff and others unless the purchasers agreed to the maximum resale price. The district court found the defendant guilty of violating the Sherman Act and damages were awarded. The appellate court ruled that Seagram's attempt to fix prices did not violate the law because fixing maximum resale prices promoted, rather than restrained competition. The appellate court also did not think there was sufficient evidence to find that Seagram and Calvert acted in concert.

The Supreme Court doubted the correctness of the verdict. First, the Court, citing *Socony-Vacuum*, found that the appellate court had erred in its finding that the price fixing did not violate the Sherman Act. The Supreme Court also found that the appellate court erred on holding the evidence insufficient to support the finding that the respondents had conspired to fix prices. It cited testimony that Calvert was willing to sell to the plaintiff without the price restriction, but later backed out and said that they had '... to go along with Seagram'. Furthermore, Calvert and Seagram both resumed selling to Indiana wholesalers who agreed to the terms of the fixing of retail prices, but neither sold to the plaintiff who did not agree to the price fixing. The Supreme Court found this was evidence enough to show that Seagram and Calvert were, indeed, working together to fix maximum resale prices, and illegally exclude wholesalers who did not agree to the conditions of the price fixing. The Court also thought that it would be a stretch to conclude that Seagram and Calvert were working independently to fix prices and exclude certain stores. On these grounds, the Supreme Court reversed the appellate court's decision, affirming the district court.

Finally, it should be noted that the Court has recently been more receptive to an approach which tends to temper the *per se* rule, one which considers the function of a given restraint in the marketplace, as well as the form the restraint takes. In *Broadcast Music, Inc. v. Columbia Broadcasting System, Inc.*, (441 US 1, 1979) the Court considered the legality of blanket licenses for music. These blanket licenses were written by organizations formed by composers as essentially license clearinghouses. As Gellhorn (1986) notes, the function of both the organizations (BMI and ASCAP) and the licenses was to reduce the transaction costs inherent in individually contracting with each composer whose music one wanted to perform or broadcast. In applying the rule of reason to the BMI case, the Court noted that

The extraordinary number of users, spread across the land, the ease with which a performance may be broadcast, the sheer volume of copyrighted compositions, the enormous quantity of separate performances each year, the impracticability of negotiating individual licenses for each composition, and

the ephemeral nature of each performance all combine to create unique market conditions for performance rights to recorded music.

As a result, the Court ruled that the restraint on trade formed by the blanket license was merely ancillary to the larger goal of enhancing efficiency through reducing transaction costs. While the court continues to hold the line on applying the *per se* rule to instances of 'naked' restraint, the significance of the Court's function-based distinction should not be overlooked. All of the aforementioned cases changed the way the courts perceived monopoly behavior and ultimately how the laws were enforced.

5. Monopolization and price discrimination

5.1. Monopolization

Section 2 of the Sherman Act outlaws monopolization and attempts to monopolize. As noted previously, it should be emphasized that what the law forbids is monopolization and the attempt to monopolize, not monopoly itself. A firm can obtain a monopoly position legally, for example, through a patent. Attempts to monopolize an industry through unjustified practices, however, may constitute a violation of the law.

5.1.1. Predatory pricing

Perhaps the most discussed form of monopolization is predatory pricing. Unfortunately, this extensive discussion has produced very little agreement, even on the central question of what constitutes a predatory price. Early in US antitrust history, predatory pricing was a main target of government. One of the earliest (and most famous) cases involving an alleged attempt to monopolize through predation is *Standard Oil of New Jersey v. United States* (221 US 1, 1911), in which the Rockefeller brothers and five other individual defendants were accused of the practice of acquiring their rivals by forcing them into bankruptcy through predatory pricing. Standard Oil was found guilty of monopolization and dissolved into thirty-four geographically separated companies. An economic framework for analyzing predatory behavior was not widely embraced by the courts until Areeda and Turner (1975) recommended a presumption of anticompetitive intent whenever price was set below short-run marginal cost.¹³ While the appeal of this test is strong, it is nevertheless the case that strong industry-specific arguments can be made for non-predatory prices both above and below this threshold. If the firm under consideration is producing under an increasing returns to scale, or 'learning by doing' production technology, then low initial prices generate large initial sales and lower future costs due to the experience from initial production. Similarly, if the firm is producing an 'experience good', low introductory prices make more consumers aware of the good's value, after which a higher price, predicated on previous experience, can be supported.

Conversely, Williamson (1977) and Milgrom and Roberts (1982), among others, have argued that even prices above short-run marginal cost may be used to strategically deter entry. These arguments present both firms and enforcers of antitrust law with a serious quandary, laid out elegantly by Joskow and Klevorick (1979). If we actively prosecute the full range of prices which could be considered predatory (including some which fall above marginal cost), then we will sometimes prosecute non-predatory, competitive behavior. Joskow and Klevorick call this a 'type-I error', or false positive. Alternatively, if we set a *per se* standard in which only pricing below marginal cost is presumptively anticompetitive, then we will sometimes fail to identify predatory pricing when it occurs, a 'type-II error', or false negative. Joskow and Klevorick suggest that the only way out of this dilemma is to weigh, instead, the same factors the incumbent does in deciding whether to set a predatory price. That is, we should estimate the rewards to the incumbent given unimpeded entry by a competitor, weighing those against the expected sum of 1) our estimate of incumbent's current losses from predation and 2) our estimate of its future profits as a monopolist.

Judge Robert Bork (1978) has adopted the position that the massive short-run losses necessarily incurred by the predator can, in fact, never be offset by the expected value of the uncertain future recoupment. Hence, anti-predation policy is unnecessary because a rational firm would never engage in predatory pricing, i.e. predation is self-policing. Recently, the courts have been somewhat sympathetic to this view. In *Matsushita Electrical Industrial Co. v. Zenith Radio Corporation* (106 S.Ct. 1348, 1986), American manufacturers of televisions accused several Japanese firms of trying to destroy the American television industry by selling their products in the US market at prices below costs. The case was dismissed by the US Supreme Court in 1986, based on the view that the losses from predation (which was alleged to have taken place over 20 years) would have been next to impossible for a firm to recoup. A somewhat more compelling case for reduced attention to predation is made by Hovenkamp (1985) who argues that, even when predatory pricing occurs, it frequently occurs in conjunction with other, more easily identifiable and demonstrable, evidence of the attempt to monopolize. As evidence, he cites *William Inglis & Sons Baking Co. v. ITT Continental Baking Co., Inc.* (668 F.2d 1014, 1036; 9th Cir. 1981), in which the court paid great attention to the complexity of the Areeda and Turner test, but very little attention to market structure in this industry. In particular,

...the bakery market contained several competitors, and the defendant was only the second largest. Second, the industry had a large amount of excess capacity. Computation of the defendant's market share including the excess capacity of competitors indicates that the defendant had approximately 8% of the market. Third, barriers to entry were quite low, and at least one new firm entered the market even as the alleged predation was occurring. The defendant could not reasonably have expected a future period of monopolistic pricing in such a market. The court would have done better to dismiss the complaint without considering the price evidence.

5.1.2. *Monopolization by other means*

Alcoa

Firms may attempt to monopolize a market through means other than predation. In 1938, the US government filed suit against Aluminum Co. of America. (Alcoa) in a district court in New York, accusing Alcoa of monopolizing the markets for bauxite, virgin aluminum, aluminum ingot, and various by-products. Judge Francis G. Caffey found Alcoa not guilty on all charges. With respect to the aluminum by-products market, Judge Caffey found that there was ample competition. Alcoa did, at one time, hold nearly a monopoly in the aluminum and alloy sheet markets. However, with the help of Alcoa's engineers, Alcoa's competitors' technology improved significantly. In the case of one by-product, aluminum foil, Alcoa was actually surpassed in market share by Reynolds Metals (Smith, 1988, p. 202).

Judge Caffey also found Alcoa not guilty on the charges of monopolizing the bauxite, virgin aluminum, and aluminum ingot markets. On the bauxite charge, Judge Caffey relied heavily on the testimony of many expert witnesses in determining the supply of bauxite as a world commodity. Through this testimony, Judge Caffey found that Alcoa only owned approximately half of all bauxite lands, and therefore was not monopolizing this raw material (Carr, 1952, pp. 221–222). With respect to monopolization of the virgin aluminum and aluminum ingot markets, he found that Alcoa never had any intention of excluding its competition (Carr, 1952, p. 223). Caffey found further that there were no barriers to entry into the market which might preclude competition, strengthening his judgment in favor of Alcoa. Caffey felt that Alcoa enjoyed a monopoly in these markets simply because it was able to efficiently seize the huge demand for virgin aluminum and aluminum ingots (Smith, 1988, p. 204).

In 1945, the US appealed, giving rise to the landmark *United States v. Aluminum Company of America* (148 F.2d 416, 1945) case.¹⁴ This time, Alcoa did not beat the government on all charges of monopolization. On the charge of monopolizing the aluminum ingot market, Judge L. Hand found Alcoa guilty. In his opinion, he drew heavily from the reasoning of Chief Justice White in *Standard Oil* in distinguishing monopolization from monopoly by looking for an intent to achieve monopoly power (Smith, 1988, pp. 207–208). Although there was no specific evidence of intent, Judge Hand felt that the fact that Alcoa held 90% of the market was sufficient to prove intent (Carr, 1988, p. 230). Judge Hand concluded that Alcoa was guilty, not because of any specific unlawful acts, but for two other reasons:

First, the company was in a position of monopoly power, and second, had not been merely a passive beneficiary of its position. Instead, the company had engaged in a positive drive to expand its business, a drive that resulted in the maintenance of its monopoly. (Smith, 1988, p. 208)

The Alcoa decision was a major change in the legal definition of monopolization. Predatory or aggressive acts were no longer necessary. Simply building

capacity ahead of demand could be sufficient to indicate intent to monopolize by a dominant firm.

du Pont

United States v. E.I. du Pont de Nemours and Co. (351 US 377, 1956) is another key case that helped define the disposition of monopolization claims. du Pont and La Cellophane entered into an agreement in 1923 to produce plain cellophane. They then licensed a number of foreign companies to produce and sell cellophane to limited geographic markets. Between 1928 and 1950, du Pont produced almost 80% of the cellophane sold in the United States. A civil suit issued in October, 1955 by the United States charged du Pont with monopolizing interstate commerce in cellophane and cellulose caps and bands.

One key factor in the monopolization charge was determination of the relevant market. The government wanted to establish the relevant market to be that of cellophane alone. In its defense, du Pont used the concept of cross-elasticity of demand to argue that their profits were not attributed to monopolizing the industry, but to the growth of commodity packaging habits of business. The Court found flexible packaging materials, not cellophane alone, to be the relevant market. Given this broad definition of market, the Court found no evidence that established that du Pont ever possessed market power to influence market prices or to exclude any producer from entering the market. du Pont also argued that, due to the competitive market for cellophane, it was not possible to possess monopoly power. In arguing this, they cited that Sylvania entered the market and maintained 25% of cellophane production in 1931. Moreover, the Court found that, even if du Pont did possess monopoly power over sales of cellophane, it was not subject to Sherman Act prosecution, since its market power was acquired through innovations and was protected by patents. The Court's opinion in this case is frequently referred to as the 'cellophane fallacy', elegantly laid out in Stocking and Mueller's (1955) classic article.

United Shoe Machinery

Yet another important case was the United States v. United Shoe Machinery (347 US 521, 1954). The government argued that one contributory factor to United Shoe Machinery's commanding 75–85% share of the market for shoe machinery was its practice of leasing, never selling, its equipment. The government maintained that this sales practice created barriers to entry. Since the firm repaired its own equipment, there were no independent repair organizations that a competitor could rely on. Thus, if a competitor sought to enter the market, it would have to also provide repair services. United Shoe Machinery claimed, instead, that research and development and other economies of scale were principally responsible for its large market share. While the Court did not find that United Shoe Machinery had in any way preyed upon its competitors, taking advantage of its large market share, it nonetheless found that its sales practices

constituted barriers to entry. Moreover, it found the arguments resting on scale economies to be belied by the existence of a competitor, Compo Shoe Machinery Corporation, which was also extremely active in research and development.

Ready-to-eat breakfast cereals

Finally, a recent case in the ready-to-eat (RTE) breakfast cereal manufacturing industry is worth mentioning. During the period from 1950 to 1970, the three major breakfast cereal producers introduced more than 150 new brands, a practice which caught the attention of the FTC. In 1981, the FTC argued before an administrative law judge (*In re Kellogg Corp.*, 3 Trade Reg. Rep. ¶21864, 1981) that the cereal manufacturers' product proliferation policy was designed to prevent entry into the market, effectively allowing them to share a monopoly of the industry.¹⁵ According to the government, incumbent firms had introduced a profusion of variants of each type of RTE cereal. Because there were fixed costs to manufacturing and marketing a breakfast cereal brand, this left no profitable niche for any new firm to enter the market. The judge ruled against the FTC, after which the FTC dismissed its complaint.

5.2. *Price discrimination*

Firms frequently find it to their advantage to charge different prices to different purchasers of identical goods. For example, students can get a discount when they purchase computers, go to movies, go to restaurants or ride a bus. The elderly get similarly favorable treatment. Residential consumers of telephone service typically pay a lower rate for telephone calls than do commercial customers. Individuals typically pay lower subscription rates for scholarly journals than do libraries. The reason firms do this, of course, is that they recognize that different, identifiable, groups of individuals (as determined by age, income, occupation, etc.) respond differently to prices for the same good. This type of pricing policy is referred to as 'third degree' price discrimination. Note that third degree price discrimination places an information burden on the firm. Not only must it know that there are two (or more) groups with different demand characteristics, but it must also know who belongs to which group (through an identification card, age, or some other means). Furthermore, the firm must be able to prevent consumers from reselling the goods they buy to other consumers.

On the other hand, if the firm does not have complete information about consumers' elasticities of demand and observes no signal which is correlated with the consumers' valuations, it may still be able to price discriminate. In doing so, it must design a menu of price and quantity combinations that are 'incentive compatible', i.e. they cause different types of consumers to choose different price/quantity combinations, while at the same time increasing the firm's rents. This is known as 'second degree' price discrimination, examples of which include quantity discounts (e.g., buy-two-get-one-free) and tie-in sales (e.g., radio sellers require that their buyers must purchase batteries from them). One very common

variant of second-degree price discrimination is the two-part tariff, of which the first part is a fixed (access) fee and the second is a unit price, e.g. an amusement park where, in addition to the admission fee, the park may charge extra (a unit price) for certain rides.

If the firm knows the demand characteristics of every consumer, then the firm should clearly set a separate price for each consumer which makes the consumer indifferent between purchasing and not. Such a price extracts the consumer's entire surplus from the transaction, so clearly the monopolist can do no better than this. This is known as 'first degree' price discrimination, and clearly places an enormous burden of information on the monopolist. Economists have demonstrated that, if a monopolist has only one unit to sell, a sealed-bid auction comes close to realizing first degree price discrimination. However, the sale of multiple units and resale among consumers will likely keep the firm from realizing perfect price discrimination. One frequently cited classroom example of near-perfect price discrimination is the provision of financial aid in US universities. All students applying for financial aid at a US university are legally compelled to accurately report their own, and possibly their family's, financial situation. Equipped with this information on ability to pay, it is argued that universities can extract the student's full surplus from the value of the degree conferred. While this argument has many problems (not the least of which is the fact that the student's expected future income is unknown), it is nonetheless a useful example for teaching students at US universities.

Section 2 of the Clayton Act of 1914 prohibited price discrimination that acts to 'substantially lessen competition'. The principal concern of the framers of this legislation was in halting a common activity by firms which sold in a variety of geographically distributed markets. When faced with a rival in one of its markets, the firm would immediately cut prices, offsetting these localized price cuts with small price increases in the other markets it served. This proved to be a highly effective way of eliminating competition and preserving local monopoly. Quantity discounts were initially included in the proscribed practices covered by the Clayton language, but were eliminated from the bill shortly before it became law. Because all sellers could, in principle, offer the same discounts, there was simply no need for this provision.

However, during the 1920s and 1930s the structure of manufacturer-wholesaler-retailer network in the US underwent a fundamental change. During this period, chain stores, which sold at the retail level but purchased directly from manufacturers, became a major source of competition for local retailers. Between 1926 and 1933, the proportion of retail sales concentrated in chain stores grew from 9% to 25% (Kintner, 1979). Because the chain stores bought in bulk from the manufacturer, they enjoyed large quantity discounts unavailable to their local competitors. Kintner indicates that, for example, 'A&P Tea Co. had received discriminations and allowances of over \$8 million in one year alone — all without fear of prosecution under the Clayton Act'. While Congress was correct in concluding that quantity discounts by firms acting as sellers was unlikely to affect competition, it had failed to anticipate the effect that quantity discounts would have on firms acting as buyers.

Consequently, the Clayton Act was amended by the Robinson-Patman Act in 1936 after successful lobbying by groups representing independent retailers, especially grocers. Important changes incorporated under Robinson-Patman amendment were first that the threshold definition of illegality was reduced to 'injury to competition' from 'substantially lessen competition' and second that violations could occur when either buyers received discounts or when sellers provided them.

Economic theory tells us that, in many situations, price discrimination can increase social welfare. Largely, this is due to the fact that a monopolist forced to charge a uniform price may choose to leave some consumers unserved, consumers who would be served if the monopolist were allowed to price-discriminate. It has been argued that the Robinson-Patman Act was based on 'equity' concerns. To the extent that it put local retailers on a more even footing with their chain competitors, this is probably true. On the other hand, economic theory suggests that under a more appropriate definition of equity, one which includes both retailers and the customers they serve, Robinson-Patman is of questionable merit. Namely, the protection of small firms may come at the cost of unserved markets and decreased social welfare. It is for this reason that Robinson-Patman is regarded by most economists as being of questionable value. Fortunately, enforcement of the law by both the DOJ and FTC has declined in recent years.

6. Horizontal mergers

Mergers between firms can be divided into three categories: horizontal mergers, vertical mergers, and conglomerate mergers. Horizontal mergers occur when they involve competing firms, whereas parties in a vertical merger have a seller-buyer relationship. For example, a merger between two auto makers falls into the category of a horizontal merger, but a merger between an auto maker and a tire producer is called a vertical merger. Mergers that are neither horizontal nor vertical are called conglomerate mergers. In this section we discuss only horizontal and vertical mergers. (See Viscusi *et al.* 1995 for a discussion of conglomerate mergers.)

Among the six major antitrust laws listed in Table 1, four of them are related to mergers (Sherman Act, Clayton Act, Celler-Kefauver Act and Hart-Scott-Rodino Act). These pieces of legislation are, in many ways, related to the composition of the four prior waves of mergers the US has experienced (we are currently in the fifth). The first merger wave, resulting in many monopolies, occurred over the years 1890–1904. According to Markham (1955), 'The conversion of approximately 71 important oligopolistic or near-competitive industries into near monopolies by merger between 1890 and 1904 left an imprint on the structure of the American economy that fifty years have not erased'. Large firms created during this period include General Electric, DuPont, Eastman Kodak and United States Steel. It may seem strange that a wave of mergers was the immediate legacy of the 1890 passage of the Sherman Act, however it is important to recall that US federal antitrust law consists at least as much of case law as it does of federal

statute. While the Sherman Act was passed in 1890, it was almost immediately defanged by the Supreme Court's 1895 ruling in *United States v. E.C. Knight Co.* (156 US 1, 1895). In this case, American Sugar Refining Company had purchased most of its competitors, including the named defendant, attaining a market share of 98% of all US sugar sales in the process. In a decision that has been repudiated by the Court and heavily criticized by scholars, Chief Justice Fuller ruled that American Sugar was outside the jurisdiction of the Sherman Act. Combined with the Court's 1899 decision in *Addyston Pipe and Steel Co. v. United States* (175 US 211, 1899), which declared illegal a collusive agreement to fix prices, the fact that firms merged from cartels (illegal under the case law) to monopolies (legal under the case law) is hardly surprising.

In part because the Sherman Act applied to mergers only when merging firms are attempting to monopolize the industry and in part for reasons described previously, the Clayton Act was passed in 1914. In the case law, this legislation was preceded by the 1911 *Standard Oil* case, which reflected both a broader interpretation of the language of the Sherman Act and a higher degree of judicial activism in antitrust. The environment reflected by these two factors put an end to the first wave of mergers.

Clearly, though, the Clayton Act had a significant loophole. Even if it were illegal under the Clayton Act for firm A to acquire firm B by purchasing its stock, it would be perfectly legal for A to acquire B by purchasing assets, instead. As a result, a second wave of mergers took place over the period 1916–1929. While firms could no longer monopolize an industry, they could still acquire significant market power by holding an oligopoly position. The Great Depression ended this second wave of mergers. The third wave of mergers began after the Second World War and peaked in 1968. Passage of the Celler-Kefauver Act in 1950 made both horizontal and vertical mergers more difficult, so firms instead engaged in conglomerate mergers. The fourth merger wave occurred following the Reagan Administration's relaxation of antitrust enforcement during the early 1980s.

Williamson (1968) built a simple economic model to illustrate the social benefit and cost of a typical horizontal merger. On the one hand, a merger results in fewer competitors in the market and, therefore, reduces competition and leads to higher prices which hurt consumers. On the other hand, a merged firm may take better advantage of economies of scale, resulting in cost savings. Thus, a merger may produce both gains and losses to society. It can be argued that a merger should be allowed if the gains generated outweigh the losses, otherwise it should be blocked. But Williamson's proposal was difficult to implement. Hard empirical evidence would be necessary to the degree to which a given merger would lower costs, raise prices, reduce output, and so on. Cost savings would be especially difficult for antitrust authorities to validate because the firms involved would have to be relied upon for such information — and their incentives would be to overstate cost savings.

An interesting example of a horizontal merger is the case involving *United States v. Philadelphia National Bank* (374 US 321, 1963). It involved the merger of two commercial banks, Philadelphia National Bank (PNB) and Girard Atrust

Corn Exchange, the second and the third largest banks of the 42 commercial banks in the Philadelphia metropolitan area. The merged bank would have become the largest in the area. Determination of the effect of this merger on competition centered on the issues of the relevant market and measures of market share and market power. Under one interpretation of the relevant geographic market (the New York-Philadelphia region), the merger would have negligible anticompetitive effects. Under the other interpretation (the Philadelphia metropolitan area), there would be a significant increase in market concentration and possible anticompetitive effects. Additionally, there was a question as to whether the federal judiciary had original jurisdiction or whether the state level was more appropriate.

The government argued that the relevant geographic market in this case was the four-county metropolitan area surrounding Philadelphia. This stemmed from a Pennsylvania law that only allowed banks to branch into counties that were contiguous to the county where their home office was located. They named the commercial banking industry as the relevant market and pointed to the difficulty of entry into the banking market in their arguments. Only one bank had been chartered in the area, and after ten years only controlled one third of one per cent of this area's deposits. This, along with the trend toward centralization of the banking industry, was used by the government to attempt to show that the merger of PNB and Girard would be detrimental to competition in the relevant market.

Philadelphia National Bank argued that the increased size of the resulting bank would aid in their ability to compete with large out-of-state banks, principally from New York. They contended that this ability would attract new business to Philadelphia and in general promote the economic development of the metropolitan area. Thus, they defined the interstate banking market, not the metropolitan area of Philadelphia as the relevant geographic market. On top of this, they attempted to show that the consumers of the Philadelphia area would reap the benefits of the merger through increased economic development, so the anti-competitive effects in the immediate area would be outweighed in the end.

The district court agreed with PNB's definition of the relevant geographic market, opining further that this issue was not within the federal courts' jurisdiction. The case reached the Supreme Court in 1963, where Justice Brennan delivered the opinion of the Court, deciding in favor of the government and disallowing the merger. At the time this case was tried, the prevailing belief in Congress was that 'competition is likely to be greatest when there are many sellers, none of which has any significant market share', an opinion that Brennan cited as 'common ground among most economists, and was undoubtedly a premise of congressional reasoning about the antimerger statute'. The law had never defined the percentage of market share that would be a threat to competition, but in his opinion, Justice Brennan set 30% as a level of market share that posed a threat. He pointed to the fact that the top two banks at the time (PNB and First Pennsylvania) controlled between them 44% of the relevant market. Afterward, the two largest banks (PNB-Girard and First Pennsylvania) would control 59% of the market. This 33% increase was regarded as 'significant' and the Court dubbed

the resulting 30% market share held by PNB-Girard as 'undue'. The Court responded to the defendant's claim that the increased size of the resulting bank would allow them to compete with larger out-of-state banks by finding that anticompetitive effects in one market cannot be justified by procompetitive consequences in another.

As stated previously, the passage of Hart-Scott-Rodino in 1976 gave greater significance to the 1968 Horizontal Merger Guidelines issued by the DOJ (and supported by the FTC). The original 1968 Guidelines eventually fell out of use because they were not updated to reflect ongoing research and current case law. In 1982, however, the Guidelines underwent a major revision, and in 1984 they were issued in a joint agreement with the FTC.¹⁶ Each change reflects a more refined approach to the analysis of a merger's pro- or anticompetitive effects. For example, while the 1984 Guidelines use the phrase 'collusion', the 1992 Guidelines use 'coordinated interaction', reflecting economic research into the area of tacit collusion and recognizing that firms do not have to communicate to act in a coordinated way. Other major changes between 1984 and 1992 include a more specific statement about how mergers may adversely affect competition and how market factors relate to the analysis of those effects. Also, the 1992 guidelines lay out a framework in which the timeliness, likelihood and sufficiency of entry contended by one of the parties to the merger can be analyzed. As the DOJ notes in a preamble to the 1992 Guidelines, 'The revisions articulate a five-step analytical process for determining whether to challenge a merger. The elements include: market definition, measurement and concentration; the potential adverse competitive effects of the merger; entry; efficiencies; and failure and exiting assets'. For example, in the measurement of concentration in an industry, the Guidelines suggest that

1. a merger is unlikely to be challenged if the post-merger HHI is below 1000;
2. a merger is unlikely to be challenged if the HHI is between 1000 and 1800 and if the merger increases the index by less than 100 points;
3. a merger is unlikely to be challenged if the pre-merger HHI is above 1800 and the merger would not increase the index by more than 50 points.

The Hirschman-Herfindahl Index (HHI) in an industry with I firms is defined as $HHI \equiv \sum_{i=1}^I s_i^2$, where s_i is the squared output share of each firm. Output shares are expressed as percentages. A market, for example, shared equally by eight firms ($I=8$) would have an $HHI = 8 \times (12.5)^2 = 1250$. If two firms merged, the HHI would increase by $25^2 - 2 \times (12.5)^2 = 312.5$. Hence, looking solely at its effect on industry concentration, the merger would be viewed as likely to have an adverse competitive effect and the government would study other factors to determine if a challenge should be made.

An application of the HHI standard was made by the FTC in 1986. The FTC challenged a proposed merger between Coca-Cola and Dr. Pepper. They argued that the proposed merger would increase the HHI for the carbonated soft drink industry by 341 points to a level of 2646. This clearly violated the Guidelines, and the FTC was successful in halting the merger.

7. Vertical mergers and restrictions

Vertical mergers link firms in buyer-seller relationships. Examples of vertical integration are numerous. The petroleum industry consists of many firms that are vertically integrated, from crude oil discovery and production to refineries to retail gasoline stations. Sometimes, instead of vertical integration, firms may choose to sign vertical contracts that limit one another's behavior. This practice is referred to as a vertical restriction.

7.1. Vertical mergers

The motives for vertical integration include taking advantage of technological economies, eliminating double marginalization (i.e. double monopolies) and reducing transaction costs. We discuss each in turn. First, there are benefits from vertical integration that arise for purely technological reasons. The classic example here is the integration of ironmaking and steelmaking, where physical proximity eliminates the need for reheating iron before it is made into steel.¹⁷

Second, firms may vertically integrate to eliminate inefficiencies. Efficiency requires the price of a product be equal to its marginal cost of production. If two vertically related firms with market power stay separate, each firm would want to raise price above its marginal cost in order to earn positive economic profits. Relative to the true marginal cost, the price of the final product would consist of two price-cost margins, one for each firm. If the firms merge, one of the price-cost margins is eliminated. To see this, consider the following example. Suppose that a retailer buys a product from a manufacturer at wholesale price p_w and sells it to consumers at a final price p . For simplicity, assume that the costs of production for the manufacturer and the retailer are both zero. So, the unit cost for the retailer is just the wholesale price p_w . The demand function for the good is given by $p = 12 - Q$. First consider the case where these two firms stay separate. Given the wholesale price p_w , the retailer chooses a retail price p to maximize $(p - p_w)(12 - p)$, yielding $p = (12 + p_w)/2$, and $Q = 12 - p = (12 - p_w)/2$. Given the retailer's order Q as a function of p_w , the manufacturer chooses p_w to maximize its profit $p_w(12 - p_w)/2$. The solution to this problem is $p_w = 6$. Thus, $p = 9$ and $Q = 3$. The profits of the manufacturer and the retailer are, respectively, 18 and 9. Now suppose they merge. The merged firm just chooses the final price p to maximize $p(12 - p)$, which yields $p = 6$ and $Q = 6$. Total profits will be 36, higher than prior to the merger. Please note that the merger in this example also benefits consumers because it reduces price from 9 to 6. Further discussion of this issue may be found in Carlton and Perloff (1994) and Tirole (1988).

A final rationale for a vertical merger is to reduce 'transaction costs'. If the costs of using a market mechanism are relatively higher due to uncertainty or imperfect information, a firm will tend to produce some of its inputs or intermediate goods by itself, i.e. vertically integrate, rather than to purchase them from outside suppliers.¹⁸

Vertical mergers can have anticompetitive effects. Perhaps the biggest concern of the court with a vertical merger is 'foreclosure of competition'. For example, if a firm (with market power) that manufactures shirts vertically integrated backward into producing buttons, the firm would have foreclosed competition in the button market because other button producers could now no longer sell to that firm. In *Ford Motor Co. v. United States* (405 US 562, 1972) the Supreme Court held that Ford's acquisition from Electric Autolite Co. of the name Autolite and associated spark plug manufacturing assets was illegal. One basis for the decision was that the merger resulted in 'the foreclosure of Ford as a purchaser of about ten per cent of total industry output'.

There are currently no merger guidelines for vertical mergers. As a result, firms must rely substantially on the case law in making a decision about whether to undertake a merger transaction.

7.2. *Vertical restrictions*

Vertical restrictions refer to the practice whereby suppliers use contracts to influence or limit the decisions of their retailers. Commonly discussed forms of vertical restrictions include resale price maintenance, exclusive territories, exclusive dealing, and tying arrangements.

Resale Price Maintenance (RPM) means that the supplier requires the dealer to resell its product at some set price. (It is sometimes referred to as vertical price fixing.) Usually, RPM is either a minimum resale price or a maximum resale price. An example of maximum resale price would be if the New York Times required its home delivery distributors to sell the newspaper for no more than \$4 per week. An example of a minimum resale price is that Panasonic once required its retailers to sell its products above a prespecified price, otherwise it would stop supplying the goods to them.

Why do firms set a range for resale prices? Maximum resale price may be related to the problem of 'double markups' discussed earlier. In the presence of 'double markups', the final price of a product is usually higher than would be collectively optimal. Firms can lower the resale price through a merger. Alternatively, they can achieve the same goal by setting a price ceiling, thereby increasing joint profit. Setting a minimum price may be related to the so-called 'free-riding' problem on the part of the retailers. Consider a personal computer. Before buying an Apple computer, the consumer would like to learn as much about it as possible. A retail computer store that sells Apples is ideal — the consumer can consult with the technically trained sales staff and try out demonstration models. When it comes time to buy, however, the consumer might decide to purchase the computer through a low-price mail-order outlet. Mail order outlets typically have lower prices precisely because they provide neither floor space for demonstration nor technically trained sales staff. In other words, the mail-order outlets are 'free-riding' on the retail store. In this case, it may be sensible for Apple to set a minimum price to make sure that the resale store can make a profit.

Exclusive territories refer to the agreement between the supplier and the dealer that the supplier will not allow any other dealer to locate within a certain area — thereby making the dealer a 'local monopoly'. Offering exclusive territories may help reduce the above-mentioned 'free-riding' problem. Also, a potential social benefit of territorial restriction is that the distribution cost may be lowered by enabling each dealer to obtain scale economies. The potentially anticompetitive effects of exclusive territories are similar to RPM — it gives dealers more local monopoly power, thereby hurting consumers.

The third type of vertical restriction is exclusive dealing. Exclusive dealing is a contract between a supplier and a dealer stating that the dealer will buy all of its supplies from that supplier. For example, Exxon may require its dealers to sell only Exxon products, not its rivals'. Exclusive dealing might be anticompetitive because rivals are preempted from doing business. The benefits of this practice might include: (1) the supplier may find it worthwhile to invest in developing the skills of the dealers if he knows that the dealers will be devoting all their efforts to selling this product, and (2) the supplier may find it worthwhile to promote its product nationally if he knows that the dealer will not substitute a lower-priced nonadvertised brand when consumers flock to their stores.

The final type of vertical restriction is tying — the practice of a seller conditioning the sale of one product on the sale of another. IBM used to require its tabulating machine customers to buy its tabulating cards from IBM. Many similar examples have arisen in antitrust cases. Some examples include the tie-in of salt to salt dispensers, ink to duplicating machines, cans to can closing machines, and staples to stapling machines. Three explanations of tying practice are prevalent. First, tying may be a form of monopoly extension. Suppose the seller is a monopolist in the tying good market, but not in the tied good market. By forcing customers to buy the tied good from it, the supplier effectively gains more market power in the tied good market.

The second reason for tying is that it allows price discrimination to be implemented more easily. For instance, assume that two theaters, X and Y, are about to rent two movies, A and B, from a movie maker. The theaters' willingness to pay are as follows. Theater X is willing to pay \$100 and \$60 for A and B, respectively. Theater Y's maximum values are \$70 and \$80. How should the movie maker set the prices in this case? Consider two hypothetical pricing policies. Under normal pricing, each movie is priced separately. Obviously, the optimal policy is to charge \$70 for movie A and \$60 for movie B, yielding a profit of $2(\$70) + 2(\$60) = \$260$. Under tying sales, those two movies are sold as a package. Clearly, the movie maker in this case can charge \$150 for the package, resulting in a profit of $2(\$150) = \300 . Thus, tying sales can increase profits.

A classic case of tying is *Jefferson Parish Hospital Dist. No. 2 v. Hyde* (466 US 2, 1984). This case illustrates the type of questions that are involved in a tying arrangement. In 1977, respondent Edwin G. Hyde, a board-certified anesthesiologist, applied for admission to the medical staff of East Jefferson Hospital. The credentials committee and the medical staff executive committee recommended approval, but the hospital was a party to a contract providing that all

anesthesiologist services required by the hospital's patients would be performed by Roux & Associates, a professional medical corporation. Mr. Hyde was not hired and he sought a declaratory judgment that the contract was unlawful under Section 1 of the Sherman Act. In particular, Mr. Hyde argued that the contract created a tying arrangement in the sense that patients of the hospital did not have the opportunity to choose an anesthesiologist service outside of the one that Parish Hospital offered.

The District Court denied Mr. Hyde's claim. First, the court regarded the entire New Orleans metropolitan area as the relevant geographic market, and concluded that since 70% of the residents living in Jefferson Parish went to hospitals other than East Jefferson, the defendant had no significant market power. Second, the court also found that the economic benefits of the contract outweighed the anticompetitive effects, because of lower prices it incurred by only working with Roux & Associates. Because of this, the court could find no reason to declare the contract illegal.

The Court of Appeals reversed the District Court's decision and found the contract to be illegal. The difference this time was that the Appellate Court considered only the East Bank of Jefferson Parish to be the relevant market, and since East Jefferson Hospital held a 30% market share they exhibited significant market power. The court's decision was also based on the reasoning that since most people's medical expenses are covered by insurance companies, hospitals are chosen because of location not because of quality or price. For these two reasons, the Roux contract was found illegal. The court believed that the contract restricted the anesthesiologist choices of the patients. The court also used the Northern Pacific R. Co. v. United States (356 US 1, 1958) precedent as a deciding factor. In this case, Northern Railroad Company received the right to rent or sell the land on either side of its railroad tracks. When it began to sell and rent this land to other parties, it required that the goods produced on this land be transported only by means of the Northern Pacific Railroad Company. This practice was an example of tying arrangement and was found illegal under the Sherman Act.

The Supreme Court reversed the Appellate Court's decision. The Roux contract was not illegal because even a 'patient's lack of price consciousness will not force them to take an anesthesiologist whose services they do not want (Jefferson, p. 3)'. The Supreme Court also did not believe that surgical and anesthesiologist services were economically separate. In other words, people do not demand an anesthesiologist's service without demanding a surgical or some other type of medical service. The Supreme Court also found that when a patient cannot evaluate the quality of the anesthesiologist's performance, then they are more indifferent between certified and non-certified anesthesiologists even in the absence of a tying arrangement. The respondent simply could not show that the contract violated the Sherman Act and unreasonably restrained trade.

Thus far, we have given a broad overview of the antitrust laws and why they were enacted. We have not discussed the economics implications of this legislation. We now discuss how economists have analyzed these various laws

and the practices that have evolved from them. That is, the antitrust legislation has impacted how economists analyze markets and we now discuss that body of research.

8. Recent research

8.1. *Tacit collusion*

If competing firms can successfully collude, they can increase their profits. One fundamental obstacle to price fixing through sustained collusion is the 'cheating problem' of collusive agreements. For example, suppose firm A and firm B produce a homogeneous product and are about to collude on prices they charge. Each firm has two options: 'Price High' and 'Price Low'. If both price high, the firms enjoy the collusive outcome with each getting a profit of \$100. If both price low, competition drives profits down to \$60 per firm. Clearly, firms prefer collusion to competition. However, if the firms 'agreed' to collude on (Price High, Price High), then each firm can get a profit of \$120 by unilaterally reducing its price. By cheating on the collusive agreement, the firm 'steals' business from the other firm and thus can supply the whole the market. This firm gains from cheating at the expense of the other firm. Therefore, the collusive outcome (100, 100) is difficult to sustain as each firm has an incentive to cheat on it. Such a situation is represented by the following table.

In recent years, substantial research has been done on how firms overcome the above-mentioned instability problem of cartels. This line of research offers two insights: (1) collusion can be sustained through retaliation and punishment, and (2) firms can reduce their incentive to cheat on collusive agreements by committing themselves to certain seemingly pro-consumer contractual relationships. We review each of these in turn.

8.1.1. *Sustaining tacit collusion in a repeated game*

Ever since the time of Chamberlin, it has been realized that firms can achieve collusion without explicit agreement. Specifically, tacit collusion can be achieved by the threat of retaliation. Since the 1980s, economists have studied extensively how firms can collude in repeated games in order to formalize the Chamberlinian view. The following example comes from Tirole (1988).

Table 4. The cheating incentive in a collusive agreement.

		Firm B	
		Price High	Price Low
Firm A	Price High	(100,100)	(40,120)
	Price Low	(120,40)	(60,60)

Consider a duopoly industry where the two firms produce a homogeneous product with the same marginal cost, c . The demand for the good is given by $D(p)$. In a static Bertrand game where the firms compete only once, we know that the only equilibrium is the competitive equilibrium in which price equals marginal cost. Now suppose that this basic Bertrand game is replicated infinitely many times. This game is called a repeated game, or supergame. Let $\Pi_i(p_{it}, p_{jt})$ be firm i 's profit at date $t = 0, 1, 2, \dots$ when it charges p_{it} and its rival charges p_{jt} . Each firm seeks to maximize the present discounted value of its profits, given by

$$\sum_{t=0}^{\infty} \delta^t \Pi_i(p_{it}, p_{jt})$$

where δ is the discount factor. At each time t , the firms choose their prices (p_{1t}, p_{2t}) simultaneously. There is no physical link between the periods. But the price decisions at time t can depend on the history of previous prices which each observes at the beginning of time t .

In this repeated game, the static Bertrand equilibrium repeated infinitely is still an equilibrium. To see this consider the following strategy: each firm chooses a price equal to the marginal cost in each period t , regardless of the history of the game up to t . Given that the rival firm charges a price equal to c in this manner, each firm can do no better than to charge c itself. But the interesting feature of this repeated game is that there are other equilibria, which do not involve both firms pricing at marginal cost. Let p_m denote the monopoly price and consider a strategy in which each firm charges p_m in period 0. It furthermore charges p_m in period t if both firms have done so in the past, otherwise it sets its price at marginal cost forever. These strategies are called trigger strategies because a single deviation triggers a halt in cooperation. They constitute an equilibrium if the discount factor is sufficiently high. To see this, note that in charging p_m , a firm earns half the monopoly profit in each period, given that the rival is using the above strategy. By deviating from this price, a firm i can earn maximum profit Π_i^m , the monopoly profit, during the period of deviation, but then it receives zero profit from the next period on. Therefore, if

$$\frac{1}{2} \Pi_i^m (1 + \delta + \delta^2 + \dots) \geq \Pi_i^m,$$

which holds if $\delta \geq \frac{1}{2}$ a firm cannot benefit from deviation, so these trigger strategies constitute an equilibrium.

This result is a formalization of tacit collusion. If a firm undercuts the monopoly price, it gains during the period of deviation but it destroys collusion in the later periods — the firms revert to the static Bertrand pricing forever, which we know is an equilibrium. Note that collusion is enforced through a purely noncooperative mechanism.

There are many other equilibria in this game. The previous reasoning actually implies that any price between the competitive price and the monopoly price can be sustained as an equilibrium price as long as the discount factor is greater than $\frac{1}{2}$. Let p belong to $[c, p_m]$, and let each firm charge price p as long as neither has yet

deviated from that price. If either firm has deviated in the past, both charge the competitive price forever. Again, these strategies are equilibrium strategies. By conforming to p , each firm gets

$$\frac{1}{2} \Pi_i (1 + \delta + \delta^2 + \dots),$$

where $\Pi_i(p) = (p - c)D(p)$.

If a firm deviates, it gets at most $\Pi(p)$ during the deviation period (because its rival charges p). Thus, it gains at most $\Pi(p)/2$ during that period, and loses half of the profit at price p forever after:

$$\frac{1}{2} \Pi_i (\delta + \delta^2 + \dots) = \frac{1}{2} \Pi(p) \frac{\delta}{1 - \delta}.$$

So if $\delta > \frac{1}{2}$ deviating from price p is not privately optimal. (This result is one facet of a general result, known as the *Folk Theorem*. For the repeated game under consideration, the Folk Theorem asserts that any pair of profits (Π_1, Π_2) such that $\Pi_1 > 0$, $\Pi_2 > 0$ and $\Pi_1 + \Pi_2 \leq \Pi_m$ is a per-period equilibrium payoff for δ sufficiently close to 1. For more on the Folk theorem, see Tirole (1988), Chapter 6.)

One factor that may hinder collusion is detection lags. If cheating on a collusive price cannot be detected soon and then punished, it is less likely that firms can sustain collusion successfully. Green and Porter (1984) analyzed such a situation. In Green and Porter, a reduction in a firm's profit at a point in time can be a result of either undercutting by rival firms, or a stochastic decline in demand, so cheating cannot be perfectly detected. The authors showed that firms can still sustain a collusive agreement in such an environment by launching a price war as long as a firm's profit drops substantially. In their model price wars occur whenever demand is low, and serves as a means of enforcing a cartel agreement, rather than a sign of its break down. Rotemberg and Saloner (1986) in a different model showed that price wars occur during booms, in contrast with Green and Porter where price wars take place during recessions. Using the data about the famous railroad cartels in the US in the late nineteenth century, Ellison (1994) tested the above two well-known models of price wars. He found evidence supporting Green and Porter's theory.

8.1.2. *Contracts that facilitate collusion*

In addition to the possibility of launching price wars to maintain prices at high levels, economists have also looked at contract forms that might facilitate collusion.

Most-favored customer clauses

One means of sustaining a collusive agreement is to use the so-called 'Most-Favored-Customers' (MFC) clause. This pricing policy guarantees a firm's

current customers that they will be reimbursed the difference between the current price and the lowest price offered in the future (up to some specified date). For instance, in the 1960s and 1970s the two manufacturers of turbine generators, General Electric and Westinghouse, offered a MFC clause during the six months following a sale. (These firms ended the practice as a part of a settlement to avoid antitrust action.) The reason that a MFC clause may facilitate collusion is as follows. By committing to refund the value of any subsequent price decline, the firm (voluntarily) raises the cost to itself of cheating on any tacitly collusive agreement. By raising the cost of cheating through the MFC clause, the firm effectively signals to other members of the industry its commitment to stand by the tacitly collusive price. Another facilitating device is a 'Meet the Competition' (MC) clause. A MC clause states (either in a contract or in an Advertisement) that the firm will meet any competitor's price on any impending sale. A contractual variation of the MC clause is the 'meet-or-release' provision. Under this provision, a seller agrees to either meet any competitor's price for the length of the contract or release the buyer from the obligation to purchase the agreed-upon amount. The primary function of meet-or-release clause is that, should another firm offer a reduced price, the original seller will be notified by its customers, presumably as soon as the lower price is discovered. Thus, meet-or-release clause informs the supplier of any price-cutting behavior by its rivals and allows the firm to match the lower price if it so chooses. Support for a higher, tacitly collusive price is thus increased in two ways. First, increasing the visibility of any price cheating discourages such behavior. Second, because the original supplier is likely to match the rival's lower price (and therefore retain the customer), the rival sees no benefit from competing via price. As a result, the joint profit-maximizing price is more likely to be sustained. A formalization of the above reasoning in a game theoretic model can be found in T. E. Cooper (1986).

Patent licensing contracts

It has long been recognized that patent licensing may be a means of getting around price-fixing by the substitution of different restrictions (see Scherer (1980), and Priest (1977)). Recently, economists have demonstrated such a possibility, again, by embedding the conventional wisdom in game theoretic models. For example, in a duopoly Cournot set-up where one firm holds a patent on a low-cost technology, Katz and Shapiro (1985) pointed out that if the firm licenses its patented technology to its rival using a contract with output royalties, the firms may be able to sustain collusion. Essentially, the royalty rate adjusts the marginal cost of the licensee so that the noncooperative Cournot equilibrium outputs of the firms coincide with the fully collusive levels. Fershtman and Kamien (1992) analyzes cross licensing in a duopoly of two complementary technologies, both of which are necessary to a production process. It is demonstrated there that, among other things, by charging each other an appropriate royalty, the firms can achieve the collusive outcome. In Eswaran (1993), two firms hold competing patents on two differentiated products, and cross licensing is shown to enhance the degree of

collusion in a repeated game. The intuition for this is as follows. From earlier discussion, we know that firms can tacitly collude in a repeated game. The likelihood of collusion, however, depends on firms' ability to punish potential deviations from the collusive agreement. Since firms produce differentiated products in the model of Eswaran, a deviator can still make a positive flow of profit in the punishing periods in the absence of licensing. Cross licensing, on the other hand, introduces the threat of increased rivalry in the market for each firm's product in the case of deviations. As a result, punishments will be more severe and hence deviations are more likely to be deterred.

The above-mentioned works mostly deal with licensing with royalties, and the channel through which collusion is promoted is that licensors can manipulate the output levels of the licensee by setting the royalty rate. In reality, licensing contracts may contain a fixed fee, as well as output royalties. It has been a common belief that licensing contracts with only a fixed fee cannot possibly have any anticompetitive consequences, for a lump sum fee does not influence the licensee's marginal costs of production. In a recent paper, Lin (1996) challenged this traditional view. Lin considered fixed fee licensing in a repeated game. At the start of the game, the low-cost firm has the option of licensing its technology to its rival. After the licensing decision, the firms compete by setting prices in the infinitely repeated game. He found that, licensing unambiguously increases the range of parameter values that supports collusion with the standard trigger strategies. This result is obtained because licensing enhances the licensee's ability to credibly punish deviations from the collusive outcome on the part of licensor. Because of its cost advantage, the low-cost firm when deviating enjoys a positive flow profit in the absence of licensing. After licensing, however, it earns zero profits if it deviates because the licensee can now lower its price to the level of the common marginal cost. Consequently, the licensor is less likely to cheat on the collusive outcome with licensing. The gain to the licensee from trade (net of the licensing fee) can then be viewed as a side payment by the low-cost firm in order to 'bribe' the high-cost firm to 'exit' the market.

8.2. *Horizontal mergers*

8.2.1. *Theoretical studies on horizontal mergers*

It has been long recognized that although horizontal mergers may be potentially profitable for firms, there are incentive problems associated with mergers or cartel formation. George Stigler (1950) and others have argued that firms that do not participate in a merger may benefit more than the participants. When a merger occurs, the new firm will typically reduce its output. Nonparticipants will then expand output and profit from the resulting higher industry price. Thus, merger participants do not capture all the profits generated from their merger. Because of this externality, mergers which would increase industry profits need not be privately profitable.

The profitability of a merger has been reexamined in the past 15 years. Salant, Switzer, and Reynolds (1983) studied the incentive to merge in a Cournot model with constant marginal cost and linear demand. These authors showed that, even though profits per firm are higher after a merger, a firm's profits in an $(n - 1)$ -firm oligopoly are lower than the profits of two firms in an n -firm oligopoly. Thus, in their set-up, a merger is in general unprofitable. This can be seen from the following simple example. Suppose that initially there are three firms in the industry each has zero cost and produces a homogeneous product. Under linear demand $p = 1 - Q$, the Cournot equilibrium profit per firm is $\frac{1}{16}$. Now if two firms in the industry merge so that the post-merger market becomes a duopoly, the combined firm receives a total profit of $\frac{1}{9}$, which is less than their joint profits prior to the merger, $\frac{1}{8}$.

In a model with differentiated products, Deneckere and Davidson (1983) demonstrated that the results in Salant, Switzer, and Reynolds can be reversed if the merged firm continues to produce all the products of its constituent firms. Perry and Porter (1985) took a different approach by specifying a tangible asset that the merged firm acquires from its two partners. Specifically, the marginal cost of each firm in Perry and Porter's model is given by $C = d + x/s$, where d is a constant, x is output, and s is the fraction of the industry capital that the firm owns. If two firms with such cost structure merge, the corresponding s will increase. Thus, the merged firm has lower marginal cost than prior to the merger, or put differently, it is twice as 'large' as each partner. The authors showed that mergers could be profitable for certain parameter values of their model.

The relationships between merger and welfare has long been a focus of debate in the literature. The Merger Guidelines implicitly assume an inverse relationship between market concentration and market performance. In particular, the entire approach presumes that a structural change, such as a merger, that increases equilibrium value of HHI also systematically reduces equilibrium welfare. Regarding the welfare consequences of horizontal mergers, Farrell and Shapiro (1990) pointed out the danger of this approach by showing that in a Cournot oligopoly, welfare rises with a small change in firms' output if and only if $dX/X + 0.5dh/H > 0$, where X is industry output and H is the HHI. This observation suggests that if a firm with large market share increases its output, then H , X and welfare will all rise. The intuition for this is as follows. In Cournot models, larger firms have lower marginal costs, so welfare is enhanced if a fixed total output X is shifted toward them and away from smaller, less efficient firms. But such shift will increase concentration. 'This observation is not a theoretical curiosity. Critics of US antitrust policy have long argued that large firms may be large because they are efficient. If so, the economic welfare may be enhanced if these efficient firms acquire more of the industry's productive capital and thus increase their market shares. One means to do this is by buying the assets of smaller, less efficient rivals.' (p. 108).

Farrell and Shapiro (1990) analyzed a homogeneous product Cournot oligopoly with general demand and cost functions. They allow for the possibility that mergers can have either a synergy effect, a learning effect, or the effect of

economies of scale. Because of the above various efficiencies that a merger can generate, a merger may lead to positive 'externalities', defined as the change in welfare minus the change in the profits of the merged firms. They derived conditions under which the externality is positive, in which case a privately profitable merger also raises welfare. Their central result is as follows. If the joint market share of the merging firms is less than the weighted sum of rival firms' market shares, and if the second and the third order derivatives of the demand and of the cost functions of rival firms have proper signs, then a merger that is privately profitable and raises price also raises welfare.

Their emphasis on the external effect also has a great practical advantage. To assess the externality requires much less information than to assess the overall welfare effect, since the effect on insiders' profits depends on internal cost savings. Such savings are often hard to observe, and the insiders, if asked to submit such information, may have incentives to overstate them.

The existing literature on horizontal mergers has been focused exclusively on the case of only one merger. The issue of how a merger by some firms may cause regrouping among the rest of the producers in the industry is largely untouched. An interesting future research direction would be to develop dynamic models of mergers to study the possibility that multiple mergers may occur sequentially, and to analyze the effects of government merger guidelines on the incentives to merge.

8.2.2. *Mergers, market concentration, and economic performance: Empirical evidence*

Empirical analysts also shed light on the economic consequences of horizontal mergers. In a clever empirical analysis of the causes and consequences of mergers, Eckbo examined the stock price performance of rivals to the merging firms. For mergers that increase the efficiency of the merging firms, the stock price rivals should fall because the rivals will then be at a competitive disadvantage. Conversely, if the merger is motivated by the expectation of reducing postmerger competition, the rivals should benefit from the postmerger increase in prices. Accordingly, the share price of rivals should rise with the announcement of the proposed merger.¹⁹ Eckbo examined 259 mergers that occurred between 1963 and 1978 and found that the announcement of a horizontal had a small positive effect on the rivals to the merging firms.²⁰ A more conclusive result was that the announcement of an antitrust challenge to the merger had no negative effect on the stock prices of rival firms. Eckbo concluded from this evidence that most mergers, even those challenged by antitrust enforcement officials, are not motivated by the expectation of post-merger collusion, but rather, are efficiency-based.²¹

A recent empirical study indicates a monopoly motivation for mergers. Using a methodology similar to Eckbo's, Prager (1992) has examined the stock price consequences of the merger between the Great Northern Railway Company and the Northern Pacific Railroad. Unlike Eckbo, however, Prager found evidence

that the stock prices of rivals to the merging railroads were positively affected by the merger and negatively affected by subsequent antitrust activity.

8.3. *Vertical mergers*

A focus of the recent study of vertical integration is the strategic incentive for vertical integration and vertical mergers. One such strategic motive is to 'raise rival's costs'. Suppose that there are two computer chip producers: firm A and firm B, and two downstream computer makers; firms 1 and 2. Initially, A and B supply both downstream firms. Now consider what will happen if firm A and firm 1 vertically merge. After the merger, the combined firm may refuse to sell chips to firm 2, and if so firm B becomes a monopolist in the upstream market. Therefore, the chip price that firm 2 faces now is higher than the premerger duopoly price. That is, by acquiring an upstream supplier firm 1 has been able to raise the input price of its rival, thereby gaining a competitive advantage over firm 2. Of course, in response to the merger by firm 1 and firm A, firms 2 and B may also merge. This happens only if firm B finds the merger more profitable than earning a monopoly profit. A recent paper by Ordober, Saloner and Salop (1990) shows that under certain conditions firm B may refuse to merge with firm 2, so to raise rival's cost is an equilibrium phenomenon in their model. See, also, Hart and Tirole (1990). Both these papers focus exclusively on the case where upstream firms compete in prices, so the double-marginalization problem is absent. In a recent paper, Gaudet and Long (1996) considered the issues of vertical integration and foreclosure in a model where both the upstream and the downstream firms are Cournot players. They showed that integrated firms may continue to purchase inputs from unintegrated upstream firms, with the goal of raising the costs of their downstream rivals. They also show that asymmetric equilibrium, where integrated and unintegrated firms coexist, may arise in equilibrium.

8.4. *Vertical relationships*

Telser (1960) and Yamey (1954) noted that resale price maintenance can be used to preserve a large dealer profit margin that generates downstream incentives to engage in promotional activities. An implicit assumption behind this argument is that downstream promotional effort is not easily observed by the manufacturer and, hence, cannot be rewarded in a more direct way. Their approach suggests that vertical restrictions can be understood as contractual relationships that are best response to various informational problems that upstream and downstream firms face. Consistent with this, the literature on vertical restrictions in the last fifteen years has been trying to explain the existence of various vertical restrictions by appealing to adverse selection (where contracting parties have asymmetric information, say, about demand) and/or moral hazard (where a party's unobservable action may affect other party's profit). In what follows, we demonstrate the methodology commonly adopted in the literature by reviewing a few recent works in this field.

8.4.1. *Using vertical restrictions to mitigate adverse selection or moral hazard*

Blair and Lewis (1994) considered the situation where there are both adverse selection and moral hazard on the part of the downstream firms. In their model, a manufacturer hires a dealer to market and stimulate final demand for the good by providing promotional and quality enhancing services to consumers. Neither the level of service supplied by the dealer nor the state of demand can be observed by the manufacturer. Consequently, adverse selection and moral hazard problems may arise in which the dealer can claim that high sales are due to her promotional effort, while low sales result from sluggish demand. The question is then how can the manufacturer design a contract that mitigate such problems.

The demand is given by $Q(p, X, \theta)$, where p is the retail price, X is the level of promotion, and θ is an exogenous taste or demographic variable that affects demand. Let $X(p, Q, \theta)$ denote the promotion function which is obtained by inverting the demand function Q . The consumer is privately informed about θ . The manufacturer's imperfect knowledge of consumer demand is represented by letting θ be the realization of a random variable distributed on $[\underline{\theta}, \bar{\theta}]$ with density function $f(\theta)$. The timing of the model is that the dealer first learns about demand parameter θ . Then the manufacturer offers a menu of contracts $\{p(\theta), Q(\theta), A(\theta)\}$ that indicates the retail price p , the supply of the good Q provided to the dealer and the fee A paid by the dealer to the manufacturer. The dealer selects from the menu of contracts according to her report of θ to the manufacturer.

The profit of a dealer of 'type' θ (i.e., a dealer who has observed θ) who reports θ' is given by

$$\begin{aligned} \Pi_d(\theta' | \theta) &= \max p(\theta')Q_d - X(p(\theta'), Q_d, \theta) - A(\theta') \\ &\text{subject to } Q_d \leq Q(\theta') \end{aligned}$$

where the dealer chooses a profit-maximizing sales level, Q_d , which is bounded above by $Q(\theta')$, the manufacturer's allocation.

The manufacturer's problem is then to design a menu of contracts $\{p(\theta), Q(\theta), A(\theta)\}$ to maximize the expected fee $\int_{\underline{\theta}}^{\bar{\theta}} A(\theta)f(\theta)d\theta$ collected from the dealer (for all θ, θ') subject to²²

$$\begin{aligned} \Pi_d(\theta | \theta) &\geq 0 \\ \Pi_d(\theta | \theta') &\geq \Pi_d(\theta' | \theta) \\ Q(\theta) &\leq \arg \max [p(\theta)Q - X(p(\theta), Q, \theta) - A(\theta)] \end{aligned}$$

The first condition stipulates that the dealer must receive at least her reservation profit (which is zero) under the contract. The second condition is the incentive compatibility constraint, which implies that the dealer maximizes her profits when truthfully reporting her privately observed θ . The third constraint states that the dealer cannot be induced to sell more than the profit-maximizing level.

The authors then derived the properties of the optimal contract, the solution to the above maximization problem. The optimal contract depends crucially on how the manufacturer's choice of p and Q affects $-X_\theta = Q_\theta/Q_X$ the marginal rate of

substitution of promotion for exogenous demand. The following results were obtained. (1) If $X_{p\theta} < 0$ and $X_{Q\theta} < 0$, then the optimal contract entails both a price ceiling and quantity rationing; (2) If $X_{p\theta} > 0$ and $X_{Q\theta} > 0$, then the optimal contract entails both a price floor and quantity forcing.²³ The optimal pricing distortions are designed to decrease the substitutability between X and θ . Consider case 1 where $MRS_{\theta X} = -X_{\theta}$ is increasing in both p and Q . The optimal contract involves both a pricing ceiling and quantity rationing as both price and quantity are set below the joint profit-maximization levels. The intuitive explanation is that starting with the joint-profit-maximizing price, if price were decreased slightly, to the first order, there is no effect on joint profits. However, a price decrease would reduce the substitutability between promotional effort and demand, thus decreasing the information rents of the dealer. Consequently, manufacturer profits are higher with a price ceiling. Similar intuition applies to case of a price floor.

Thus, depending on how price and quantity choice affect the substitutability of the random demand component for promotion, the vertical contract exhibits either price ceiling or price floor. The result might help to explain the finding of Ippolito (1988) that price ceiling and price floors are sometimes observed in the same industry across different markets. For example, in 18 RPM cases involving gasoline retailing, price ceilings were alleged in one-half of the cases and price floors were alleged in the remainder of the cases. This could be explained by a variation in consumer demand parameters across different markets in the industry. Regarding the welfare effect of RPM, the authors provided one example in which a price ceiling is detrimental to consumer welfare, and a price floor may increase consumer surplus, relative to the case that vertical constraints are not allowed. Motivated by observations in franchising contracts, Bhattacharyya and Lafontaine (1995) considered a model where there is a double-sided moral hazard problem in a manufacturer-dealer relationship. In such a vertical relationship, joint profits depend on the actions of both the manufacturer and the dealer. For instance, sales are affected by the quality of the product (which depends on the effort of the manufacturer) and the promotional effort of the dealer. Since each party's effort also benefit the other, the firms may have a tendency to 'free ride' on each other in the absence of a vertical restraint. Similar to the approach adopted in Blair and Lewis, Bhattacharyya and Lafontaine analyzed the optimal contract for the manufacturer and the dealer under the relevant incentive constraints. They found that a linear revenue sharing contract is optimal in mitigating the double moral hazard problem. A nice feature of their model is that it fits well over the observed pattern in many franchising contracts.

8.4.2. *Anticompetitive incentives for vertical restrictions*

A recent paper by Rey and Stiglitz (1995) analyzes a strategic incentive for producers to offer their dealers exclusive territories. In their model, two manufacturers produce imperfect substitutes and distribute them via retailers. Their model is one of perfect information; there is neither adverse selection nor

moral hazard. A two-stage game is considered. In the first stage, manufacturers simultaneously propose contracts to their retailers. In the second stage the retailers compete in prices. Their main result is that by lessening competition in the downstream market, imposing exclusive territories can decrease competition in the upstream market. The intuition of this result is as follows. A producer would like his rival to match price increases, so that as he increases his own price, the rival does not get any price advantage. In general, it will not be in the best interest of the rival to do this. In the standard Bertrand equilibrium, a producer considers the consequences of changing his price assuming his rival does not alter his own price. In the game of Rey and Stiglitz, the rival producer does not change his price, but the rivals' retailer will in the second stage of the game. This leads to a lower perceived elasticity of demand, and hence to higher prices.

The issues regarding vertical relationships in general involve a synthesis of many branches of economics, such as contract theory, strategic behavior, and information economics, and are hence extremely difficult to analyze in a compact way. It is believed that research in this field will be fruitful (Tirole, 1988).

8.5. *Research and development cooperation*

Another field where there has been extensive economic research recently is cooperative research and development (R&D). It is safe to say that during the 100 years of antitrust history of the United States, it had been believed that any type of cooperation among rival firms will harm competition and economic prosperity. This traditional view has been changed since the 1980s and is reflected in the literature of R&D cooperation among business firms. Prior to 1980, there were two main antitrust concerns regarding R&D cooperation. First, it was believed that since competition is the engine of technological progress, cooperation will automatically hamper innovation. Second, R&D cooperation may be used as a vehicle by firms to fix prices. In the past fifteen years, partly in response to Japanese experience in allowing and even encouraging R&D cooperation, economists have been engaged in active study in the effects of cooperative research on technological progress. For example, D'Aspremont and Jacquemin (1988) emphasize that 'spillover' — the idea that a firm's innovative effort may inevitably benefit rivals due to imitation, etc. — is the nature of the innovation process. The presence of 'spillover' decreases the incentive for R&D. The authors showed that if such technological 'spillover' is large, R&D cooperation may in fact increase equilibrium R&D investment, as firms can internalize 'spillovers' through cooperation. It is by now widely agreed among economists that R&D cooperation may foster innovation, in contrast with the traditional beliefs.

Influenced by economists' suggestions, the Congress of the United States in 1984 passed The National Cooperative Research Act (NCRA). The two main provisions of the NCRA are: (1) the law explicitly states that the rule of reason standard applies to research joint ventures; and (2) cooperative R&D ventures registered under the Act pay actual damages, rather than treble damages, in case they are found guilty of antitrust violations. In 1993, Congress passed the

National Cooperative Research and Product Act which extended the protection of the NCRA to joint production ventures. However, Congress was not convinced that the benefits of joint marketing would dominate the associated risks of cartel behavior and consequently rejected this proposal (Antitrust & Trade Regulation Report, 6-10-93, p. 721).

9. Concluding remarks

This paper surveys the development of the US antitrust system, concentrating on the extent to which antitrust law reflects the state of current economic theory. The second section of this paper describes enforcement in the US antitrust system from a historical perspective. Case law, economic theory and policy instruments such as the Merger Guidelines detail an increasingly refined approach to the identification and prosecution of anticompetitive behavior. The third section presents empirical evidence of a major change in the level of US antitrust enforcement. We show that the time series of caseloads is best represented as a difference stationary process and document a significant comovement of the levels of government and private antitrust cases. The laws governing specific areas of antitrust (price-fixing, monopolization, mergers, and vertical restraints) are detailed in sections four through seven. While some of these issues, such as the inefficiency of monopoly, have produced rallying points for jurists, economists and policy analysts, other issues such as predatory pricing continue to elude any sort of formal consensus. Still others, such as price discrimination as viewed through the odd and convoluted language of Robinson-Patman, defy reasonable and useful interpretation. Finally, we review many of the recent developments in the economic theory of market structure, some of which have already impacted the enforcement of antitrust, and some which certainly will in the near future. Due to space limitations, many important questions are not addressed, such as the comparison of the US antitrust system with those of Japan and European countries, the relationship between antitrust and politics, etc. Readers interested in these issues should review Martin (1994) and Burgess, Jr. (1995).

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Notes

1. In much the same way, the Sherman Act's anti-predation stance reflects a single, not universally held, view of the relationship between price-cost margins and predatory

intent. It has similarly been argued (Williamson, 1977; Joskow and Klevorick, 1979) that anti-predation legislation which depends only on price-cost margins may have anticompetitive effects. See Section 5.1 for a more detailed discussion of this issue.

2. Formally, the total assets of each of the involved firms is only one criterion for the reportability of a transaction. Transactions which result in one firm holding a large percentage of the voting securities in another firm or a large financial stake in the other firm are also reportable (US General Accounting Office, 1990).
3. The jurisdiction of the FTC and DOJ does not extend to all industries. In particular, Section 10 of the Clayton Act specifies that banking institutions, for example, are covered by the Board of Governors of the Federal Reserve.
4. These guidelines cover horizontal mergers only. A set of Vertical Merger Guidelines was introduced by the Justice Department in 1985, but they proved highly controversial and were withdrawn in 1993 by Assistant Attorney General Anne Bingaman.
5. It may seem somewhat remarkable, therefore, that President Woodrow Wilson was convinced to cede some administrative control over antitrust enforcement to an independent commission. In fact, Wilson was initially opposed to the creation of the FTC. However, as Burgess (1995) notes, he was finally convinced by Louis Brandeis and Teddy Roosevelt (among other Progressives) that the broad scope of its protection against 'unfair competition' was desirable. Additionally, it is important to keep in mind, as Wagner (1971) notes, that the 'independence' of independent commissions had yet to be established. This would not occur until the Supreme Court ruled on the 'Humphrey Affair' in 1935, a case in which President Roosevelt demanded the resignation of William E. Humphrey, then the Chairman of the FTC.
6. The aforementioned GAO report (US General Accounting Office, 1990) indicates not only that the Reagan and Bush administrations had shifted DOJ resources away from the Antitrust Division, but also that, 'Although Division management told Congress that decreases in its budget would not affect its enforcement activities, resource constraints appear to have impeded the Division's enforcement of the antitrust laws'. (p. 36) Congress expected that the 1990 imposition of a \$20 000 fee for the required Hart-Scott-Rodino premerger filing would generate significant additional resources for the Division. Instead, the report notes that 'Filing fees, however, have proven to be less than anticipated', roughly three-quarters of the expected \$20 million.
7. Keeping in mind the five aforementioned factors affecting the antitrust caseload, there is clearly room for structural research explaining these stylized facts.
8. Although the statutory limit on corporate fines is \$10 million, individuals and corporations can also be fined twice their gross pecuniary gain from the crime or twice the gross pecuniary loss they imposed on another.
9. The case is *United States v. Mrs. Baird's Bakeries, Inc.* The US Department of Justice prosecuted the case, which is currently under appeal as docket #96-10671 in the Fifth Circuit.
10. Allis-Chalmers, while implicated in earlier price-fixing allegations in the market for electrical equipment, exited this market in late 1962 and was not involved in this case. (Sultan, 1974).
11. The other firms involved were Allis-Chalmers with 11% and I-T-E with 9%. (Carlton and Perloff, 1994).
12. In *Appalachian Coals*, competing producers of bituminous coal formed a corporation to act as their selling agent in setting prices. The government brought suit and the district court in 1932 found *Appalachian Coals* in violation of the Sherman Act. However, upon appeal, the Supreme Court reversed the decision. The opinion

- observed that 'a close and objective scrutiny of particular conditions and purposes is necessary in each case. ... The mere fact that the parties to an agreement eliminate competition among themselves is not enough to condemn it'.
13. They recommend using short-run average variable cost as an approximation for short-run marginal cost.
 14. The Supreme Court, unable to manage a quorum, sent the issue to the Circuit Court of Appeals where it was tried before Circuit Judges L. Hand, Swan and A.N. Hand.
 15. See Schmalensee (1978) for an economic model of the 'product proliferation' strategy.
 16. The 1984 Guidelines are reprinted in the Trade Regulation Reports, June 5, 1992. In 1992, the Guidelines were re-released and can now be found on the Internet at www.usdoj.gov/atr/guidelines/merger.txt.
 17. An excellent treatment of the effect of these sort of economies of scope on firm behavior may be found in Teece (1980).
 18. For further reading on this topic, please see Spengler (1950).
 19. A potential problem with this methodology occurs if the rivals are large, diversified firms that draw relatively small amounts of their income from the affected market. In this case, the stock price consequences on the rivals to the merging firms may be negligible regardless of whether the merger is procompetitive or anticompetitive. See, for example, McAfee and Williams (1988).
 20. This result, Eckbo argues, is consistent with the notion that a merger announcement often sends a signal to rival firms about how they too might improve their efficiency. Under this 'signaling' theory, the share prices of rival firms may actually rise in the face of an efficiency-driven merger proposal by competitor firms.
 21. A similar study and set of empirical findings is contained in Stillman (1983).
 22. Costs of production are assumed to be zero for simplicity.
 23. The authors refer to a price ceiling (or floor) as a situation in which price is set at a level below (or above) the joint-profit-maximizing level. The same qualification applies to quantity rationing and quantity forcing.

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