The Intertemporal Path of U.S. Criminal Antitrust Enforcement

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Abstract
Firms’ conduct related to price-fixing, bid-rigging, output-restriction and market allocation schemes are considered illegal per se and these constitute the criminal antitrust conspiracies. We study criminal enforcement by the Antitrust Division of the U.S. Department of Justice during the post-war era, 1948-2003, and the data reveal substantial short-run fluctuations in enforcement as well as conspicuous long-run drifts. Four key findings emerge from our time-series analysis which controls for shorter-run and longer-run driving forces. First, criminal enforcement follows a distinct counter-cyclical pattern with the number of criminal cases prosecuted by the Antitrust Division increasing about two years after an economic downturn. We tie this finding to the rich literature on the stability of cartels. Second, criminal enforcement appears to increase a year or two after increases in civil enforcement (monopolization cases, merger control and restraints of trade). We link this finding to the process via which the Antitrust Division pursues criminal investigations and our results suggest that civil investigations unearth criminal conduct leading to an increase in criminal cases prosecuted. Third, there is evidence of a clear structural-break in criminal enforcement starting around 1979. We relate this result to the shift in U.S. doctrine of emphasizing antitrust enforcement in those areas with clearer loss of welfare. We also discuss the role played by amnesty programs, leniency laws and increases in fines. Fourth, our results show that post-structural-break, Republican administrations have placed greater emphasis on criminal enforcement as compared to Democrats. An explanation of this finding is that Republicans have attempted to target business conduct with incontrovertible harm to consumers without compensating gains in efficiency. Apart from the main results, the paper also looks at the bigger picture of criminal enforcement which includes grand jury investigations, fines imposed on individuals and corporations and the number of individuals and corporations charged.

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1. Introduction

Business conduct related to price-fixing, bid-rigging, output-restriction and market allocation schemes are *per se* antitrust violations and are considered to be illegal as they have clear detrimental effects on (consumer) welfare. This is in contrast to the market power versus efficiency considerations in merger control where the *rule of reason* prevails. Criminal antitrust enforcement aims to impose penalties on past and ongoing behavior and aims to act as a deterrent for future conduct. As described in Antitrust Division’s primer on price-fixing and related violations and the American Antitrust Institute’s (2001) report:

Price-fixing can occur when there is agreement to adhere to price discounts, to hold prices firm, to eliminate or reduce discounts, to maintain certain price differentials between different types, sizes, or quantities of products, to adhere to a minimum fee or price schedule, to fix credit terms or not to advertise prices. Bid rigging can be in the form of: bid suppression (where competitors may agree not to bid), complementary bidding (where bids which are submitted are artificially too high or too low so as to be unacceptable to the buyer), bid rotation (where competitors take turns to submit the lowest bid) or subcontracting (where the winning bidder contracts to competitors whom have agreed not to bid or to submit a losing bid). Customer or market allocation can occur not only by refusing to sell to customers allocated to another competitor but by offering an artificially high price to customers to ensure they do not buy.

An emerging literature has focused on the deterrent value of enhanced criminal fines and the role played by leniency programs in revealing information about price-fixing and related violations. These studies, however, use data only from the recent past since the important changes in these programs are relatively new. Somewhat surprisingly, there does not appear to be any study that conducts a systematic econometric analysis of the criminal enforcement patterns by the Antitrust Division of the U.S. Department of Justice. Since the U.S. has had the longest distinct criminal and

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2. The civil enforcement, comprising of merger control, monopolization and restraints of trade cases, is jointly carried out by the Federal Trade Commission and the Antitrust Division of the Department of Justice. Criminal enforcement related to violations like price-fixing, bid-rigging and market allocation schemes, however, is exclusively conducted by the Antitrust Division. Foer and Landes (1999, p.23) note
civil components to antitrust enforcement of any country, and that enforcement has undergone dramatic changes over the last few decades, this rich history provides us with an interesting opportunity to econometrically examine some the economic, political and intellectual forces that have driven changes in this component of antitrust enforcement.

This paper aims to study the broad forces that have driven some of the changes in criminal enforcement over time. Figure 1(a) presents the time-series data on criminal prosecutions (or, criminal cases filed by the Antitrust Division) over the period 1948-2003; the data show short-run fluctuations as well as evidence of long-run drifts. In terms of identifying the broad forces that may have played a role, we focus on three: (i) fluctuations in economic conditions and the stability of collusive agreements; (ii) shifts in intellectual thinking about the role of antitrust and criminal enforcement in particular; and (iii) the political will to more vigorously pursue criminal enforcement. In section 3 we review point (i) above and discuss the theoretical and empirical literature on the potential link between economic conditions and criminal investigations. Below we discuss points (ii) and (iii).

There is now a large literature on the impact of the contributions by Stigler (1964), Williamson (1968) and Demsetz (1973, 1974) on the conduct of antitrust. This shift in intellectual thinking was later picked up by the Chicago-School legal scholars who in numerous contributions that in terms of funding allocated, close to 70% of federal antitrust activity is carried out by the Antitrust Division of the Department of Justice.

In one of the earliest cartel cases, the Department of Justice in the 1907 American Tobacco case sued 94 U.S. and several British firms. The charges included the U.S. and British firms agreeing to stay out of each other’s domestic markets and geographically allocate the remainder of the global markets. The U.S. Supreme Court ruled that the conduct was illegal.

There have been several studies, starting with Posner (1970), that have examined fluctuations in antitrust enforcement as measured by the total number of antitrust court cases initiated by the antitrust agencies; some of the key papers in this literature are summarized in Ghosal and Gallo (2001). This literature has examined the link between politics and antitrust, interest group effects and the impact of economic fluctuations on antitrust. However, these studies do not focus on criminal antitrust enforcement.
solidified the law and economics framework for the new antitrust.\footnote{For example, Bork (1978), Posner (1979), Easterbrook (…) and Landes and Posner (1981).} This school of thought generally took the view that the only types of antitrust violations the government should focus on are price-fixing and certain types of mergers. Posner (1979) remarked that “only explicit price fixing and very large horizontal mergers ... are worthy of serious concern.” Bork (1978) notes that taking action against price-fixing have lead to potentially large gains in consumer welfare over the decades. He argued that the primary focus should be on horizontal price-fixing agreements between competitors which are \textit{per se} anti-competitive. The overall impact of this change in thinking was as follows. First, civil antitrust matters related to vertical and conglomerate mergers, resale price maintenance, vertical restrictions, among others, that were looked down upon as anti-competitive and reducing welfare, were de-emphasized as greater emphasis was placed on the pro-competitive and efficiency aspects of mergers and other business conduct. Second, the focus of enforcement sifted to areas where there was likely to be clearer harm to welfare: (i) price-fixing and related conspiracies; and (ii) horizontal mergers in relatively concentrated markets. This has been documented extensively in, for example, Baker (2002, 2003), Crandall and Winston (2003), Kovacic and Shapiro (2000), Mueller (1996) and Peltzman (2001).

The above considerations reasonably lead us to believe that the overall antitrust climate had changed to emphasize the significant consumer welfare loss associated with price-fixing and related violations causing (in econometric terminology) a structural-break in the enforcement of criminal conduct. While we may have a approximate idea about the time-period when these effects occurred, we may not be able to precisely identify the date of the structural-break. In section 6 we use time-series econometric techniques to detect the potential structural-break date.

Turning to political will, it appears to be the case that following the new beliefs regarding the central purpose of antitrust, the Republican administrations have potentially taken this message...
to heart. Criminal enforcement was significantly ratcheted up during the Reagan administration with a 112% increase in the number of criminal cases prosecuted as compared to the Carter administration (see Table 4). The upswing during the Reagan tenure continued into the Bush Sr. administration. Since then the pace of the number of criminal prosecutions has tapered off, but there were dramatic increases in criminal fines under the Clinton administration. There are several complex aspects to these bigger changes which we discuss later in Section 8. While the prosecutions under Bush Jr. administration has dropped off quite a bit, it is not entirely clear at this point whether this is due to lack of enforcement or whether companies have become more aware of large fines and the deterrence effect is working. In terms of his antitrust philosophy, in an interview reported in Financial Times (Feb. 17, 2000), Bush noted: “My own personal view... is [that] ... antitrust law needs to be applied where there are clear cases of price-fixing.” He went on to suggest that antitrust enforcement should be restricted to price-fixing. From a historical antitrust perspective, this is quite a radical departure and generally reflects a more extreme version of the stance on antitrust during the Reagan administration. Given this, in our econometric analysis we control for the political stance and attempt to quantify the extent of the difference, if any, between Republican and Democratic administrations. Examining the potential political effect is also interesting because of the institutional structure of the Antitrust Division: The Assistant Attorney General who heads the Antitrust Division is appointed by the U.S. President, setting the stage for potentially large shifts in enforcement with switches of the party in power.

Apart from the shift in intellectual thinking and potential changes in political will, there have been several key administrative milestones related to changes in leniency laws and harsher fines to make criminal enforcement more effective and increase the deterrence value; Griffin (2003), Klein (1999), Kobayashi (2001) and the American Antitrust Institute’s (2001) report present details on these changes and their potential effects. It is important to note that while these have been key factors
in the success of enforcement in recent years, in the bigger picture of criminal enforcement these changes are endogenous to the broader shifts in intellectual thinking about criminal enforcement and the political willingness to prosecute.

The paper is organized as follows. In section 2 we provide details about the process via which criminal antitrust investigations emanate. Section 3 provides a review of some results related to the link between economic conditions and the stability of cartels. The empirical model, data and econometric issues related to identifying structural-breaks in antitrust enforcement are presented in sections 4, 5 and 6. Estimation results appear in section 7 and the paper concludes with a discussion and final remarks in sections 8 and 9.

2. Criminal Antitrust Investigations: The Process

To gain an understanding of price-fixing and related criminal prosecutions by the Antitrust Division, it is important to grasp the genesis of such investigations. The first point that needs to be noted is that the Antitrust Division does not have the resources to scour the entire landscape looking for price-fixing and related violations. The economy is too big and the size of the Division’s staff and monetary budget are simply not large enough to handle this workload. Instead, the Division has to rely on other mechanisms to get information. Table 1, for example, provides a quick look at the Division requesting information about possible violations. Ideally one would like to have information about the origins of a given price-fixing case. However, due to confidentiality restrictions, it is very difficult in general to publicly trace the source of information that triggered an investigation. (At times such information has become available for the more prominent cases, but are not available generally.) The origins of a criminal investigation by the Antitrust Division can be myriad and they can emanate from, for example:

(1) Documents and other information discovered during the process of other investigations. For
example, the issuance of second-requests and civil investigative demands during a merger evaluation may reveal cooperative pricing and market allocation schemes. Also, one criminal investigation may reveal information about other criminal violations;\(^6\)

(2) Information provided by other firm(s) in the market;\(^7\)

(3) Signs of price wars, potentially signaling breakdown of collusive agreements;\(^8\)

(4) Signs of rapid increase in prices or complaints by consumers or consumer groups about rising prices and suspicion of cartel-like activities. These have occurred in myriad products such as school milk contracts, electricity, local construction projects, gasoline, cable television, natural gas, airline pricing, among others;\(^9\)

\(^6\) For example, the Antitrust Division’s investigation of the lysine cartel involving Archer-Daniels Midlands and several Asian firms unearthed evidence on vitamin and related cartels leading to their prosecution including large multinationals like Hoffman-La Roche and Rhone-Poulenc. There are numerous instances of one investigation leading to another is common. Block and Feinstein (1986) presents evidence from the highway construction industry where the Antitrust Division prosecuted about 200 contractors on charges of bid-rigging. Another example is the Antitrust Division while evaluating the pending merger between First Data Inc. and Concord EFS Inc. discovered evidence on exclusivity contracts between Western Union Financial Services Inc. and retail outlets which prevent competitors from setting up money-transfer systems at those outlets. This lead the Division to start an investigation of Western Union and issue Civil Investigative Demands (“Western Union Gets DoJ CID,” \textit{Wall Street Journal}, February 5, 2004; “Exclusivity Pacts By Western Union At Stake in Probe,” \textit{Wall Street Journal}, February 9, 2004).

\(^7\) For example, in 1999 a settlement was reached in a milk price-fixing case where Marigold Foods, Land O’Lakes, Geo Benz and Sons, and Marigold Venture along with Dairies Trade Association were the accused. Part of the origin of this investigation was information revealed by another firm in the market.

\(^8\) Examples ...

\(^9\) For example, in 2001, at the height of California’s energy crisis, the price of natural gas spiked about 700% as it crossed the state line on an El Paso Corporation pipeline. This increase in price prompted complaints by various groups leading to judicial investigation and eventual prosecution. El Paso Corp. was accused to have entered secret deals - recorded in phone and other conversations - to cut out competitors and drive up prices. Subsequently when El Paso Corp. gave up control of the flow of gas, prices plummeted. During the same time period, the California Independent System Operator found that prices in 2000 were 10 times higher than in 1999 and the electric companies had withheld power through bidding strategies. In 1999, the Nevada Grocery Retailers filed a complaint with the State Dairy Association accusing local and regional dairies with collusion. In 2000, the Colorado Attorney’s General office initiated an investigation into gasoline price fixing after receiving numerous complaints from local businesses and individuals of suspected collusion.
(5) An informant via the leniency program;¹⁰
(6) Information uncovered while studying bidding patterns.¹¹

If, after review of the information and markets, the Antitrust Division reckons that the conduct falls under one of the criminal violations, they will recommend a federal grand jury investigation. The grand jury comprises of a group of several individuals - up to about two dozen - who become privy to the confidential information that forms part of the government’s case. During the grand jury investigation the accused has no access to legal counsel. However, the counsel for the defendant can negotiate with the Division on the terms of the subpoenas. The investigation begins with the Antitrust Division issuing subpoenas for documents. Since the process is confidential, the grand jury deliberations are often the first time the defendant hears about the accusations leveled by the Antitrust Division. If, on completion of the grand jury hearings, there is ample evidence, the Antitrust Division prepares a draft indictment. The Assistant Attorney General of the Antitrust Division makes the final decision on whether or not to indict certain individuals. Given the above process, it may take a fair amount of time to collect all the evidence required to successfully prosecute price-fixing cases.

3. Economic Conditions and Cartels
We noted in section 2 that some of the channels through which the Division gets information about price-fixing and related violations are when price wars occur or when prices spike and the information flows into the Division’s investigative offices. Our objective here is to get a sense of

¹⁰ Examples of where leniency played a part in revelation of information and prosecutions are (1) the Sotheby’s and Christie’s auction house conspiracy and (2) the vitamins cartel where Rhone-Poulenc collaborated with the Antitrust Division to provide evidence against Hoffman La Roche and BASF.

¹¹ These examples are too numerous to cite. Many of them have occurred as part of government contracts. Many others in local and regional markets. The products have ranged from timber, military supplies, milk, petroleum, aluminum, construction projects, waste disposal, among numerous others.
whether economic expansions or contractions are more likely to produce evidence on the existence of collusive agreements, leading to investigations.

Good evidence on the formation, duration and stability of cartels are notoriously hard to find. Most of the reliable evidence we have are from a relatively handful of prominent cartels that have been discovered and/or prosecuted. Scherer (1980), Suslow (1988) and Levenstein and Suslow (2002), for example, provide reviews of the empirical literature. Our purpose is to examine the evidence, discuss predictions of some of the theoretical models and attempt to link them to when information might flow into the Antitrust Division for investigation and subsequent prosecution.

The conventional view on the link between economic conditions and the stability of collusive agreements is probably best summarized in Scherer (1980, p.206) who notes that:

“there is evidence that industries characterized by high overhead costs are particularly susceptible to pricing discipline breakdowns when a cyclical or secular decline in demand forces member firms to operate well below designed plant capacity.”

He goes on to give examples of industries like cement, mining, chemicals, steel and aluminum. According to this view, collusion is likely to break down during periods of low demand. In more recent work, Levenstein and Suslow (2002, p.11) review several cross-section studies of cartels and conclude that instability in the economic environment destabilizes cartels. Suslow (1991) finds that demand uncertainty is the single most important determinant of cartel stability, affecting it adversely. In terms of evidence from the more detailed case-studies, Levenstein and Suslow (p.18) note that very few case studies have “...informed our understanding on the relationship between cyclicality and cartel stability.” In terms of duration, Levenstein and Suslow note that the precise timing of the start and end of cartels is hard to pin down, In terms of the evidence they compiled, cartels typically have lasted between 3 to 8 years. Of the cartels during the 1990s for which they have evidence, the average duration was about 5.4 years with a standard deviation of 4.7 years.

Turning to theory, there is an extensive game-theoretic literature that models how changes
in economic conditions affect the stability of cartels. However, the assumptions and the nature of demand fluctuations considered, vary considerably across the different models. So it is hard to generalize the results. Below we briefly review the results from a few key papers to highlight the contrasting results offered by the models. In an important departure from the conventional wisdom that cartels are likely to break down during economic downturns, Rotemberg and Saloner (1986) and Rotemberg and Woodford (1992), for example, showed that the incentive to deviate from collusive agreements is greatest during economic expansions - when demand is “high”. In contrast, in Green and Porter (1984) the incentive to deviate from collusive agreements is greatest when demand is low. Haltiwanger and Harrington (1991) relax the i.i.d. assumption about demand changes in Rotemberg and Saloner (1986) and construct a more general model which incorporates the intertemporal path of demand changes. They show that prices will generally co-move with the state of demand; while the gains from deviating from the collusive agreement are the greatest during periods of high demand, collusive agreements are more likely to break down when demand is low as foregone profits are relatively low. In more recent work, Nocke (2002), for example, shows that a sufficient fall in demand will lead to greater excess capacity which in turn causes the cartel to become unstable. In equilibrium some or all firms will leave causing the price to collapse. These set of models produce results that are more in tune with the conventional wisdom of greater likelihood of cartel breakdowns during periods of economic contractions. Overall, there is little consensus in theory as to whether cartels are more likely to break down when demand is low or high.\footnote{Slade (1987, 1990) presents an insightful discussion of the problems of testing oligopoly models. She points out that definitive tests that would allow us to distinguish between alternate game-theoretic models were not possible as the frequency of the data collected were often longer than the firms’ response time. In addition, while the method of communicating and observability of choice variables form an important part of the dynamics of strategic interaction, controlling for these fundamentals in data would be quite difficult.}

To shed light on plausible outcomes, we turn to some empirical findings. Suslow (1988)
investigated international cartels and found that survival was directly proportional to economic activity. Baker (1989) found that cartels in the U.S. Steel industry were more likely to break down when demand is low. Examining cartels formed under the Webb-Pomerene Export Trade Act, Dick (1996) finds that stability was greater during periods of stable prices and growing demand. Slade (1990) concludes that low demand appears to be conducive to price wars. Levenstein and Suslow (2002) note that cheating and negative external shocks appear to be important contributors to cartel breakdowns.

What are the implications of these findings for our study? One of the channels via which information about price-fixing and related violations flows into the Antitrust Division is, for example, when price-fixing agreements break down, sometimes manifesting themselves in price wars or complaints filed by firms to the Antitrust Division. This would set off a trigger from which the Antitrust Division starts an investigation with possible prosecution of a cartel. Given the above literature, it is useful to examine the link between economic conditions and criminal investigations: if they largely follow economic contractions (expansions), then it may imply that breakdown of collusive agreements may be more likely during economic expansions (contractions). To be candid, our conclusions in this regard will only be suggestive as we do not have the detailed data required to directly examine the link between cartel stability, information flows to the Antitrust Division and criminal prosecutions.

4. Empirical Specification

In deriving the empirical specification to examine some of the forces that drive criminal enforcement, we think of the Antitrust Division’s objectives as follows. First, the Division faces monetary and non-monetary resource constraints. The latter, for example, include constrains given by the number of staff available as a given pool of attorneys, economists and support staff undertake
both civil (mergers, monopolization, restraints of trade) and criminal investigations. The overall number of investigations the Division pursues may end up being less than the desired number and consequently the number of prosecutions is likely to be less than desired number due to such constraints. Second, consider a situation where there the economy has numerous price-fixing conspiracies that result in higher prices, but the Division is not vigorously pursing criminal investigations. The rise in prices often lead consumers to complain to their congressmen and senators with calls for greater action and investigations. At the other end of the spectrum, suppose there is excessive activity by the Division in terms of prosecuting companies for price-fixing and related behavior. Producer groups may lobby the legislators to have the Division back off. These considerations imply that if there is a disequilibrium in the intensity of criminal enforcement, either too little or too much, then the Antitrust Division may have to take corrective action. Given the above, one modeling strategy would be to account for the adjustment and disequilibrium costs when deriving the intertemporal path of criminal enforcement.

The theoretical and empirical underpinnings of the framework where one considers a decision-maker’s objective to minimize the expected present value of a quadratic loss function subject to adjustment and disequilibrium costs are well known; see, for example, Gould (1968), Kennan (1979) and Treadway (1971). In our context, we assume that the Antitrust Division pursues criminal investigations and prosecutions subject to minimizing these two costs. We begin by

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13 This could arise either because the Division is pre-occupied with other types of investigations, uninformed and unaware of these violations or that it’s current stance is one of less focus on criminal matters.

14 Some of the markets where these have occurred include, for example, retail gasoline, cable TV, airline, building contracts, school milk and lunch contracts, government procurement contracts, among others.

15 Add the examples on (1) how domestic producers have often used poor economic conditions and high current losses to justify cooperative actions and (2) prosecution of foreign firms (cartels) have lead to protests from foreign governments .....
Since the derivations are well documented in, for example, Gould (1968), Kennan (1979) and Treadway (1971), we don’t repeat them here.

Presenting some notation: CRIM\(_t\) = Number of criminal antitrust cases filed in court (or, prosecutions); VIOL\(_t\)=Number of (unobserved) criminal violations; POL\(_t\)=Political party of the President with P=1 if Republican, else 0; REG\(_t\)=regime with R=1 if new regime, else 0; FUND\(_t\)=Funding allocated to the antitrust division; MERG\(_t\)=Total number of mergers in the U.S.; ECON\(_t\)=Aggregate economic conditions (GDP, stock market index or corporate profits); and CIVIL=the total number of civil (monopolization, mergers, restraints of trade) antitrust court cases filed by the Antitrust Division. Formally, the Division is assumed to minimize the quadratic loss function:

\[
\text{min}_{\text{CRIM}(t)} E \sum_t \rho [\phi_D (\text{CRIM}_t - \text{CRIM}_t^*)^2 + \phi_A (\text{CRIM}_t - \text{CRIM}_{t-1})^2],
\]

where CRIM\(_t\) is the actual number of court cases, CRIM\(_t^*\) is the desired number of cases, \(\phi_D\) and \(\phi_A\) are the disequilibrium and adjustment cost parameters and \(\rho\) is a constant discount factor. The Antitrust Division makes a sequence of actual CRIM\(_t\) decisions designed to meet the target CRIM\(_t^*\) which is a function of relevant driving variables (described below). Solving the model results in the standard partial-adjustment equation:\(^{16}\) \(\text{CRIM}_t - \text{CRIM}_{t-1} = \lambda (\text{CRIM}_t^* - \text{CRIM}_{t-1})\), where the actual change in the number of criminal cases prosecuted is a fraction \(\lambda\) \((0 \leq \lambda \leq 1)\) of the desired change, with \(\lambda\) being a function of the adjustment and disequilibrium costs noted above. Rewrite the above:

\[
[2] \text{CRIM}_t = \lambda \text{CRIM}_t^* + (1 - \lambda) \text{CRIM}_{t-1}.
\]

Next, we model the desired CRIM\(_t^*\) as a function of the relevant driving variables. We first

\(^{16}\) Since the derivations are well documented in, for example, Gould (1968), Kennan (1979) and Treadway (1971), we don’t repeat them here.
present our benchmark specification and then discuss additional issues related to the dynamics and lagged structure of the model variables. Let CRIM* be specified as:

$$CRIM_i^* = a_1 \text{VIOL}_{t-1} + a_2 \text{POL}_{t-1} + a_3 \text{REG}_{t-1} + a_4 \text{FUND}_{t-1} + a_5 \text{MERG}_{t-1} + a_6 \text{ECON}_{t-1} + a_7 \text{CIVIL}_{t-1} + u_t.$$  

First, in section 2 we described the process of investigations and prosecutions. Given this, we assume that the relevant factors take time to impact the number of investigations and prosecutions and only use lagged values. Second, the motivation for equation [3] is as follows. CRIM* is driven by the number of (unobserved) violations, VIOL, last period, assuming that it takes time for information about possible violations to flow into the Antitrust Division; $a_1$ is expected to be positive. The Division’s willingness to investigate and initiate new prosecutions depends on the prevailing political stance, POL. As we noted in the introduction, Republican administrations appear to place greater emphasis on price-fixing and related violations; $a_2$ is expected to be positive. Under a new regime, REG, that favors intensified antitrust enforcement in areas of clear welfare loss such as price-fixing, we expect $a_3$ to be positive. The new regime effects following the emphasis placed by the Chicago school scholars on price-fixing was discussed in the introduction. The ability to initiate new investigations is expected to be dependent on the level of funding, FUNDS; $a_4$ is expected to be positive. The total number of mergers in the U.S., MERG, incorporates multiple effects. For example: (a) an increase in the number of mergers to be evaluated may give rise to the possibility that significant amounts of monetary and non-monetary resources may be diverted to evaluate them, potentially taking resources away from pursuing criminal and other types of cases; and (a) information discovered by the Antitrust Division during merger evaluations may unearth price-fixing
and related violations and this may lead to increased criminal cases. Given the conflicting directional effects, the sign of \( a_{5} \) is ambiguous. The economic activity variable, ECON, is linked to the literature on cartel stability discussed in section 3. Given the mixed results on the formation and stability of collusive agreements over economic expansions and contractions, the sign of \( a_{5} \) is ambiguous. Finally, the civil enforcement variable, CIVIL, potentially captures multiple effects (elaborate on this from section 2): (a) a greater emphasis on civil enforcement may take away resources and focus from criminal matters; and (b) greater number of civil investigations, such as monopolization and restraints of trade cases and mergers, may lead to discovery of criminal violations (see discussion in footnote 6). Given the divergent effects, the sign of \( a_{7} \) is ambiguous. The error term is assumed to be iid: \( u_{t} \sim (0, \sigma_{u}^{2}) \).

Finally, we specify the equation for the (unobserved) violations as:

\[
[4] \text{VIOL}_{t} = v_{0} + b_{1}\text{POL}_{t-1} + b_{2}\text{REG}_{t-1} + b_{3}\text{CRIM}_{t-1} + b_{4}\text{MERG}_{t-1} + b_{5}\text{ECON}_{t-1} + \epsilon_{t},
\]

We assume that every period has some given number of (unobserved) criminal violations \( v_{0} \). Regarding the factors that might influence the intertemporal variation in violations, we assume that these effects take time and only use lagged values. A Republican administration or a new regime that places greater emphasis on criminal prosecutions would imply potentially lesser violations as firms perceive a higher probability of prosecution; \( b_{1} \) and \( b_{2} \) are expected to be negative.\(^{18}\) If the Antitrust Division is vigorously prosecuting criminal cases, CRIM, then potential violations are likely to be lower due to the greater likelihood of detection and prosecution; \( b_{3} < 0 \). In periods characterized by

\(^{17}\) Case example ...

\(^{18}\) Cite information from law firms warning their clients to beware of price-fixing due to high rate of prosecution and high fines...
greater mergers (MERG), potential violators may be more inclined to engage in anti-competitive behavior with the view that the Division is pre-occupied with evaluating mergers; \( b_4 > 0 \). The economic activity variable, ECON, controls for the link between economic conditions and criminal violations. Given our discussion in section 3, the direction of the relationship (sign of \( b_5 \)) is ambiguous. The error term is assumed to be iid: \( u_t \sim (0, \sigma_u^2) \).

To get the specification we estimate, we use [4] to replace \( V_{i-1} \) in [3] and then use the resulting expression to replace \( CRIM^*_t \) in [2]. The resulting expression is of the general form:

\[
[5] \quad CRIM_t = c_0 + \sum \alpha_i POL_{t-i} + \sum \beta_j REG_{t-j} + \sum \delta_k FUND_{t-k} + \sum \theta_i MERG_{t-i} + \sum \gamma_j ECON_{t-j} \\
+ \sum \zeta_k CIVIL_{t-k} + \sum \rho_m CRIM_{t-m} + \epsilon_t,
\]

where \( \epsilon_t = (u_t + a_t e_{t-1}) \), and \( f, g, h, i, j \) and \( k \) are the lag lengths. Given the structure of equations [2], [3] and [4], the lags \( f=g=i=j=m=2 \) and \( k=h=1 \). The coefficients in [5] are typically combinations of the coefficients in equations [2], [3] and [4]. Given our assumptions for the error terms \( u_t \) and \( e_t \), and assuming zero covariance between \( u_t \) and \( e_t \), \( \epsilon_t \) is a linear combination of two iid errors: \( \epsilon_t \sim iid(0, \sigma_u^2 + a_t^2 \sigma_e^2) \), which is similar to a MA(1) process.

We now turn to some additional issues regarding the specification:

(a) Equations [3] and [4] were presented with only one-lag to describe the basic structure. If we consider a richer dynamic specification, incorporating deeper lags of the included variables in equations [3] and [4], then equation [5] will retain the same functional form but will include additional lags. Our experiments with choosing alternate lag structures showed that deeper lags were typically not significant. Where they were, we include them in our estimation in section 7. Further, a richer dynamic specification of [3] and [4] would result in a higher-order MA(.) process for the error term \( \epsilon_t \); we formally test for this in section 7.
(b) In equation [5], the Antitrust Division’s funding (FUND) may potentially be endogenous to the number of criminal cases prosecuted as the Division may request increased funding due to increased expenditures resulting from investigations and prosecutions. In section 7, we conduct econometric tests to evaluate this.

5. Data

Our data are annual and cover the post-war period 1948-2003. Including earlier years is not meaningful as the two world wars and the great depression significantly affected the conduct of antitrust. Data on the total number of criminal cases prosecuted by the Antitrust Division, the total number of antitrust cases (criminal plus civil) and funding are from the Division’s historical statistics. Data on the total number of mergers in the U.S. are from three sources; Nelson (1959) for the early years, the Federal Trade Commission’s merger series for the period 1958-1977 and the Thompson’s Financials M&A database for the period 1978-2003. Data on the party of the President and the composition of the House and the Senate are from U.S. historical archives. Aggregate U.S. data on GDP and corporate profits are from the Federal Reserve Bank of St. Louis data archives and data on the S&P 500 are from Shiller (1989), updated for the recent years.

Figure 1(a) displays the data on the total number of price-fixing and related criminal cases prosecuted. These data are the total number of criminal court cases filed by the Antitrust Division minus miscellaneous criminal cases filed by the Division related to obstruction of justice, false statements, mail fraud and perjury. This correction is important because the latter class of criminal cases have little to do with price-fixing and related violations which we are interested in. There is a fair amount of year-to-year variation and the data show a marked elevation of the level of prosecutions starting the late-1970s/early-1980s. Figure 1(b) shows the total number of antitrust court cases (civil plus criminal). To gauge the ‘relative’ intensity of criminal enforcement, in figure
We note one caveat. While majority of the grand jury activity is related to criminal investigations, some of them also occur during civil investigations. The Antitrust Division’s ‘published’ data does not separate out the criminal and civil grand juries.

1(c) we display the ratio of the number of criminal cases to the number of total antitrust cases (i.e., the ratio of figures 1(a) and 1(b)). Like figure 1(a), the data show considerable short-run fluctuations and the relative intensity starts rising markedly after the late-1970s. Over the last 20-25 years, on average almost 75% of the antitrust enforcement, in terms of the number of court cases initiated, has been criminal. This represents a significant ratcheting up of criminal enforcement. Figure 1(c) also implies that the relative intensity of civil enforcement (mergers, monopolization and restraints of trade cases) has declined over this same period.

Next, we consider some related data to take a look at the bigger picture of criminal enforcement. These data are available only over the period 1969-2003; the record-keeping of the Antitrust Division’s workload statistics have considerably changed over time. Figure 2(a) shows the data on the number of grand jury investigations initiated; details about grand juries were presented in section 2.19 These data show short-run fluctuations and the level appear to be a bit higher during the 1980s and lower during the 1990s. Figure 2(b) presents the number of individuals and corporations fined as part of criminal prosecutions. These data show a downward drift after the late-1970s/early-1980s. Finally, figures 3(a)-3(d) present information on monetary fines paid by individuals and corporations, both total amounts as well as per individual and corporation. These data reveal an interesting pattern: apart from relatively short-period in the late-1990s, the numbers are rather low. As we discuss in section 8, the spikes in the data are primarily driven by a few high-profile prosecutions that generated large fines, but the typical fines have been rather modest.

Figure 4 presents changes in the economy-wide variables related to real GDP, real S&P 500 index and corporate profits. All three of these variables are designed to capture broad economic conditions. Finally, figures 5(a) and 5(b) present data on the political variables: the Republican

19 We note one caveat. While majority of the grand jury activity is related to criminal investigations, some of them also occur during civil investigations. The Antitrust Division’s ‘published’ data does not separate out the criminal and civil grand juries.
versus Democratic composition of the House and the Senate, and the party of the President.

6. Detecting Structural-Breaks in Criminal Enforcement

In the introduction we discussed the reasons for expecting a structural-break in criminal enforcement, namely a shift in intellectual thinking that antitrust should focus on business conduct with clearer harm to welfare. Since we do not have a well-defined variable to control for this, we use econometric techniques to detect structural-breaks in criminal enforcement. The specific methodology we use tests for a structural-break at an unknown date because while we may know the approximate time-period during which a break may have occurred, ex-ante we cannot identify the precise break date (see Andrews, 1993; Hamilton, 1994, Ch.22; Stock, 1994; and Stock and Watson, 1996, 2003). The literature on structural breaks, which burgeoned in the 1990s, shows that not controlling for breaks in the data when they are present, results in biased coefficient estimates and standard errors and consequently misleading inferences. This literature also shows that merely detrending the data in a conventional way, when the true cause is a structural-break, in an inadequate way to address the problem. Later, in our presentation of additional results, we show that after controlling for structural-break in the data, long-run trends in criminal enforcement, either linear or quadratic, have no role to play.

Before we outline the tests, it is important to clarify what a detected structural-break date means. Suppose CRIM, has time-series observations over t=0,...,T and the statistical tests reveal a structural-break in year \( \tau \). This tells us that the mean of CRIM, series in the \( t=0,...,\tau \) interval is different from the \( t=\tau+1,...,T \) interval. Nothing may actually have happened in the year \( \tau \), but events in the \( \tau+1 \) to \( T \) period result in a sample mean that is different from the preceding period.

Let CRIM, be the number of criminal cases prosecuted and \( \tau \) the hypothesized unknown structural break date. The dummy variable \( D(\tau) \) is defined as \( D(\tau)=0 \) for \( t\leq \tau \) and \( D(\tau)=1 \) for \( t>\tau \).
A regression including the unknown structural break point is given by [6]:

\[ CRIM_t = c_0 + \sum_{k=1}^n \rho_k CRIM_{t-k} + \xi D_t(T) + \omega_t. \]

The specification is autoregressive of order ‘n’ where ‘n’ is determined optimally based on the number of lags that are significant to fully account for the variables own dynamics. Specification [6] allows for a change in the intercept before and after the hypothesized break point and under the null hypothesis of no structural break, \( \xi = 0 \). Since the break date \( \tau \) is unknown, we consider a series of break dates between two potential dates \( \tau_0 \) and \( \tau_1 \). For each hypothesized break date, we estimate the above equation and get a F-statistic from testing \( \xi = 0 \) against the alternative of \( \xi \neq 0 \). We focus on the largest of the resulting F-statistics from the sequence and use the Quandt Likelihood Ratio (QLR) statistic to detect the break point. As noted in Stock and Watson (1996), the distribution of the QLR statistic depends on the number of restrictions being tested \( q \) (\( q=1 \) in the above equation), and the width of the end-points \( \tau_0/T \) and \( \tau_1/T \), where \( T \) is the total sample size; \( \tau_0 \) and \( \tau_1 \) cannot be too close to the sample endpoints. Following Stock and Watson (1996), we consider a 15% trimming of the CRIM time series; i.e., \( \tau_0 = 0.15T \) and \( \tau_1 = 0.85T \). Given our full sample period of 1948-2003, this implies that we delete about 9 years from each end of the sample and test for a structural-break in criminal enforcement over the years 1957 to 1994.

We estimated [6] with lag lengths of up to four, but typically only two lags were significant. Estimating [6] and testing for all potential break dates between 1957 and 1994 revealed the highest F-statistic of 6.23 for the year 1979. The estimated F-statistics were compared with critical values of the Quandt Likelihood Ratio statistic with 15% trimming: 1%=7.78, 5%=5.86 and 10%=5.00. Thus our highest F-statistic of 6.23 is significant at the 5% level. Given our sample period, this implies that 1948-1979 represents one regime with lower criminal enforcement and 1980-2003
We experimented with alternate representations of specification [6] including a more complete set of variables that might effect CRIM, but our results from the structural break tests were similar. To conserve space we don’t report these in the paper.\textsuperscript{20}

7. Estimation and Results

In this section we first present the empirical specification to be estimated. Second, we examine whether the Antitrust Division’s funding is potentially endogenous to the number of criminal cases prosecuted. Third, we present the main estimation results and some additional results to check for robustness.

7.1 Specification

We note three issues before writing the specification to be estimated:

1. Apart from when there is a change in the President, we have $POL_t = POL_{t-1}$. The Presidential dummy is highly persistent and, for numerous observations, the current and lagged values are identical. Given this, we only enter one-lag of the Presidential effect $POL_{t-1}$.

2. Apart from entering the break dummy $D(1979)$, we also enter an interaction term where the structural-break dummy is interacted with the party of the President, $D(1979) \times POL_{t-1}$. The motivation is that we want to examine whether the Republican versus Democratic stance towards criminal enforcement has been different before and after the structural-break.

3. To a greater or lesser extent, the levels of several of the explanatory variables are non-stationary, such as the Antitrust Division’s funding, the total number of mergers in the U.S., GDP, S&P 500 and corporate profits. We formally tested for non-stationarity using the Augmented Dickey-Fuller and

\textsuperscript{20} We experimented with alternate representations of specification [6] including a more complete set of variables that might effect CRIM, but our results from the structural break tests were similar. To conserve space we don’t report these in the paper.
Phillips-Perron (1988) unit root tests; these tests have a null hypothesis of difference-stationary. Using conventional significance levels, these tests could not reject the null that these variables are difference stationary. Given this, we entered the Antitrust Division’s funds, GDP, S&P 500, corporate profits and the merger wave variables in first-differences.

The final specification we estimate is given by [7]:

\[ CRIM_t = c_0 + \alpha_1 POL_{t-1} + \sum_n \delta_n \Delta FUND_{t-n} + \sum_i \theta_i \Delta MERG_{t-i} + \sum_j \gamma_j \Delta ECON_{t-j} + \sum_k \zeta_k CIVIL_{t-k} \]
\[ + \sum_i \rho_i CRIM_{t-i} + \xi D_t(1979) + \psi D_t(1979)P_{t-1} + \epsilon_t, \]

where, \( \Delta \) represents first-difference and, as discussed for equation [5], the error term is a moving-average process, \( \epsilon_t = (u_t + a_t, c_{t-1}) \). One way to look at equation [7] is as follows: after accounting for the structural-break in 1979, the annual CRIM time-series is stationary and the short and medium term fluctuations in enforcement are emanating from the included explanatory variables and, since some of the explanatory variables are non-stationary, they are entered in first-differences.

7.2 Potential Endogeneity of Funding

The Antitrust Division’s level of funding (budget) is approved by the legislature. Requests for increase in funding may follow an increased workload in criminal investigations and prosecutions potentially making funds endogenous. However, the number of criminal cases is not the only factor influencing funding; the party of the President, composition of the House and the Senate, complexity of cases, internal investigations, civil enforcement, among other factors, are likely to determine funding. Given these considerations, we examine the possibility that FUNDS may potentially be endogenous in equation [7].

We implemented Granger (1969) and Geweke, Meese and Dent (1983) procedures to test for
(econometric) causality (or joint-determination) by using information about the dynamic relationships between pairs of variables.\textsuperscript{21} Using equation [8], the Granger test examines whether lagged-values of CRIM affect current values of and FUND.

\[ \text{FUND}_t = a + \sum_m b_m \text{FUND}_{t-m} + \sum_n c_n \text{CRIM}_{t-n} + u_t, \]

where ‘a’, ‘b’ and ‘c’ are parameters with the null hypothesis being \( c_n = 0 \) \( \forall n \). The estimated test statistic had a \( p\text{-value} \) of 0.64 indicating that FUND and CRIM were not jointly-determined. Via equation [9], the Geweke et al. test examines whether “lead-values” of FUND affect current CRIM.

\[ \text{CRIM}_t = d + \sum_k p_k \text{CRIM}_{t-k} + \sum_w q_w \text{FUNDS}_{t+w} + \sum_g r_g \text{CRIM}_{t-g} + e_t, \]

where ‘d’, ‘p’, ‘q’ and ‘r’ are parameters. The test includes \( k \) “lags” and \( w \) “leads” of funds. The null hypothesis is \( q_w = 0 \) \( \forall w \). The estimated test statistic had a \( p\text{-value} \) of 0.76. Given the \( p\text{-values} \), our data over 1948-2003 reveal little evidence that funding is jointly-determined with the criminal cases. Given this, we do not pursue instrumental variable estimation. OLS estimates corrected for the MA(.) error structure will yield unbiased and consistent parameter estimates and standard errors using the Newey-West (1987) procedure.

\textbf{7.3. Results and Implications}

We estimate specification [7] and in our estimation we account for the MA(1) error structure

\textsuperscript{21} An option was to pursue the Hausman-test route. However, finding instrumental variables for F proved challenging. We experimented with federal government spending and lagged cases as potential instruments for funding, but the explanatory power of the first-stage regressions were very low indicating that these were poor instruments. As is well known, weak instruments cause serious inference problems. Given this we did not pursue this option.
(see discussion of equation [5]). To check whether the error term required a higher-order MA(.) specification, as would result from a richer lagged structure in [3] and [4], we implemented a Lagrange-Multiplier test for an MA(2) error structure. The test statistics are reported at the bottom of Table 3(a). For all the specifications, we cannot reject a MA(2) structure. As noted in Table 3(a), except for the coefficients related to the constant, POL$_{t-1}$, D(1979) and D(1979)*POL$_{t-1}$, the reported numbers are the coefficient estimates multiplied by one-standard-deviation of the respective variable. Since there is considerable variation in the size of the estimated coefficients, and means and standard deviations of the variables, the estimates multiplied by one-s.d. give us a ready look at the implied quantitative effect. As a benchmark, the results in Column A do not include the structural-break dummy D(1979) and the D(1979)*POL interaction term. Columns B, C and D present the results from estimating [7] with alternate economic conditions variables - GDP, S&P 500 and corporate profits.

The results in column A show that hardly any variable is significant. The lagged dependent variable is highly significant with a large quantitative effect and the lagged merger variable is positive and significant. The high explanatory power of the regression in column A is being driven by the lagged dependent variable. The results in column B show a dramatic difference. Our key findings and inferences are as follows. One, the number of criminal cases prosecuted increases after a decrease in real GDP, with a lag of one-to-two years. The combined quantitative effect shows an increase of 7 to 8 cases prosecuted; this is meaningful quantitative effect given the sample mean number of criminal cases prosecuted of about 35. Thus, after a one-to-two year lag following an economic downturn, the Antitrust Division’s criminal enforcement activity rises. An explanation of this finding is that information about collusion and related activities emerges during economic downturns leading to investigations and prosecutions. Given the broad nature of our criminal prosecutions data, one can only make rough inferences. Based on our results, it would seem to be
the case that information emerges about the breakdown of cartels and/or their formation during economic downturns. If the former plays a significant role, it ties in with some of the theoretical models and empirical findings reported in section 3 which support the more conventional view of cartel breakdown during downturns.

Two, criminal cases prosecuted increase after an increase in the total number of mergers in the economy. The total quantitative effect is an increase of about 6 cases. Further, the number of criminal prosecutions increase after an increase in the number of civil court cases. The quantitative effect is an increase of about 5-6 cases prosecuted. These two results are rather significant in the sense that a greater number of mergers evaluated by the division and, more generally, an increase in civil enforcement do not appear to distract the Division into ignoring criminal investigations. Quite the contrary, our results point to complementarities between merger control and civil enforcement on the one hand and criminal enforcement on the other. One plausible interpretation of these results is that information unearthed during merger and other civil investigations unearths information related to price-fixing and related conduct leading to investigations and an increase in the number of criminal prosecutions.

Three, the estimate on the structural-break dummy D(1979) shows a dramatic increase of about 37 cases per year after the structural-break. As was explained in section 6, the interpretation of the identified structural break-date is important: nothing actually has to have happened in 1979, but that the mean of the CRIM series over the 1980-2003 period is (statistically) significantly greater than the mean of the series over 1948-1979. Our motivation for searching for the potential break year and including the structural-break dummy was the shift in intellectual thinking towards greater emphasis on business conduct like price-fixing that resulted in incontrovertible loss of welfare. The estimates show that this shift was quantitatively and qualitatively highly significant.
Four, the coefficient on the D(1979)*POL interaction term indicates that post-structural-break, Republican administrations have systematically initiated about 12 more criminal prosecutions per year than Democrats. Correspondingly, the coefficient on the POL variable is insignificant implying that pre-structural-break, there was no difference between Republicans and Democrats in their propensities towards criminal enforcement. In a broader sense, our results indicate that post-structural-break the ratio of criminal enforcement to civil enforcement is higher under Republican administrations. One explanation of this finding is that Republicans, by focusing on criminal enforcement, attempt to target business conduct with clearer loss of welfare such as price-fixing.

Five, adding the structural-break dummy D(1979) and the D(1979)*POL interaction term results in a drastic drop in the coefficient estimate of the lagged dependent variable, implying that omission of these relevant effects were in part being picked up by the variables own dynamics. The lagged dependent variable is still significant indicating that criminal prosecutions tend show persistence, but the degree of persistence is now has much smaller.

Six, without controlling for the structural-break effect (as in column A), we do not get any interesting results linking politics, or changes in economic conditions or complementarities between civil and criminal enforcement. Thus controlling for the structural-break appears crucial to get a clear understanding about the forces that drive fluctuations in criminal enforcement and prosecutions.

Seven, an increase in the Division’s funding appears to have a negative effect on the number of criminal cases initiated. While the result is a bit odd, several previous studies have produced mixed effects of the Divisions funding on case activity. Also, the late-1970s and early-1980s which saw dramatic increases in criminal prosecutions (Figure 1(a)) simultaneously saw significant cuts in the Division’s budget (Figures 6(a) and 6(b)). This feature is likely to be driving the estimated negative relationship between funding and criminal enforcement.

Next, in columns C and D in Table 3(a) present the results using alternate measures of
economic conditions: S&P 500 composite stock index and corporate profits. While there are some quantitative and qualitative differences, our broad inferences from these columns are quite similar to those presented in column B. Finally, in Table 3(b), we present some additional results:

(1) In column A we re-estimate the specification in Table 3(a) column B by augmenting it with a linear trend. The justification for adding a trend is as follows. As we look at figure 1(a), in a conventional sense one might argue that the time-series in criminal cases is simply positively trended over the sample period. If so, controlling for the trend may be important as omission of this might render our inference suspect. As we see from the estimates in column A of Table 3(b), the trend variable itself is insignificant and does not alter any of our conclusions from Table 3(a). We also re-estimated with a quadratic trend and our inferences do not change.

(2) Since various appointments to the House and Senate committees and sub-committees and funding decisions are dependent on which party has majority, these may be important political influences exerted on the Antitrust Division’s activities via the budgetary and related processes. The results after including the House and Senate variables are reported in column B of Table 3(b). Both these political variables are insignificant and do not add to our understanding of the intertemporal changes in criminal enforcement.

8. The Bigger Picture of Criminal Enforcement

Our discussion and econometric analysis so far focused on the actual number of prosecutions. While these data reveal in no uncertain terms the willingness to prosecute cartels, there are several other indicators of the stance on criminal enforcement. They include the number of individuals and corporations prosecuted, the total and per capita fines levied on individuals and corporations and the number of grand jury investigations initiated and pending. These data, summarized by Presidential tenure, are presented in Table 5 and the annual time-series data are presented in Figures 2(a, b) and
3(a, b, c, d). The total number of individuals and corporations charged per year were the highest during Ford and Carter administrations. Both these time-series have shown a secular decline since then. In contrast to this, the monetary fines levied per individual and corporation, and the total fines on individuals and corporations, shows a secular increase over the entire sample period. The number of prosecutions data which we analyzed earlier, show a marked increase during Reagan and Bush (Sr.) administrations but have fallen off since then. The final piece of the picture relates to the number of grand jury investigations initiated and pending investigations. As we noted in section 2, these data primarily contain grand juries for criminal investigations, but also contain such juries for civil investigations. In short, they are not as clean as the other data we have looked at in terms of criminal enforcement. The grand jury investigations initiated show an increase during the Reagan-Bush years, fall during the Clinton years and again seem to be increasing during the Bush (Jr.) administration. As we noted in section 2, grand jury investigations eventually may lead to prosecutions, so an increase in these investigations may be viewed as a leading indicator of upcoming prosecutions.

The overall picture that emerges is a somewhat complicated one. Prior to the Reagan tenure, the number of prosecutions were lower but more individuals and corporations were charged per prosecution; per capita fines were lower for both individuals and corporations. During the Reagan tenure and after, the number of individuals and corporations charged per prosecution are lower, but fines are much higher. This seems to indicate that the criminal enforcement strategy has changed to one of sending a clear deterrence signal.

9. Concluding Remarks
Our objective was to examine the rich history of U.S. criminal antitrust enforcement and econometrically examine the economic, political and intellectual forces that have driven changes in
enforcement over the period 1948-2003. Several findings emerged from our analysis. First, criminal enforcement follows a distinct counter-cyclical pattern with the number of criminal cases prosecuted by the Antitrust Division increasing about two years after an economic downturn. This appears to signal that the Antitrust Division gets more information about price-fixing and related violations following economic downturns, leading to investigations and prosecutions. To the extent that some of this is the result of breakdown of collusive agreements, it supports the conventional wisdom of cartel instability and breakdowns during periods of low demand (see section 3). Second, criminal enforcement increases a year or two after increases in civil enforcement (monopolization cases, merger control and restraints of trade). This result suggests that civil investigations unearth criminal conduct leading to an increase in criminal cases prosecuted, thereby signaling complementarities in the investigative process. Third, there is evidence of a clear structural-break in criminal enforcement starting around 1979. We relate this result to the shift in U.S. doctrine of emphasizing antitrust enforcement in those areas with clearer loss of welfare. Fourth, our results show that post-structural-break period of 1980-2003, Republican administrations have placed greater emphasis on criminal enforcement as compared to Democrats. An explanation of this finding is that Republicans have attempted to target business conduct with incontrovertible harm to welfare without compensating gains in efficiency.
References


Easterbrook, F.


Report Possible Antitrust Violations

Antitrust division

How to Report a Possible Violation
Information from the public is vital to the work of the Antitrust Division. Your phone calls, letters, and e-mail messages are often the first indication of an antitrust violation and may provide the initial evidence to begin an investigation. If you have information about a possible antitrust violation or potential anticompetitive activity, whether civil or criminal, please contact the Division (contact information included). We will review your complaint and refer it to one of our offices for investigation, if appropriate.

Confidentiality
Our confidentiality policy applies to all complaints received by the Antitrust Division.

Types of Antitrust Violations
For details about different types of antitrust violations, refer to:
Antitrust Enforcement and the Consumer,
Price Fixing, Bid Rigging and Market Allocation Schemes: What They Are and What to Look For.

Leniency Policies
Individuals or companies who (a) believe they may have been involved in criminal antitrust violations and (b) cooperate with the Antitrust Division may avoid prosecution if they meet the conditions of our individual or corporate leniency (amnesty) policies.

*In the accompanying Antitrust Division’s primer on price-fixing and related violations, it notes:

What You Can Do
Antitrust violations are serious crimes that can cost a company hundreds of millions of dollars in fines and can send an executive to jail for up to three years. These conspiracies are by their nature secret and difficult to detect. The Antitrust Division needs your help in uncovering them and bringing them to our attention. If you think you have a possible violation or just want more information about what we do, contact the New Case Unit of the Antitrust Division (contact information provided).
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<th>Mean</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
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<td>Number of Criminal Cases Filed (or, prosecuted)</td>
<td>35.91</td>
<td>25.55</td>
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<td>Ratio: Criminal Cases Filed to Total Antitrust Cases Filed</td>
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<td>0.22</td>
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<td>Total Antitrust Cases Filed</td>
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<td>21.2</td>
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<td>ΔGDP</td>
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<tr>
<td>ΔS&amp;P 500</td>
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<td>91.98</td>
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<td>Senate</td>
<td>0.45</td>
<td>0.07</td>
<td>0.32</td>
<td>0.55</td>
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Notes: The data cover the period 1948-2003. A ‘Δ’ indicates first-difference. Units for GDP (real billions), Profit (real billions), Funds (real millions).
### Table 3(a). Estimation Results

Estimated specification [7]:

\[
\text{CRIM}_t = c_0 + \alpha_1 \text{POL}_{t-1} + \sum \delta_i \text{FUND}_{t-k} + \sum \theta_i \text{MERG}_{t-i} + \sum \gamma_j \text{ECON}_{t-j} + \sum \zeta_k \text{CIVIL}_{t-k} + \sum \rho_k \text{CRIM}_{t-k} + \xi D_{t}(1979) + \Psi \text{POL}_{t-1} + \epsilon_t,
\]

<table>
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<tr>
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<th>B</th>
<th>C</th>
<th>D</th>
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<tr>
<td></td>
<td>Real GDP</td>
<td>Real GDP</td>
<td>Real S&amp;P 500</td>
<td>Real Corporate Profits</td>
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<td>No Structural-Break</td>
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<td><strong>Constant</strong></td>
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<td>-1.23 (0.848)</td>
<td>-1.90 (0.705)</td>
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<td>10.14* (0.001)</td>
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<td>12.22* (0.001)</td>
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<td>2.87 (0.134)</td>
<td>5.17* (0.003)</td>
</tr>
<tr>
<td><strong>_____MERGERS_t-2</strong></td>
<td>1.55 (0.411)</td>
<td>2.30 (0.103)</td>
<td>0.28 (0.834)</td>
<td>0.28 (0.774)</td>
</tr>
<tr>
<td><strong>CIVIL_t-1</strong></td>
<td>-3.09 (0.187)</td>
<td>0.75 (0.641)</td>
<td>1.24 (0.518)</td>
<td>1.20 (0.422)</td>
</tr>
<tr>
<td><strong>CIVIL_t-2</strong></td>
<td>2.31 (0.119)</td>
<td>5.11* (0.001)</td>
<td>4.10* (0.003)</td>
<td>4.11* (0.001)</td>
</tr>
<tr>
<td><strong>_____FUNDS_t-1</strong></td>
<td>1.08 (0.478)</td>
<td>1.77 (0.312)</td>
<td>1.78 (0.258)</td>
<td>0.82 (0.650)</td>
</tr>
<tr>
<td><strong>_____FUNDS_t-2</strong></td>
<td>-1.18 (0.592)</td>
<td>-4.58* (0.001)</td>
<td>-5.19* (0.001)</td>
<td>-3.73* (0.007)</td>
</tr>
<tr>
<td><strong>POL_t-1</strong></td>
<td>4.72 (0.192)</td>
<td>-0.69 (0.798)</td>
<td>0.82 (0.796)</td>
<td>1.85 (0.527)</td>
</tr>
<tr>
<td><strong>D(1979)</strong></td>
<td>_</td>
<td>36.95* (0.001)</td>
<td>29.53* (0.001)</td>
<td>27.42* (0.001)</td>
</tr>
<tr>
<td><strong>D(1979)_POL_t-1</strong></td>
<td>_</td>
<td>12.45* (0.019)</td>
<td>12.38* (0.010)</td>
<td>13.46* (0.003)</td>
</tr>
<tr>
<td><strong>Adjusted-R^2</strong></td>
<td>0.7008</td>
<td>0.8336</td>
<td>0.8058</td>
<td>0.8022</td>
</tr>
<tr>
<td><strong>LM: _____χ^2(2)</strong></td>
<td>0.0653</td>
<td>0.0183</td>
<td>0.0998</td>
<td>0.0514</td>
</tr>
<tr>
<td><strong>LM: _____χ^2(1)</strong></td>
<td>0.0319</td>
<td>0.0507</td>
<td>0.3031</td>
<td>0.0706</td>
</tr>
</tbody>
</table>

**Notes:**
1. Except for the Constant, Pres\_t-1, D(1979) and D(1979)\_Pres\_t-1 coefficients, the reported numbers are the coefficient estimates multiplied by one-standard-deviation of the respective variable. This is done because there is considerable variation in the size of the means and standard deviations across the variables. Also, multiplied by one-s.d. gives us a direct glimpse at the quantitative effect.
2. \_\_\_\_\_p-values (two-tailed), using the Newey-West (1987) heteroscedasticity and serial correlation consistent standard errors, are in parentheses. A * indicates statistical significance at least at the 10% level.
3. The bottom rows ‘LM: \_\_\_\_\_χ^2(2)’ and ‘LM: \_\_\_\_\_χ^2(2)’ present the p-values from the LM-test. Given the results, all the specifications were estimated with a MA(2) error structure.
### Table 3(b). Additional Results: Variations Around the Baseline Results in Table 3(a) Column B.

<table>
<thead>
<tr>
<th></th>
<th>A. Include Linear Trend</th>
<th>B. Include House and Senate Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>6.02 (0.319)</td>
<td>11.10* (0.069)</td>
</tr>
<tr>
<td>CRIM&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>10.14* (0.001)</td>
<td>8.58* (0.001)</td>
</tr>
<tr>
<td>CRIM&lt;sub&gt;t-2&lt;/sub&gt;</td>
<td>-3.07 (0.134)</td>
<td>3.85* (0.085)</td>
</tr>
<tr>
<td>ΔGDP&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>-2.37 (0.223)</td>
<td>-2.14 (0.239)</td>
</tr>
<tr>
<td>ΔGDP&lt;sub&gt;t-2&lt;/sub&gt;</td>
<td>-4.85* (0.024)</td>
<td>-4.86* (0.009)</td>
</tr>
<tr>
<td>ΔMERGERS&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>3.79* (0.029)</td>
<td>3.39* (0.019)</td>
</tr>
<tr>
<td>ΔMERGERS&lt;sub&gt;t-2&lt;/sub&gt;</td>
<td>2.31 (0.139)</td>
<td>2.87* (0.074)</td>
</tr>
<tr>
<td>CIVIL&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>1.53 (0.626)</td>
<td>-0.42 (0.811)</td>
</tr>
<tr>
<td>CIVIL&lt;sub&gt;t-2&lt;/sub&gt;</td>
<td>9.85* (0.001)</td>
<td>4.67* (0.001)</td>
</tr>
<tr>
<td>ΔFUNDS&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>2.30 (0.261)</td>
<td>1.73 (0.274)</td>
</tr>
<tr>
<td>ΔFUNDS&lt;sub&gt;t-2&lt;/sub&gt;</td>
<td>-4.39* (0.005)</td>
<td>-4.12* (0.008)</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.11 (0.663)</td>
<td>-</td>
</tr>
<tr>
<td>POL&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>-0.10 (0.971)</td>
<td>-0.13 (0.962)</td>
</tr>
<tr>
<td>D(1979)</td>
<td>39.70* (0.001)</td>
<td>42.09* (0.001)</td>
</tr>
<tr>
<td>D(1979)×POL&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>12.58* (0.017)</td>
<td>9.79* (0.077)</td>
</tr>
<tr>
<td>HOUSE&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>_</td>
<td>-7.85 (0.261)</td>
</tr>
<tr>
<td>SENATE&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>_</td>
<td>-1.53 (0.805)</td>
</tr>
<tr>
<td>Adjusted-R²</td>
<td>0.8299</td>
<td>0.8390</td>
</tr>
</tbody>
</table>

**Notes:** See details in Table 3(a). *p*-values (two-tailed), using the Newey-West (1987) heteroscedasticity and serial correlation consistent standard errors, are in parentheses. A * indicates statistical significance at least at the 10% level.
Table 4. Broad Picture of Criminal Enforcement by Presidential Tenure, 1948-2003

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>17.80</td>
<td>19.62</td>
<td>23.00</td>
<td>11.20</td>
<td>13.30</td>
<td>22.50</td>
<td>34.70</td>
<td>73.75</td>
<td>72.75</td>
<td>51.50</td>
<td>27.66</td>
</tr>
<tr>
<td>Ratio</td>
<td>0.36</td>
<td>0.38</td>
<td>0.34</td>
<td>0.22</td>
<td>0.20</td>
<td>0.32</td>
<td>0.50</td>
<td>0.78</td>
<td>0.79</td>
<td>0.63</td>
<td>0.56</td>
</tr>
<tr>
<td>Grand Jury Initiated</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>31.83</td>
<td>43.50</td>
<td>41.75</td>
<td>51.25</td>
<td>46.25</td>
<td>29.87</td>
<td>33.34</td>
</tr>
<tr>
<td>Grand Jury Pending</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>61.66</td>
<td>83.50</td>
<td>61.75</td>
<td>114.75</td>
<td>148.00</td>
<td>94.37</td>
<td>104.30</td>
</tr>
<tr>
<td>Number of Indiv.</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>35.30</td>
<td>58.00</td>
<td>65.50</td>
<td>43.50</td>
<td>37.00</td>
<td>31.12</td>
<td>18.30</td>
</tr>
<tr>
<td>Number of Corp.</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>60.16</td>
<td>96.00</td>
<td>106.00</td>
<td>81.25</td>
<td>64.50</td>
<td>35.62</td>
<td>16.00</td>
</tr>
<tr>
<td>Fine Indiv.</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>189.16</td>
<td>611.50</td>
<td>1,184.50</td>
<td>1,314.75</td>
<td>1,972.50</td>
<td>3,386.25</td>
<td>3,724.67</td>
</tr>
<tr>
<td>Fine Corp.</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>1,020.33</td>
<td>2,667.00</td>
<td>11,437.55</td>
<td>19,172.13</td>
<td>22,065.25</td>
<td>231,696.63</td>
<td>142,785.33</td>
</tr>
<tr>
<td>Fine per Indiv.</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>5.35</td>
<td>11.34</td>
<td>19.47</td>
<td>29.76</td>
<td>51.79</td>
<td>98.75</td>
<td>195.80</td>
</tr>
<tr>
<td>Fine per Corp.</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>16.76</td>
<td>28.24</td>
<td>104.72</td>
<td>230.53</td>
<td>357.37</td>
<td>9,205.50</td>
<td>9,536.86</td>
</tr>
</tbody>
</table>

Notes: All the numbers refer to the average per year during the Presidential tenure.

Variable definitions
- **Number**: total number of criminal cases filed (or prosecuted).
- **Ratio**: the ratio of total criminal cases filed to the total antitrust cases filed.
- **Grand Jury Initiated**: the number of grand jury investigations initiated.
- **Grand Jury Pending**: the number of grand jury investigations pending.
- **Number of Indiv.**: the total number of individuals convicted
- **Number of Corp.**: the total number of corporations charged
- **Fine Indiv.**: total fines on individuals (in thousands of dollars).
- **Fine Corp.**: total fines on corporations (in thousands of dollars).
- **Fine per Indiv.**: the ratio of Fine Indiv. to Number of Indiv. (in thousands of dollars).
- **Fine per Corp.**: the ratio of Fine Corp. to Number of Corp. (in thousands of dollars).
Figure 4. Changes in Economy-Wide Variables

Year

Read GDP
Real Profits
Real S&P 500