How Did The Market Evaluate Federal And State Antitrust Enforcement Against Microsoft?

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This paper utilizes an event study framework to measure the market's reaction to antitrust enforcement actions against Microsoft. We employ a methodology introduced by Bittlingmayer and Hazlett (2000) but extend their data set to include post-1997 events. The inclusion of 1998-2002 data is vital because many critical legal decisions and several of Microsoft's largest one day returns occur in this time period. We also test directly for net wealth transfers across the computer industry. Overall, our results confirm that antitrust efforts negatively impact the target. However our results do not support the theory that antitrust enforcement actions produce net economic gains for the industry. In particular, pro-enforcement rulings fail to produce net economic gains in the computer industry. More significantly, anti-enforcement rulings produce positive economic gains for the industry. These results are similar to Bittlingmayer and Hazlett (2000) but suggest a lower level of net market losses to the industry due to antitrust efforts.

INTRODUCTION

This paper examines stock market reactions to announced legal events regarding antitrust enforcement actions against Microsoft. In particular, we attempt to update and improve the landmark study by Bittlingmayer and Haslett (2000) (henceforth BH) that examines stock market reaction to legal events in the Department of Justice's suit against Microsoft. As BH note, the historical record of enforcement actions and counter actions provides an excellent social laboratory to examine empirically key aspects of antitrust theory. Our research also builds on work by Joskow (2002), Klein (2001), Whinston (2001) and Liebowitz and Margolis (2001), all of whom suggest that a Microsoft breakup would not enhance competition nor benefit complementary business. It is also consistent with the broader line of research that examines stock market reactions to regulatory and/or tax changes including De Vany and McMillan

(2004), Schwert (1981), Mitchell and Netter (1989), Hoffer, Pruitt, and Reilly (1988), Jarrell and Peltzman (1985), and Schipper and Thompson (1983).

Four reasons suggest that an update of the BH study is critically important. First, the BH study examines events as they relate to the Department of Justice's (DOJs) antitrust enforcement efforts against Microsoft from 1991 through mid-December, 1997. As the next section suggests, the 1997 ending date is well short of the conclusion of DOJs efforts as litigation and subsequent settlement discussions continued through November, 2001. Secondly, the 1997 ending date is well before nine states and the District of Columbia decided to pursue separate action against Microsoft. This joint action occurred after DOJ settled with Microsoft, removing the federal government as a plaintiff in the lawsuit that had been jointly pursed by DOJ, nine states, and the District of Columbia. The subsequent state/District of Columbia suits lingered into 2002. Third, as Table 2 indicates, the largest one day Microsoft returns associated with the entire antitrust case occur after 1997. Given the importance of the Microsoft case to the considerations of antitrust enforcement consequences, we believe the full series of events should be examined. A final set of concerns with the BH study arise from the construction of their sector portfolios and their test of net economic effects. BH examine announcement effects on equally weighted sector portfolios. Since both the smallest and the largest firms have the same portfolio weight, the economic significance of the smaller (larger) firm's abnormal returns is over (under) stated. In short, abnormal returns to equally weighted portfolios do not measure the market's assessment of net economic gains or losses to a sector. Finally, BH do not directly test for the market's assessment of net economic gains or losses across the computer industry. We suggest that the best method for testing directly, the market's assessment of net economic gains and losses, is to measure abnormal returns to a value weighted portfolio comprising Microsoft and the full sample of computer firms.

We feel this paper contributes to ongoing policy discussions regarding the economic value of antitrust enforcement. In particular, we extend the time frame originally examined by BH to include significant antitrust events at both the federal and state levels, and we improve the methodology by examining abnormal returns to pooled value weighted portfolios and by testing directly the net economic impact of the antitrust case on the computer industry.

ANTITRUST ENFORCEMENT EFFORTS AGAINST MICROSOFT

By 1988 Microsoft had become the world's dominant software firm. Not surprisingly, it became the target of a series of legal actions by competitors and probes by the government, all challenging its business practices. The culmination was an antitrust probe by the Justice Department in 1993 that resulted in a 1994 consent decree in which Microsoft agreed not to tie the sale of one product to the sale of another product. In October 1997, the U.S. Justice Department accused Microsoft of violating the 1994 consent decree by forcing computer makers to take Microsoft's Explorer browser with the Windows operating system. In December 1997, a federal court ordered Microsoft to offer computer manufacturers a version of Windows without the Explorer browser.

Following a trial that began in October 1998 and ended in February 1999, Microsoft was found by U.S. District Court Judge Thomas Penfeld Jackson to have used its monopoly power to stifle innovation and competition. Additional efforts to settle the case were unsuccessful, and on April 3, 2000 Jackson ruled that Microsoft had violated federal antitrust laws. This was followed by a final judgment on June 7, 2000, ordering a breakup of Microsoft into two companies: an

applications company and an operating system company. On June 28, 2001, a Federal appeals court unanimously threw out the lower court's breakup order, although the appeals court agreed that Microsoft had engaged in anti-competitive behavior. The June 28, 2001 appeals court ruling also sent the case back to a lower court so that a new remedy regarding Microsoft's conduct could be found. On November 2, 2001, the U.S. Justice Department announced a settlement of the case with Microsoft. Under the settlement, Microsoft was required to disclose some technical data and restrict some of its business practices. On November 6, 2001, nine states and the District of Columbia, which had been plaintiffs in the litigation settled by the U.S. Justice Department, announced that they viewed the settlement by the federal government as inadequate and that they would continue to pursue their own case against Microsoft. Both Gilbert and Katz (2001) and Klein (2001) provide good summaries of the Microsoft antitrust case through 2000.

Between March and June 2002, Federal District Court Judge Colleen Kollar-Kotelly held hearings in which nine states and the District of Columbia argued that Microsoft needed to be restrained from engaging in abuses of its monopoly power in new areas of technology. On November 1, 2002, the case against Microsoft concluded with Judge Kollar-Kotelly largely endorsing the settlement between Microsoft and the U.S. Justice Department with the caveats that there were increased requirements for technical disclosure.

TESTING MARKET REACTION TO ANTITRUST ENFORCEMENT EVENTS

Stock market reactions to antitrust proceedings provide empirical evidence of investors' expectations of the marginal effect of antitrust enforcement on target firms, their competitors, and their complements. If antitrust enforcement actions negatively impact Microsoft's prospects, then unanticipated pro-enforcement actions should negatively impact Microsoft's stock returns. Likewise, unexpected setbacks to antitrust enforcement actions should positively affect Microsoft's stock returns. Firms providing substitutes for Microsoft's operating system or application software stand to gain from successful antitrust enforcement. Hence, unexpected pro- (anti-) enforcement actions should positively (negatively) impact stock returns of firms providing substitute products. Theory also suggests that monopolists may negatively impact firms supplying complementary products. For example, if Microsoft earns monopoly rents on its operating and applications suite, then the total cost of deploying a desktop PC or workstation is higher than in an otherwise competitive environment. A reduction in Microsoft's monopoly rents would lower the total cost of a computer thus benefiting complementary hardware producers. See Whinston (2001) for additional details on the relationship between monopoly power and complementary product producers.

If antitrust enforcement provides net efficiency gains, then losses to Microsoft should be more than offset by economic gains to both competitor and complementary firms. Assuming that the financial markets can quickly digest the impact of legal proceedings, then unexpected pro- (anti-) enforcement actions should positively (negatively) impact stock returns of firms providing complementary and/or substitute products. Furthermore, unexpected pro- (anti-) enforcement actions should positively (negatively) impact the returns of a value weighted portfolio comprising Microsoft, its complements, and it competitors.

Overall, the theory suggests six empirically testable hypotheses:

H1. Unexpected anti-enforcement announcements have a positive impact on Microsoft's stock returns.

H2. Unexpected pro-enforcement announcements have a negative impact on Microsoft's stock returns.

H3. Unexpected anti-enforcement announcements have a negative impact on the stock returns of firms supplying complementary and/or substitute products.

H4. Unexpected pro-enforcement announcements have a positive impact on the stock returns of firms supplying complementary and/or substitute products.

H5. Unexpected anti-enforcement announcements have a negative impact on a value weighted portfolio comprising Microsoft, its complements, and it competitors.

H6. Unexpected pro-enforcement announcement have a positive impact on a value weighted portfolio comprising Microsoft, its complements, and it competitors.

H1 and H2 reflect the theory that successful antitrust efforts negatively impact the target. H3 and H4 are consistent with the theory that successful antitrust efforts positively impact, on average, the remaining firms in the industry. Hypotheses H1-H4 are consistent with the hypotheses tested by BH. However, H1 – H4 do not make predications about the heart of the theory: do antitrust actions provide net economic gains across the industry. H5 and H6 directly test whether anti-enforcement (pro-enforcement) efforts result in net economic losses (gains) across the industry.

Following BH we test for announcement effects with a multivariate dummy variable regression model. The literature on dummy variable models to capture abnormal returns is well developed. In addition to BH, De Vany and McMillan (2004), Prince and Rubin (2002), Hertzel and Smith (1993), Mathios and Plummer (1989), Binder (1985), Schipper and Thompson (1983), and Gibbons (1980) utilize dummy variable regressions in event study designs.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \sum_{N=-n}^{+n} \gamma_{iN} d_{iN} + \varepsilon_{it} \qquad \textbf{(1)}$$

In this model R_{it} is the return for firm or portfolio i in period t, and R_{mt} is the proxy for the market return on day t. The dummy variables d_{iN} take on the value one for days t + N if an announcement event occurs on day t. Otherwise they are zero. The individual dummy coefficients γ_{iN} estimate abnormal returns for a firm or sector portfolio on day t + N. Cumulative effects are determined by $\sum_{N=-n}^{n} \gamma_{iN}$. We estimate cumulative effects for eleven [-5, 5], three [-1, 1], and one [0] day event windows. As in BH, we produce estimates for Microsoft and nine sector portfolios. These estimates allow us to test hypotheses H1 – H4. However, we also estimate Model 1 with using a grand pooled portfolio comprising all firms in the sample, including Microsoft. These additional estimates allow us to directly test H5 – H6.

We produce estimates based on both *ex ante* and *ex post* significant events. The *ex ante* event dates are determined by Wall Street Journal (WSJ) reports of significant legal decisions or findings. Since the spirit of this study is to update the BH findings our *ex ante* set includes

separately tabulated pro- and anti-enforcement announcements from 1991 through 1997, as defined by BH. We supplement the original BH list by generating our own list of WSJ reports for the post 1997 period. Although we scanned WSJ reports through 2003 we found no significant rulings beyond December, 2002. Hence the entire event list covers the period January 1991 through December 2002. We also test a second set of events which *ex post* produce abnormal Microsoft returns. In order to determine *ex post* significant events, we estimate the following model:

$$R_t = \alpha + \beta R_{mt} + \sum_{j=1}^{J} \sum_{N=-n}^{+n} \gamma_{jN} d_{jN} + \varepsilon_t \qquad \textbf{(2)}$$

where R_t is Microsoft's return on day t, R_{mt} is the index return on day t, and d_{jN} is the dummy variable for *ex anti* day t + N of event j. In this model γ_{jN} measures the abnormal return for N^{th} day of event j. Cumulative abnormal returns for event j are measured as $\sum_{N=-n}^{n} \gamma_{jN}$. *Ex ante* events are *ex post* significant if the p value for the cumulative return is less than 10%. For purposes of determining *ex post* significant dates, cumulative one and three day abnormal returns are measured. Appendix I provides a complete list of the *ex ante* events. The *ex post* significant events are in Appendix II.

Daily return and market capitalization data for each firm were extracted from CRSP files for calendar years 1991-2002. The CRSP files also provide return data for the market proxies. We use the S&P500 Index as our proxy but results do not change significantly if we use the CRSP equally weighted index. The nine sector portfolios are constructed from a cross section of 156 computer related firms. The criteria for forming the nine sector portfolios are discussed in BH. As with any time series, the study may be influenced by survivorship bias. However, the effects of survivorship bias are diminished greatly by the construction of the portfolios. In particular, firms do <u>not</u> need to span the entire 1991-2002 time period to be included in the pool. As firms drop out due to acquisitions or failure, their weight is adjusted accordingly. The firms comprising each of the nine sector portfolios can be found in Appendix III.

Table 1 provides summary daily return statistics for Microsoft and both the equal and value weighted portfolios. Comparison of the means and standard deviations of the value vs. equal weighted portfolios suggests differences in their return characteristics and supports our decision to examine both types of portfolios. Table 2 shows the 10 largest positive and negative daily returns for Microsoft over the entire 1991-2002 period. Seven of the largest one day percentage losses and six of the largest one day percentage gains occur in the post 1997 period. More importantly two of the largest one day losses in the post 1997 period are directly related to antitrust rulings. The return data reinforce the importance of including the 1998-2002 time period in estimating the overall effects of the government antitrust enforcement efforts directed at Microsoft.

TABLE 1
SUMMARY DAILY RETURN STATISTICS FOR
MICROSOFT AND NINE SECTOR PORTFOLIOS
JANUARY 2, 1991 TO DECEMBER 31, 2002

Sector	Firms	Weight	Mean	Median	Max	Min	Standard Deviation	Obs
Component	16	Equal	0.11%	0.08%	15.97%	-11.54%	2.44%	3027
		Value	0.17%	0.15%	14.51%	-14.60%	2.71%	3027
Computer	14	Equal	0.08%	0.07%	14.23%	-11.35%	2.09%	3027
		Value	0.10%	0.08%	16.84%	-9.55%	2.04%	3027
Corporate	9	Equal	0.08%	0.06%	17.17%	-15.91%	2.40%	3027
		Value	0.11%	0.05%	18.51%	-26.28%	2.16%	3027
Distributor	17	Equal	0.09%	0.07%	16.96%	-14.51%	2.19%	3027
		Value	0.11%	0.12%	12.16%	-16.78%	2.01%	3027
Network	19	Equal	0.16%	0.20%	7.26%	-8.83%	1.73%	3027
		Value	0.27%	0.27%	9.29%	-9.71%	2.16%	3027
PC Software	23	Equal	0.11%	0.15%	15.52%	-12.68%	2.18%	3027
		Value	0.18%	0.15%	21.52%	-18.21%	2.92%	3027
Peripheral Equipment	13	Equal	0.10%	0.07%	28.65%	-11.81%	2.40%	3027
		Value	0.12%	0.12%	23.87%	-23.65%	2.69%	3027
Conductor	11	Equal	0.13%	0.11%	16.91%	-13.13%	2.84%	3027
		Value	0.14%	0.09%	15.10%	-15.23%	2.60%	3027
Non-PC Software	44	Equal	0.12%	0.21%	14.32%	-10.65%	1.91%	3027
		Value	0.17%	0.21%	12.97%	-17.43%	2.26%	3027
Microsoft	1	NA	0.13%	0.00%	19.57%	-15.60%	2.39%	3027

TABLE 2
LARGEST ONE DAY NEGATIVE AND POSITIVE MICROSOFT RETURNS
JANUARY 2, 1991 TO DECEMBER 31, 2002

Event Number	Event Date	Return	Wall Street Journal Explanation
1	4/24/2000	-16%	Reports that the government is planning to force Microsoft to divest its MS Office software
2	4/3/2000	-15%	Ruling that Microsoft violated the terms of the consent decree
3	11/30/2000	-12%	AOL and Gateway announce the internet connected Touch Pad
4	12/15/2000	-11%	Microsoft revenue trails forecast

5	8/31/1998	-9%	Technology sector sell off
6	3/12/2001	-8%	Technology sector sell off
7	9/17/2001	-8%	Market sell off
8	4/20/1992	-8%	Market sell off
9	12/20/2000	-7%	Market sell off
10	7/25/2002	-7%	Market sell off

Event Number	Event Date	Return	Wall Street Journal Explanation
1	10/19/2000	20%	Microsoft sales and earnings beat forecast
2	5/8/2002	11%	Activision reports strong sales of video games that run on Xbox
3	1/3/2001	11%	Market advances
4	4/15/1992	10%	Federal judge dismisses Apple's Copyright infringement suit
5	1/19/2001	10%	Microsoft earnings and sales in line with or better than expectations
6	12/15/1999	10%	Windows 2000 nearly complete
7	4/18/1997	10%	Microsoft posted an 85% rise in quarterly profit, far ahead of projections
8	4/5/2001	9%	Microsoft announces internet song service
9	7/8/1991	9%	Market advances
10	3/23/2000	8%	Microsoft announces ad campaign for Xbox

Overall, our study produces cumulative abnormal returns for both anti- and pro-enforcement announcement from 1991 to 2002. Separate results are produced for Microsoft, the nine sector portfolios, and a grand pooled portfolio. Abnormal return results are conditioned on both *ex ante* and *ex post* announcement sets. Although we are most interested in value weighted portfolio results we include both equal and value weighted portfolio results to provide better comparisons to the BH study.

EMPIRICAL RESULTS

Following BH, we first examine eleven, three, and one day abnormal returns for Microsoft and nine portfolios of firms providing complementary and/or substitute products for Microsoft's operating and applications software systems. We also include a pooled regression that combines Microsoft with all of the firms in the nine portfolios. We include the pooled regression as it provides the best test of the market's assessment of net wealth transfers among the computer industry segment. Net wealth transfers are best evaluated from value weighted portfolios. However, to be consistent with BH, we conduct regressions with both value and equally weighted portfolios.

Conditioning on *ex ante* events

Table 3 presents abnormal return results for Microsoft and the value weighted portfolio separately conditioned on the *ex ante* anti-enforcement and pro-enforcement events. With regard to the anti-enforcement events, Microsoft exhibits significant positive abnormal returns for both the one and three day event windows. These results strongly support H1 that setbacks to antitrust enforcement efforts benefit the target. Likewise Microsoft exhibits significant negative one and three day abnormal returns surrounding the pro-enforcement events. These results strongly support H2 that favorable enforcement actions negatively impact the target. It is interesting to note that BH did not find significant one day returns for Microsoft when conditioning on the pro-enforcement events. This suggests that unlike the earlier period, post-1997 antitrust enforcement actions had more negative and significant impacts on Microsoft's returns. Overall, these two results are consistent with the theory that antitrust enforcement negatively impacts the target.

However, support for the theory appears limited to the impact on the target. Theory suggests that setbacks to antitrust efforts should negatively impact the remaining firms in the industry. Examining the nine sector portfolios, anti-enforcement events do not result in significant negative abnormal returns at any of the eleven, three, or one day windows. Even more striking are the results in which five of nine sector portfolios have significantly positive abnormal returns at the eleven, three, or one day windows [Component, Computer, Distributor, Network, and Semi-conductor]. These results are clearly contrary to H3 and suggest that setbacks to antitrust enforcement are viewed by the market as neutral or positive, depending on the sector. Conditioning on the pro-enforcement events confirms the story. None of the nine sector portfolios exhibit positive and significant abnormal returns for any of the event windows. Two of nine sector portfolios [Component and Network] have significantly negative abnormal returns for at least one of the event windows. These results do not support H4 and are consistent with a neutral or negative reaction to antitrust efforts among firms in the computer industry. However, the results are not as strong as in BH who find significantly negative abnormal returns in five of the nine sectors.

In order to truly test net wealth effects, we go beyond BH and examine abnormal returns for a value weighted portfolio that pools Microsoft with the entire sample of 156 computer related firms. Focusing on the anti-enforcement events, we find positive and significant abnormal returns for all three event windows. This result strongly rejects H5 and suggests that the market sees a net economic benefit among a cross-section of computer firms to setbacks in antitrust enforcement. Conditioning on the pro-enforcement events, we also reject H6 as none of the event windows indicate significantly positive abnormal returns. Evidently, the market sees real economic benefit to roadblocks in the antitrust efforts and assigns no economic benefit to the impact of supporting rulings on other computer firms.

Table 4 presents abnormal return results for Microsoft and the equally weighted portfolios also conditioned on the *ex ante* anti-enforcement and pro-enforcement events. Conditioning on the anti-enforcement events, five of nine sector portfolios have significantly positive abnormal returns on either one or three day event windows [Component, Computer, Network, PC Software, and Semi-conductor}. None of the remaining three portfolios have significantly negative abnormal returns. As with the value weighted portfolios, the results reject H3 that unexpected anti-enforcement announcements have a negative impact on the stock returns of other computer firms. Likewise, the pooled regression indicates significantly positive abnormal

TABLE 3
ABNORMAL RETURNS FOR MICROSOFT AND THE VALUE WEIGHTED PORTFOLIOS WITH ABNORMAL RETURNS ESTIMATED FROM MODEL 1 USING *EX ANTE NEWS EVENTS*

	***Ex ante* Antitrust News Events**					
	Anti-Enforcement Events			Pro-Enforcement Events		
	11 Day	3 Day	1 Day	11 Day	3 Day	1 Day
Firm or Sector Portfolio	[-5,5]	[-1,1]	[0]	[-5,5]	[-1,1]	[0]
Microsoft	0.015	0.018	0.025	-0.012	-0.011	-0.010
	(0.347)	(0.034)	(0.000)	(0.089)	(0.009)	(0.000)
Component	0.017	0.016	0.013	-0.001	-0.013	-0.005
	(0.291)	(0.067)	(0.010)	(0.916)	(0.005)	(0.059)
Computer	0.027	0.007	0.005	-0.001	0.002	0.000
	(0.022)	(0.252)	(0.158)	(0.895)	(0.590)	(0.961)
Corporate	-0.008	-0.002	-0.001	0.010	-0.002	-0.001
	(0.573)	(0.767)	(0.863)	(0.146)	(0.654)	(0.687)
Distributor	0.030	0.016	0.009	-0.002	0.000	0.001
	(0.020)	(0.018)	(0.023)	(0.722)	(0.997)	(0.718)
Network	0.003	0.018	0.017	-0.022	-0.004	-0.002
	(0.828)	(0.022)	(0.000)	(0.005)	(0.408)	(0.478)
PC Software	0.016	0.005	0.006	0.006	-0.007	0.000
	(0.380)	(0.641)	(0.243)	(0.473)	(0.175)	(0.895)
Peripheral Equipment	0.014	0.001	-0.003	0.004	0.005	0.001
	(0.415)	(0.901)	(0.562)	(0.605)	(0.287)	(0.842)
Semi-conductor	0.023	0.017	0.017	0.002	-0.003	-0.003
	(0.152)	(0.041)	(0.001)	(0.795)	(0.517)	(0.220)
Non-PC Software	-0.002	-0.001	0.004	-0.003	-0.005	-0.003
	(0.881)	(0.908)	(0.256)	(0.643)	(0.172)	(0.169)
Pooled	0.022	0.011	0.010	0.001	-0.002	-0.001
	(0.034)	(0.045)	(0.001)	(0.856)	(0.583)	(0.422)

(p-values in parentheses)

TABLE 4
ABNORMAL RETURNS FOR MICROSOFT AND THE EQUALLY WEIGHTED PORTFOLIOS WITH ABNORMAL RETURNS ESTIMATED FROM MODEL 1 USING *EX ANTE SIGNIFICANT NEWS EVENTS*

	***Ex ante* Antitrust News Events**					
	Anti-Enforcement Events			Pro-Enforcement Events		
Firm or Sector Portfolio	11 Day [-5,5]	3 Day [-1,1]	1 Day [0]	11 Day [-5,5]	3 Day [-1,1]	1 Day [0]
Microsoft	0.015	0.018	0.025	-0.012	-0.011	-0.010
	(0.347)	(0.034)	(0.000)	(0.089)	(0.009)	(0.000)
Component	0.017	0.013	0.014	-0.004	-0.012	-0.003
	(0.300)	(0.121)	(0.003)	(0.615)	(0.005)	(0.229)
Computer	0.015	0.002	0.008	0.007	-0.001	-0.001
	(0.250)	(0.717)	(0.039)	(0.243)	(0.888)	(0.601)
Corporate	-0.005	-0.002	-0.003	0.009	-0.003	-0.001
	(0.762)	(0.808)	(0.556)	(0.239)	(0.583)	(0.646)
Distributor	0.008	0.011	0.005	0.000	-0.006	0.001
	(0.632)	(0.195)	(0.334)	(0.954)	(0.179)	(0.617)
Network	0.005	0.017	0.005	-0.006	-0.005	-0.002
	(0.674)	(0.011)	(0.158)	(0.347)	(0.258)	(0.352)
PC Software	0.014	0.010	0.010	0.011	-0.001	0.001
	(0.309)	(0.180)	(0.018)	(0.075)	(0.898)	(0.610)
Peripheral Equipment	0.016	-0.002	0.002	0.009	0.001	-0.005
	(0.359)	(0.870)	(0.711)	(0.257)	(0.876)	(0.111)
Semi-conductor	0.017	0.020	0.016	0.007	-0.007	-0.003
	(0.352)	(0.038)	(0.004)	(0.422)	(0.199)	(0.287)
Non PC Software	0.005	0.003	0.003	0.005	-0.001	0.000
	(0.708)	(0.663)	(0.443)	(0.321)	(0.708)	(0.926)
Pooled	0.010	0.008	0.007	0.005	-0.003	-0.001
	(0.299)	(0.136)	(0.023)	(0.251)	(0.211)	(0.429)

(p-values in parentheses)

returns at the one day window. Although this result contradicts H5, it is weaker than the pooled results from the value weighted portfolio. This reinforces our argument that giving undue weight to the returns of smaller firms distorts the economic interpretation of regression results.

Conditioning on the pro-enforcement events, we find that none of the nine sector portfolios have significantly positive abnormal returns, while one sector portfolio [Component] has significantly negative portfolio returns over the three day window. Based on these results, we reject H4 for the equally weighted portfolios. Likewise, the pooled regression results contradict H6. While not providing as clear a picture of the true economic impact of antitrust litigation, the equally weighted portfolio results do not support the theory that there are net economic benefits associated with antitrust enforcement.

Overall, conditioning on the *ex ante* events provides clear evidence that from the market's perspective, positive antitrust efforts hurt Microsoft and are more or less neutral for the remaining firms. However, the market perceives setbacks to the antitrust case as positive signals for Microsoft and the industry as a whole.

Conditioning on *ex post* significant events

Although carefully constructed, the *ex ante* event list potentially lacks market validation. This section examines the abnormal return models conditioned on subsets of anti- and pro-enforcement events that the market deems significant to Microsoft. We use Model 2 to determine which events are *ex post* significant. The *ex post* significant events are listed in Exhibit II. The results for the *ex post* events on the abnormal returns of value weighted portfolios appear in Table 5. Conditioning on the anti-enforcement events, Microsoft exhibits significantly positive abnormal returns for both the one and three day windows. These results are as expected and reinforce the theory that setbacks to antitrust efforts are positive events for the target. None of the nine sector portfolios have significantly negative abnormal returns while two of the nine portfolios [Network and Semi-conductor] exhibit positive abnormal returns over the one day event window. These results clearly reject H3. In the pooled regression comprising Microsoft and the 156 firms, none of the event windows produce significant abnormal returns. While rejecting H5, these results are weaker than those generated from the *ex ante* event set as the market finds no overall gain to the industry. Apparently, the anti-enforcement events that are strongest for Microsoft are on average more neutral for the industry.

Not surprisingly, conditioning on the *ex post* pro-enforcement events produces significantly negative abnormal Microsoft returns across all three event windows. Examining the nine sector portfolios, none exhibit significantly positive abnormal returns. However, the Component sector does produce negative abnormal returns for the one day window. With no positive abnormal returns and one sector with significantly negative abnormal returns, these results reject H4. As before, we use the pooled regression to evaluate H6. Here we find no evidence the market sees a net economic benefit to pro-enforcement rulings as all three windows produce insignificant abnormal returns.

Table 6 presents results for the equally weighted portfolios. Examining the anti-enforcement events, none of the sector portfolios exhibit significantly abnormal returns. While rejecting H3, the results are weaker than with the value weighted portfolios, which produced two sectors with significantly positive abnormal returns. The pooled regression rejects H5 as none of the abnormal returns are significantly negative, which is quite similar to the results from the value weighted portfolios. Examining the panel of pro-enforcement events four of the nine sector portfolios [Component, Corporate, PC Software, and Non-PC Software] have significantly

negative abnormal returns in either the one or three day windows. These results clearly reject H4. Likewise, the regression utilizing the entire pool of firms rejects H6 as both the one and three day windows produce significantly negative abnormal returns.

A comparison of the pro-enforcement panels from Tables 5 and 6 shows considerable sensitivity to the weighting scheme. In particular, four of the nine equally weighted portfolios from Table 6 exhibit significantly negative abnormal returns at either the one or three day windows while only one value weighted portfolio produces similar results. More importantly, under equal weighting, the pooled regression suggests a net economic loss in the computer industry due to pro-enforcement rulings. However under value weighting (Table 5), the pooled regression indicates a neutral industry reaction. While both panels reject H6, Table 6 does so much more strongly. These results demonstrate that equal weighting has the potential of biasing the economic significance of net industry effects.

Nevertheless, conditioning on the *ex post* significant events does not alter the main results. We continue to reject H3-H6. But, the specific anti-enforcement events that produce abnormal Microsoft returns do not necessarily produce abnormal industry wide returns. The market reserves the stronger response for the full *ex ante* set of events.

TABLE 5
ABNORMAL RETURNS FOR MICROSOFT AND THE VALUE WEIGHTED PORTFOLIOS ABNORMAL RETURNS ESTIMATED FROM MODEL 1 WITH *EX POST SIGNIFICANT NEWS EVENTS*

	***Ex Post* Antitrust News Events**					
	Anti-Enforcement Events			Pro-Enforcement Events		
Firm or Sector Portfolio	11 Day [-5,5]	3 Day [-1,1]	1 Day [0]	11 Day [-5,5]	3 Day [-1,1]	1 Day [0]
Microsoft	0.042	0.032	0.043	-0.063	-0.083	-0.057
	(0.071)	(0.011)	(0.000)	(0.015)	(0.000)	(0.000)
Component	0.013	0.001	0.005	0.001	-0.027	-0.016
	(0.600)	(0.969)	(0.492)	(0.967)	(0.054)	(0.038)
Computer	0.034	0.003	0.001	0.000	-0.003	-0.001
	(0.052)	(0.711)	(0.833)	(0.990)	(0.805)	(0.831)
Corporate	0.011	0.006	0.002	-0.014	-0.013	-0.008
	(0.616)	(0.614)	(0.790)	(0.573)	(0.316)	(0.271)
Distributor	0.005	0.004	0.006	0.003	0.007	0.012
	(0.790)	(0.686)	(0.280)	(0.890)	(0.532)	(0.065)
Network	0.013	0.009	0.018	0.034	-0.013	-0.005
	(0.524)	(0.392)	(0.003)	(0.238)	(0.401)	(0.555)

PC Software	-0.010	-0.007	0.002	-0.017	-0.026	0.006
	(0.727)	(0.629)	(0.801)	(0.585)	(0.101)	(0.506)
Peripheral Equipment	0.040	0.005	-0.003	0.022	0.004	0.006
	(0.113)	(0.698)	(0.701)	(0.420)	(0.761)	(0.489)
Semi-conductor	0.015	0.009	0.015	-0.003	-0.014	-0.005
	(0.521)	(0.446)	(0.041)	(0.901)	(0.293)	(0.552)
Non-PC Software	0.005	0.000	0.001	-0.010	-0.011	-0.007
	(0.800)	(0.970)	(0.859)	(0.623)	(0.316)	(0.301)
Pooled	0.022	0.006	0.008	0.001	-0.012	-0.004
	(0.141)	(0.485)	(0.074)	(0.966)	(0.157)	(0.405)

(p-values in parentheses)

TABLE 6
ABNORMAL RETURNS FOR MICROSOFT AND THE EQUALLY WEIGHTED PORTFOLIOS ABNORMAL RETURNS ESTIMATED FROM MODEL 1 WITH *EX POST* SIGNIFICANT *NEWS EVENTS*

	***Ex Post* Antitrust News Events**					
	Anti-Enforcement Events			Pro-Enforcement Events		
Firm or Sector Portfolio	11 Day [-5,5]	3 Day [-1,1]	1 Day [0]	11 Day [-5,5]	3 Day [-1,1]	1 Day [0]
Microsoft	0.042	0.032	0.043	-0.063	-0.083	-0.057
	(0.071)	(0.011)	(0.000)	(0.015)	(0.000)	(0.000)
Component	0.027	0.005	0.004	-0.028	-0.040	-0.018
	(0.263)	(0.674)	(0.568)	(0.280)	(0.004)	(0.022)
Computer	0.034	0.009	0.007	-0.003	-0.016	-0.010
	(0.072)	(0.365)	(0.253)	(0.894)	(0.143)	(0.127)
Corporate	0.014	0.003	0.000	-0.036	-0.027	-0.018
	(0.591)	(0.841)	(0.999)	(0.206)	(0.074)	(0.036)
Distributor	-0.039	-0.001	0.005	-0.023	-0.020	-0.005
	(0.095)	(0.939)	(0.475)	(0.377)	(0.145)	(0.535)
Network	0.004	0.014	0.007	0.048	0.002	-0.003
	(0.787)	(0.101)	(0.148)	(0.047)	(0.868)	(0.659)

PC Software	0.027	0.008	0.006	-0.011	-0.034	-0.016
	(0.194)	(0.457)	(0.367)	(0.619)	(0.004)	(0.019)
Peripheral Equipment	0.025	0.014	0.003	-0.011	-0.013	-0.013
	(0.330)	(0.304)	(0.736)	(0.701)	(0.378)	(0.133)
Semi-conductor	0.032	0.014	0.014	0.016	-0.025	-0.015
	(0.243)	(0.342)	(0.102)	(0.597)	(0.110)	(0.097)
Non-PC Software	0.029	0.010	0.002	-0.040	-0.037	-0.025
	(0.108)	(0.288)	(0.719)	(0.039)	(0.000)	(0.000)
Pooled	0.021	0.010	0.004	-0.020	-0.031	-0.018
	(0.161)	(0.222)	(0.328)	(0.210)	(0.000)	(0.000)

(p-values in parentheses)

CONCLUSION

This paper utilizes an event study framework to measure the market's reaction to antitrust enforcement actions. We examine the returns of both Microsoft and firms supplying complementary and/or substitute products. We employ a methodology introduced by BH, but extend their data set to include post-1997 events. We also examine the abnormal returns to value weighted portfolios as these provide a better assessment of net economic gains and losses. Our results are broadly consistent with BH, but provide a more complete test of the theory. In support of the theory, we find that anti- (pro-) enforcement actions positively (negatively) impacted Microsoft's stock returns. However, the market provides no evidence to support the theory that antitrust efforts produce net economic gains among firms that provide complementary and/or substitute products. On the contrary, these firms appear to benefit from setbacks to antitrust efforts and realize little or no market gains to pro-antitrust enforcement actions. In this regard, our evidence against the theory is weaker than in BH, especially when the economic significance of abnormal returns is considered.

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APPENDIX I
EX ANTE EVENT DATES WITH CLASSIFICATIONS

THE 1991 - 1997 ANNOUNCEMENTS ARE DIRECTLY FROM BITTLINGMAYER AND HAZLETT (2000). THE 1998 – 2002 ANNOUNCEMENTS ARE CULLED FROM THE WALL STREET JOURNAL INDEX.

Date	Announcement Summary	Classification
7/18/1994	Microsoft signs consent decree.	Anti-Enforcement
3/8/1995	DOJ and Microsoft ask federal appeals court to reverse Sporkin's Decision.	Anti-Enforcement
4/25/1995	Three-judge appeals panel voices concern that Sporkin may have exceeded his authority.	Anti-Enforcement
6/19/1995	Appeals court reinstates consent decree Sporkin rejected.	Anti-Enforcement
7/24/1995	DOJ withdraws broad subpoenas.	Anti-Enforcement
8/9/1995	DOJ say it will take no action prior to Windows 95 shipment.	Anti-Enforcement
8/22/1995	Judge formalizes consent.	Anti-Enforcement
8/4/1997	Microsoft closes purchase of Web-TV after DOJ ends its review without taking action.	Anti-Enforcement
4/22/1998	Microsoft injunction comes under fire-appeals panel seems to back Microsoft's view that order exceeded court's power.	Anti-Enforcement
7/20/1998	States narrow suit against Microsoft. Drop "Office" claims.	Anti-Enforcement
6/29/2001	Microsoft scores big legal victory. Harsh findings of fact stand. Lower court will determine penalty.	Anti-Enforcement
7/19/2001	Microsoft requests that appeals court rehears part of case.	Anti-Enforcement
9/7/2001	Regulators won't seek Microsoft break-up. Antitrust officials will ask for broad restrictions on business practices.	Anti-Enforcement
10/1/2001	Judge orders urgent talks on Microsoft. In aftermath of attacks, fast settlement is seen as benefiting economy.	Anti-Enforcement
11/1/2001	Microsoft reaches tentative antitrust pact-US will require some limits on monopoly, require little Windows change.	Anti-Enforcement
3/12/1991	Microsoft becomes target of FTC investigation.	Pro-Enforcement
10/21/1992	FTC has subpoenaed data from Microsoft.	Pro-Enforcement
12/11/1992	FTC staff lawyers sent report on December 4 requesting injunction against Microsoft.	Pro-Enforcement

Date	Announcement Summary	Classification
8/2/1993	DOJ is review documents from Microsoft.	Pro-Enforcement
8/23/1993	DOJ reported that on August 20 it will launch a formal investigation of Microsoft.	Pro-Enforcement
6/6/1994	DOJ investigation intensifying. Depositions taken.	Pro-Enforcement
1/11/1995	Competitors file brief to unravel consent decree.	Pro-Enforcement
1/16/1995	Sporkin invites Jacobovitz and Reback to present oral arguments.	Pro-Enforcement
1/20/1995	Sporkin asks DOJ and Microsoft why changes should not be made in consent decree.	Pro-Enforcement
1/23/1995	Sporkin at loggerheads with Bingaman and MS attorney. Apple appeals case to Supreme Court.	Pro-Enforcement
2/1/1995	DOJ has issued subpoenas in Microsoft/Intuit investigation.	Pro-Enforcement
2/15/1995	Sporkin rejects consent decree as too lenient.	Pro-Enforcement
2/23/1995	Apple alleges it was threatened by Microsoft.	Pro-Enforcement
6/12/1995	DOJ reviews Microsoft stipulation against patent infringement suits.	Pro-Enforcement
6/22/1995	DOJ issues subpoenas to publishers.	Pro-Enforcement
7/31/1995	DOJ extends investigation to area-bundling of software.	Pro-Enforcement
2/6/1996	DOJ interested in Microsoft acquisition of Vermeer Technologies.	Pro-Enforcement
9/20/1996	DOJ has launched an investigation of Microsoft's Internet software business.	Pro-Enforcement
2/12/1997	Texas has launched an antitrust investigation of Microsoft.	Pro-Enforcement
5/20/1997	DOJ requests additional information about Microsoft's planned acquisition of WebTV Networks.	Pro-Enforcement
6/30/1997	Three senators have asked the FTC to again investigate Microsoft's business practices, including compliance with consent decree.	Pro-Enforcement
8/19/1997	DOJ is reviewing Microsoft's minority stake in Apple.	Pro-Enforcement
10/7/1997	Four more states join Microsoft investigation.	Pro-Enforcement
10/17/1997	Microsoft under investigation by European officials.	Pro-Enforcement
11/3/1997	Senate internet panel to probe Microsoft's power.	Pro-Enforcement
11/10/1997	Texas sues Microsoft, alleging licenses impede state's probe.	Pro-Enforcement
12/12/1997	Judge orders Microsoft to stop bundling software with Windows operating system.	Pro-Enforcement

Date	Announcement Summary	Classification
12/18/1997	U.S. and Microsoft disagree on court order compliance.	Pro-Enforcement
12/30/1997	DOJ alleges that Microsoft thwarts court order.	Pro-Enforcement
1/15/1998	Judge Jackson rejects attempt by Microsoft to remove Special Master in U.S. Action.	Pro-Enforcement
1/23/1998	Microsoft and Justice end a squirmish. The company agrees to unbundle Explorer.	Pro-Enforcement
2/3/1998	Subpoenas issued in probe of Microsoft.	Pro-Enforcement
2/5/1998	Microsoft partners in "Active Desktop" subpoenaed in U.S. Antitrust probe.	Pro-Enforcement
2/20/1998	AOL, MCI subpoenaed in Microsoft case.	Pro-Enforcement
3/17/1998	Microsoft probe expanded to cover Sun's Java.	Pro-Enforcement
4/6/1998	U.S. closes in on new Microsoft case-officials think evidence supports a broad charge of extending monopoly.	Pro-Enforcement
4/24/1998	Microsoft subject of new antitrust probe investigating whether Microsoft tried to induce Netscape to split Internet market.	Pro-Enforcement
4/30/1998	States rejoin federal effort in case against Microsoft.	Pro-Enforcement
5/19/1998	U.S. sues Microsoft on antitrust grounds. Microsoft accused of curbing competition. State actions begin.	Pro-Enforcement
9/2/1998	U.S. adds to case alleging illegal pressure on Apple, Intel, and others.	Pro-Enforcement
9/4/1998	Microsoft's bid to limit scope of trial denied.	Pro-Enforcement
9/15/1998	Judge refuses to dismiss charges in Microsoft case.	Pro-Enforcement
9/18/1998	Microsoft bid to limit scope of antitrust suit rejected by judge.	Pro-Enforcement
1/14/1999	Judge rejects Microsoft's motion to dismiss case.	Pro-Enforcement
11/8/1999	Microsoft found to be a predatory monopolist.	Pro-Enforcement
12/7/1999	US asks judge to find violations of law by Microsoft.	Pro-Enforcement
11/5/2001	States find flaws in deal with Microsoft.	Pro-Enforcement
11/6/2001	Key states want tighter rules on Microsoft. One third will go against settlement deal.	Pro-Enforcement
11/7/2001	Nine states rebuff US-Microsoft accord-case will return to court. Others to back accord	Pro-Enforcement
12/7/2001	States to seek tougher curbs on Microsoft-objectors to US settlement to offer new proposal; Apple, Sun may benefit.	Pro-Enforcement

APPENDIX II
EX POST EVENT DATES WITH CLASSIFICATION

ALL *EX ANTE* EVENTS THAT PRODUCED SIGNIFICANT ONE OR THREE DAY ABNORMAL MICROSOFT RETURNS USING MODEL 2

Date	Announcement Summary	Classification
7/18/1994	Microsoft signs consent decree.	Anti-Enforcement
3/8/1995	DOJ and Microsoft ask federal appeals court to reverse Sporkin's Decision.	Anti-Enforcement
8/9/1995	DOJ say it will take no action prior to Windows 95 shipment.	Anti-Enforcement
8/22/1995	Judge formalizes consent.	Anti-Enforcement
4/22/1998	Microsoft injunction comes under fire-appeals panel seems to back Microsoft's view that order exceeded court's power.	Anti-Enforcement
6/29/2001	Microsoft scores big legal victory. Harsh findings of fact stand. Lower court will determine penalty.	Anti-Enforcement
11/1/2001	Microsoft reaches tentative antitrust pact-US will require some limits on monopoly, require little Windows change.	Anti-Enforcement
6/6/1994	DOJ investigation intensifying. Depositions taken.	Pro-Enforcement
6/22/1995	DOJ issues subpoenas to publishers.	Pro-Enforcement
4/24/1998	Microsoft subject of new antitrust probe investigating whether Microsoft tried to induce Netscape to split Internet market.	Pro-Enforcement
11/8/1999	Microsoft found to be a predatory monopolist.	Pro-Enforcement