

# Horizontal Mergers and Motives: Analysis of Wealth Effects on Acquirers, Targets and Rivals<sup>◇</sup>

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## ABSTRACT

Mergers and acquisitions naturally receive a great deal of attention in academia, business and the media. This interest has been fuelled by the waves in merger activity that characterised the later decades of the last century. However, it has proved somewhat more challenging to test the true motives behind these mergers. We investigate UK horizontal mergers between 1985 and 2004, in particular, testing the market power and productive efficiency motives by analysing the wealth effects of merger, and subsequent antitrust investigation, announcements on acquirer, target and rival shareholders. Employing the event study methodology to facilitate this analysis, we find results generally consistent with the productive efficiency motive for our total sample, and especially for our unchallenged sample. Analysis of our challenged sample yields results that are consistent with the market power hypothesis. Finally, disaggregation of our sample by industry provides us with some useful insights.

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**I: INTRODUCTION**

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Mergers and acquisitions naturally receive a great deal of attention in academia, business and the media. This interest has been fuelled by the waves in merger activity that characterised the later decades of the last century. The 1960s and 1970s, catalysed by belief in the market for corporate control [Manne (1965)] was the era of conglomerates, the 1980s were characterised by the ‘bust up’ [Scherer (1988)] of these conglomerates after it was discovered that many were actually value dilutive, and the 1990s, coinciding with the stockmarket boom, were dominated by a multitude of horizontal mergers.

Since Manne’s (1965) seminal paper on the market for corporate control, and fuelled by the introduction of the event study [Fama et al. (1969)], the field has been pervaded with studies into mergers and acquisitions. Many of the studies have attempted to discover who gains from these transactions, and place a value on how large these gains are.<sup>1</sup> Jensen and Ruback (1983) interpret the US findings to broadly state that takeovers generate positive gains, target firm shareholders benefit and acquirer shareholders do not lose. Franks and Harris (1989) fail to find a similar consensus for the UK. Further studies have attempted to tackle other issues in the field, for example, Travlos (1987) analysed the effect of different acquisition payment types, while Kennedy and Limmack (1996) studied the difference between those mergers that explicitly forced the CEO to change and those that did not.

However, it has proved somewhat more challenging to test the true motives behind these mergers. Halpern (1983) and Berkovitch and Narayanan (1993) examine some of the motives behind mergers, however, the difficulty in being able to isolate the effects of individual motives has led to innovative but limited further study.<sup>2</sup>

Motivated by the recent wave in horizontal takeovers, and by the inherent limitations in Eckbo’s (1983) original study, we further investigate the motives behind horizontal takeovers in the UK, testing in particular, the market power and productive efficiency hypotheses. To anticipate, we find results generally consistent with the productive efficiency motive for our

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<sup>1</sup> See, for example, Firth (1980), Jensen & Ruback (1983), Jarrell, Brickley & Netter (1988), Franks & Harris (1989), Limmack (1991), Gregory (1997), Bruner (2002).

<sup>2</sup> See Eckbo (1983), Shahrur (2003) and Fee & Thomas (2004).

total sample, and especially for our unchallenged sample, while analysis of our challenged sample yields results that are consistent with the market power hypothesis.

The article is organised as follows. In the next section we analyse the main theoretical motivations behind mergers, provide a synopsis of previous studies and review the leading empirical methodologies. In Section III, we describe the data, and in Section IV, our methodology. The results and analysis can be found in Section V, while Section VI presents our conclusions.

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## II: LITERATURE REVIEW

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### II.1. Merger Motives

A number of motives for mergers and acquisitions have been put forward. Broadly, five sources of motivation emerge from the literature:

#### *II.1.1. The Market for Corporate Control*

This idea was first introduced by Manne (1965), who stated that a poorly managed company would have a declining share price relative to its rivals. Well-performing companies would be attracted by the potential capital gain inherent in the stock, provided that they believe they could manage the company more efficiently, and would try to purchase the firm. Essentially, the rights to manage corporate resources can be regarded as a good demanded by rival management teams. This motive should depress the acquirer's share price on announcement of the transaction, while raising that of the target firm.

While Manne (1965) argued that this market may operate most effectively in the area of horizontal mergers, in recent decades the motive has become more associated with the conglomerate wave of the 1960s and 1970s.

### ***II.1.2. The Agency Motive***

It is suggested by Berkovitch and Narayanan (1993) that acquirers may act purely in their own self-interest when launching an acquisition attempt. Such management actions result in agency costs which reduce the total value of the combined firm. As the acquirer will select a target that it feels is most suited to improving its own welfare, the target has some value to the acquirer, and it will attempt to retrieve some of this. Therefore, the target should gain upon announcement of the transaction while the acquirer should lose.

### ***II.1.3. Managerial Hubris***

The suggestion that an acquisition is motivated by the overconfidence of management was introduced by Roll (1986). The idea is that bidding management overestimates the gains from an acquisition and therefore, overpays. As a result, the bidder usually loses at the announcement while the target gains, and the overall shareholder effect is only neutral.

### ***II.1.4. Market Power (or Collusion)***

A horizontal merger reduces the number of firms in the industry, increasing the visibility of each firm's actions and thereby raising the probability of detecting members who try to cheat on the cartel, in effect lowering the costs of monitoring the tacit collusive agreement.<sup>3</sup> This enhances the stability (and profitability) of the cartel in the short run. Since collusive agreements serve to raise product prices and generate monopoly rents, the acquirer and target firms should both experience positive abnormal shareholder returns at the merger announcement. Eckbo (1983) suggested that such mergers should generate positive abnormal returns for rival firms at the announcement, as they will also earn monopoly rents from the new industry structure. Therefore, the subsequent launch of an antitrust investigation should cause negative abnormal returns for the rivals, as the probability of them being able to benefit from monopoly rents falls.

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<sup>3</sup> As put forward by Stigler (1964).

### ***II.1.5. Productive Efficiency***

Reductions in production, distribution, marketing and other costs may arise from a horizontal merger due to, for example, rationalisation, economies of scale and replacement of inefficient management teams.<sup>4</sup> Potential realisation of these synergies should generate positive abnormal shareholder returns for the merging firms at the merger announcement, and if it is perceived that rivals will be at a competitive disadvantage after the consummation of the merger, negative abnormal returns to rivals.

Yet, Eckbo (1983) argues that the effect on rivals is unrestricted. He suggests that the announcement of an efficient merger could have an ‘information effect’ which leads to positive abnormal returns to rivals, as it may disseminate news that gives rivals the opportunity to also increase their productivity. However, we are not entirely convinced. First, it is extremely unlikely that any additional information, about the particular efficiency or technological innovations that motivated the merger, is actually released at the merger announcement. Second, even if such information is released, it is difficult to see how details which are specific to the merger being announced, passes on anything new and valuable to the rivals that would cause a discernible reaction in their stock prices.

An explanation offered by Song and Walkling (2000) is one that we are slightly more comfortable with. They suggest that external catalysts, such as regulatory changes, technological innovations or shifts in consumer tastes, change the potential gains to a merger and therefore affect the probability of an acquisition attempt. A subsequent, unexpected acquisition attempt within the industry suggests that the expected gain from bidding for a firm, under this new environment, exceeds the cost, for at least one firm in the industry. This causes all firms in the industry to reassess their probability of being acquired, and hence, a revision in each firm’s value. However, the assumption of an unanticipated acquisition attempt that corresponds to a change in the external environment is strong,<sup>5</sup> and this means that the likelihood of rivals experiencing gains at the announcement of an efficiency-motivated merger is actually quite small.

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<sup>4</sup> As put forward by Eckbo (1983), Jensen & Ruback (1983), Shahrur (2003) and Fee & Thomas (2004).

<sup>5</sup> As Roll (1986) points out, it has been highlighted by many authors that the assumption of an unanticipated bid is by no means assured.

We therefore believe that the most realistic reaction by rivals to the announcement of an efficiency-motivated merger is negative. If the merger is then challenged on antitrust grounds, we would expect a reversal in the reactions of the merging firms and the rivals.

The final two motives are particularly applicable to horizontal mergers, and will be the subject of our focus in this analysis. Table II.1 summarises the predictions associated with these two motives.

*Table II.1: Summary of Predictions*

	Merger Announcement		Antitrust Investigation Announcement	
	Merging Firms	Rivals	Merging Firms	Rivals
<b>Market Power (Collusion)</b>	<ul style="list-style-type: none"> <li>▪ Positive</li> <li>▪ Higher probability of collusion will result in higher monopoly rents to the merging firms [Eckbo (1983)].</li> </ul>	<ul style="list-style-type: none"> <li>▪ Positive</li> <li>▪ Higher probability of collusion will result in higher monopoly rents to the rival firms [Eckbo (1983)].</li> </ul>	<ul style="list-style-type: none"> <li>▪ Negative</li> <li>▪ Potential monopoly rents now less likely to be achieved [Eckbo (1983)].</li> </ul>	<ul style="list-style-type: none"> <li>▪ Negative</li> <li>▪ Potential monopoly rents now less likely to be achieved [Eckbo (1983)].</li> </ul>
<b>Productive Efficiency</b>	<ul style="list-style-type: none"> <li>▪ Positive</li> <li>▪ Lower operating, marketing, distribution or other costs [Eckbo (1983), Jensen &amp; Ruback (1983)].</li> </ul>	<ul style="list-style-type: none"> <li>▪ Negative</li> <li>▪ Competitive disadvantage [Eckbo (1983)].</li> <li>▪ (Positive)</li> <li>▪ Information regarding industry wide restructuring [Eckbo (1983)].</li> <li>▪ Acquisition Probability Hypothesis [Song &amp; Walkling (2000)].</li> </ul>	<ul style="list-style-type: none"> <li>▪ Negative</li> <li>▪ Potential efficiency gains now less likely to be achieved [Eckbo (1983)].</li> </ul>	<ul style="list-style-type: none"> <li>▪ Positive</li> <li>▪ Competitive disadvantage less likely [Eckbo (1983)].</li> <li>▪ (Negative)</li> <li>▪ Information regarding industry wide restructuring less likely to be released [Eckbo (1983)].</li> <li>▪ Acquisition Probability Hypothesis less likely [Song &amp; Walkling (2000)].</li> </ul>

Three leading studies have emerged with specific focus on the motivations behind horizontal mergers. Eckbo (1983) distinguishes between the two motives by analysing the effect of antitrust investigation announcements. His findings are inconsistent with the market power hypothesis and support the productive efficiency motive. In addition, the gains to rivals at the merger announcement suggest that the synergy motives behind the merger are insufficient to make the rivals worse off. By definition, this also contradicts the argument that the merging firms were expected to initiate a predatory price war upon completion of the merger.

However, his analysis is restricted only to the mining and manufacturing sectors in the USA, which is a serious limitation of scope. The study suffers from having to drop several observations over the course of the analysis. Also, by Eckbo's own admission, his data is biased towards the collusion hypothesis. Although this serves to make his findings' support for the efficiency hypothesis stronger, the investigation could nevertheless be improved using a wider industry sample. In addition, Eckbo's sample period was 1963-1978. Roll (1986) states that older US findings were a function of the time period, therefore it remains whether these results would be robust to more contemporary data.

Shahrur (2003) and Fee and Thomas (2004) adopt a slightly different approach to Eckbo (1983) by analysing the effect on customers and suppliers. The two studies differ in their selection method for suppliers and buyers, but their findings complement each other. Again, they find support for the productive efficiency motive, and again, the studies are US-based.

In light of the fact that Eckbo's original analysis, considering its limitations, has not been extended and repeated, it would be interesting to see if Eckbo's methodology, expanded for a wider industry base (so as to overcome the limitation of scope and collusion bias) and brought up-to-date for the UK (to overcome the period-specific findings), yielded similar results.

## **II.2. Empirical Methodologies**

The two most widely used models to assess the impact of mergers are the event study and the accounting study:<sup>6</sup>

### ***II.2.1. Event Studies***

These analyse the abnormal returns to shareholders on and around the announcement date of a specific event. The absolute return is simply calculated as the change in the share price for one day, plus any dividends paid, divided by the previous day's closing price. This return

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<sup>6</sup> See Bruner (2002).

less the normal return offered by a benchmark gives rise to the abnormal shareholder return.<sup>7</sup> Fundamental to the event study is the assumption that stockmarkets are efficient and rational,<sup>8</sup> such that the impact of an event will be reflected immediately in security prices, which are the present value of future cash flows to shareholders. This immediacy of response is the major advantage of using event studies as the impact of an event can be isolated, with other factors kept constant, relatively easily.

### ***II.2.2. Accounting Studies***

These examine the financial statements of acquirers before and after an acquisition to see whether financial performance has changed. The focus is on variables such as net income, return on equity, earnings per share and gearing ratios. To assess the benefit of acquisitions, it is necessary to investigate whether acquirers have outperformed their non-acquiring rivals. Accounting studies are based on historical data whereas event studies, being based on share price data, are forward looking.

Table II.2 compares the strengths and weaknesses of both methods. Fundamentally though, the event study is a more appropriate model for this investigation<sup>9</sup> as its immediacy and uniformity facilitate a more powerful aggregate analysis, it is forward looking (a necessity for analysing the future benefits of mergers) and it is a direct measure of the value created for shareholders.

The benefits of event studies have led to them dominating the field since the 1970s. While very appropriate for studies focusing on the event date, a criticism aimed at studies analysing longer term, post-merger performance, for example Agrawal, Jaffe and Mandelker (1992) and Gregory (1997), is that such studies question the fundamental premise upon which the event study itself is built. Assuming that the market is efficient and rational implies speedy

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<sup>7</sup> MacKinlay (1997) provides an excellent discussion of the event study methodology, along with comparisons of the various benchmarks that can be used.

<sup>8</sup> Fama (1998) re-examines the validity of these assumptions and again finds that they are indeed reasonable.

<sup>9</sup> For examples of the application of event studies to horizontal mergers, refer to Eckbo (1983), Shahrur (2003) and Fee & Thomas (2004).



share price reaction that incorporates all available information and expectations about an event. However, studies looking at the long term share price reaction refute these assumptions. As Fama (1998) reaffirms the validity of assuming efficiency and rationality, long term share price movements cannot be associated exclusively with the original merger, but rather, subsequent events as well. Therefore, a long term study is not a robust application of an event study. In our investigation, multiple event windows are used, which analyse both the short term and longer term effects of horizontal mergers.

*Table II.2: Comparison of Research Methodologies*<sup>10</sup>

<b>Event Studies</b>	<b>Accounting Studies</b>
<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>▪ A direct measure of value created for investors.</li> <li>▪ Forward looking.</li> </ul> <p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>▪ Requires significant assumptions about the functioning of the stockmarket: efficiency, rationality, and absence of restrictions on arbitrage. Research suggests that for most stocks, these are not unreasonable assumptions, on average and over time.</li> <li>▪ Vulnerable to confounding events, which could skew the returns for specific companies at specific events. Care by the researcher and law of large numbers deal with this.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Credibility: statements have been certified, accounts audited.</li> <li>▪ Used by investors in judging corporate performance. An indirect measure of economic value creation.</li> </ul> <ul style="list-style-type: none"> <li>▪ Possibly non-comparable data for different years: companies may change their reporting practices over time; regulations change over time.</li> <li>▪ Backward looking.</li> <li>▪ Ignores value of intangible assets.</li> <li>▪ Sensitive to inflation/deflation due to historical cost approach.</li> <li>▪ Possibly inadequate disclosure by companies. Great latitude in reporting financial results.</li> <li>▪ Differences among companies in accounting policies add noise.</li> <li>▪ Differences in accounting principles between countries make cross-border comparison difficult.</li> </ul>

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### III: DATA

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#### III.1. Sample Construction

Our sample of horizontal mergers is drawn from the Thomson Financial SDC Database. We define a horizontal merger as one where the target and acquirer share the same four-digit

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<sup>10</sup> Adapted from Bruner (2002).

primary SIC code. Our analysis is restricted to UK transactions between 1 January 1985<sup>11</sup> and 30 June 2004 and includes both successful and unsuccessful mergers. In addition, we only include deals in our sample that meet the following criteria:

1. The announcement date of the proposed merger can be determined on the Thomson Financial SDC database.
2. The bidder did not own a majority interest in the target prior to the deal.
3. The bidder and target are domestic, publicly-traded firms.

This gives rise to a comprehensive sample of 485 proposed horizontal mergers within the period. The mean (median) real value<sup>12</sup> of these mergers is \$1.0bn (\$218m).

We then divide our sample into challenged and unchallenged mergers. By searching within our sample for those mergers that have been referred to the UK antitrust authorities, and then cross-referencing these with the UK Competition Commission to obtain the announcement date of the antitrust investigation, we are able to obtain a subsample that consists only of challenged mergers. We then search within our sample for those mergers that were explicitly not challenged by the UK antitrust authorities. These, by definition, should be equal to the remaining deals in the sample. We therefore obtain subsamples of 125 challenged and 360 unchallenged mergers.

We also require that the targets and acquirers in the unchallenged (and challenged) subsamples have sufficient daily stock price data available on Thomson Financial DataStream in order to calculate abnormal returns for the merger (and antitrust investigation) announcement periods. While we use the full challenged subsample in this stage of the data collection, we use a random sample of 126 deals from the unchallenged subsample in order to assist the analysis. These further restrictions reduce the analysed sample size slightly. Previous studies have also

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<sup>11</sup> The start of the sample period is limited by the availability of data on the Thomson Financial SDC Database.

<sup>12</sup> The real value of a merger is taken to be its rank value, as reported by Thomson Financial SDC, at year 2000 prices, where  $Rank\ Value = Transaction\ Value - Liabilities\ Assumed + Net\ Debt\ of\ Target$ . The transaction value is the total consideration that the acquirer paid for the percentage of the target they are acquiring plus any liabilities assumed if publicly disclosed. Where rank value is not calculated, Thomson Financial SDC states it as equal to the transaction value.

suffered from having to drop observations due to problems associated with obtaining data on companies that have changed their names over time. However, by accounting for this we have minimised the loss of observations. Table III.1 contains the details of the final sample.

*Table III.1: Sample Details*

<b>Original Sample</b>	<b>Mergers</b>			
Unchallenged	360			
Challenged	125			
Total	485			

<b>Analysis Sample</b>	<b>Targets</b>	<b>Acquirers</b>	<b>Rival Portfolios</b>	<b>Total</b>
Unchallenged (Random Sample)	126	126	126	378
Challenged (Sample at Merger Announcement)	85	87	112	284
Total	211	213	238	662

Challenged (Sample at Antitrust Investigation Announcement)	86	90	112	288
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## **III.2. Summary Statistics**

### **III.2.1. Horizontal Mergers**

Summary statistics for the total sample are presented in Tables III.2-III.4. We notice that considerable variation exists in both the frequency and size of deals by year and across industries. Consistent with previous findings is the large number of horizontal mergers that were proposed in the 1990s (60 percent of mergers in our sample are from this decade). In fact, we observe from Figure III.1 that our sample period experienced two waves of merger activity, 1987-1992 and 1994-2000. This latter period coincided with the stockmarket boom of the late 1990s. However, what is noticeable from the data is a rapid decline in the frequency of deals announced since the turn of the decade (an 80 percent fall between 1999 and 2004). Accompanying this is a staggering 98 percent fall in mean deal value, in real terms, between 2000 and 2004. While in the past, investment banks have relied heavily on mergers and acquisitions income, it is this dramatic slowdown that has recently forced many to look elsewhere to supplement revenues.<sup>13</sup>

<sup>13</sup> See, for example, Wright (2004).

However, Figure III.2 shows that the mean real value of horizontal mergers does not follow the frequency of deals as closely as we would expect. In fact, the correlation is a very low 0.04. In addition, the mean is susceptible to distortion by very large individual deals, as is the case in 1999, 2000 and 2001. Two Financials deals totalling \$73.3bn are announced in 1999, two Healthcare deals totalling \$79.2bn in are announced in 2000 while a \$29.7bn deal in Financials is announced in 2001. Excluding these deals, the means are \$551m, \$2.0bn and \$235m for 1999, 2000 and 2001 respectively. Therefore, while 2000 is still the most valuable year in terms of deals announced, these figures are much more in line with the rest of the sample period indicating that there has not been a significant trend in real merger value over time.

Our industry analysis in Table III.2 shows that the Industrials sector has experienced the highest number of proposed horizontal mergers (93 deals). This is largely due to the rapid consolidation that the transport industry (a subsector of Industrials) experienced over the early part of the last decade. Another possible explanation for the high frequency of Industrials deals is that transactions in this sector are fairly inexpensive. Table III.4 shows that, at \$283m, the size of Industrials deals is well below the average. Telecommunications on the other hand has experienced the least activity with only six deals announced, while Financials enjoys the most valuable deals, with a mean of \$12.6bn.

### ***III.2.2. Unchallenged Mergers***

Summary statistics for the unchallenged sample are presented in Tables III.5-III.7. The mean (median) real deal size is \$979m (\$175m), which is lower than the total sample average. Again, Industrials experience the most merger activity (53 deals announced), and Telecommunications, the least (2 deals proposed). Financials and Healthcare contain the most valuable merger proposals, with the mean real merger value being \$11.2bn and \$8.5bn respectively. In fact, the largest merger in the subsample is announced in 2000 in Healthcare, and is valued at \$78.8bn. The least valuable deals are in the Telecommunications sector, with a mean real value of \$114m.

### ***III.2.3. Challenged Mergers***

Summary statistics for the challenged sample are presented in Tables III.8-III.10. The mean (median) real deal size is \$1.1bn (\$454m), which is higher than the total sample average. This finding suggests that the antitrust authorities target larger mergers, and is consistent with the hypothesis that larger mergers are more likely to be motivated by market power. Our analysis in the Section V will verify this thesis. The Healthcare and Industrials sectors were scrutinised most by the authorities with 45 percent and 43 percent of deals within these sectors challenged respectively. Of the challenged deals though, these sectors did not contain the most valuable proposals, with the mean real merger value being only \$426m and \$385m respectively. Financials, with a mean of \$18.4bn, again contained the most valuable deals. With 4 percent and 0 percent of deals challenged respectively, High Technology and Real Estate were least investigated.

The antitrust authorities were busiest in 1986 and 1990, during which, 62 percent and 50 percent of all deals announced were challenged, respectively. However, Figure III.3 shows that despite some variability, the proportion of deals challenged has been trending downwards over the sample period. It is interesting to note that during the most active merger period, 1997-1999, the authorities challenged the least proportion of deals.

Additionally, we find that the mean and median number of trading days between a merger announcement and its corresponding antitrust investigation announcement is 49 days. However, there exists considerable variation in this figure, with a standard deviation of 88 trading days. It is interesting to note that we do not detect any evidence to suggest that the UK Competition Commission has improved detection efficiency over the sample period. However, the UK authority's efficiency is still considerably better than the Justice Department and Federal Trade Commission in Eckbo (1983). These two US authorities averaged 302 and 318 trading days respectively to detect an antitrust case.

Table III.2: Horizontal Merger Frequency by Year and Across Industries

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total	
Consumer Products & Services			1	2	1		1	1	3	3	2	2	5	5	3	1	1					32
Energy & Power		1	1	2		3	3	1	3		12	6	4	4	3	1	1	1	2	1	1	49
Financials			1					2		1	1	1	1		2	1	1					10
Healthcare		1		1	1		3				2	7	2			2				1		20
High Technology				2	2	1	1	1			2	2	2	1	1	3	1	1	2	3	3	25
Industrials	2	1	5	3	10	3	6	6	3	7	5	2	3	10	8	6	7	1	1	3	2	93
Materials		4	3	3	3	7	4	1	3	1	2	1	2	2	6	2	3					44
Media & Entertainment		2	4	4	2	3	4	1	2	3	3	5	3	5	6	7	2		4	1	2	59
Real Estate			2	4	2		3	1				2	4	6	6	1			1			32
Retail	2	2	5	3	6	2	1	3	1	2	1	2	4	3	6	4	2		1	3		48
Consumer Staples	5	6	5	8	4	5	6	3	3	1	1	2	2	4	9						1	67
Telecommunications	2		1						1												1	6
<b>Total</b>	<b>11</b>	<b>13</b>	<b>24</b>	<b>33</b>	<b>31</b>	<b>24</b>	<b>32</b>	<b>17</b>	<b>19</b>	<b>18</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>40</b>	<b>50</b>	<b>28</b>	<b>18</b>	<b>12</b>	<b>15</b>	<b>10</b>	<b>485</b>	

Table III.3: Total Real Value (base year 2000) of Horizontal Mergers by Year and Across Industries (\$m)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total	
Consumer Products & Services			315	190	66		39	16	853	182	142	3,406	183	326	2,113	218	1		136			8,186
Energy & Power		1,364	2,950	1,297		745	3,395	15	21	14,942	5,621	5,621	8,873	8,188	1,173	5,418	13	18,131	34			72,180
Financials			1,907					12,977		41		90	302		73,302	7,963	29,724					126,305
Healthcare		377		16	189		342				14,614	2,943	122			79,229			10			97,841
High Technology				67	49	69	44	49			426	410		29	117	2,427	28	1,062	559	155		5,492
Industrials	393	277	1,745	421	1,241	116	417	97	70	3,122	310	649	641	1,557	999	3,518	8,840	274	893	709		26,289
Materials			379	5,203	1,716	217	610	193	496	259	63	148	113	1,326	4,482	323	81					15,610
Media & Entertainment		555		1,231	113	362	80	48	1,184	532	71	214	652	3,880	3,589	10,521	591	2,786	483	86		26,980
Real Estate			191	505	759		334	60				53	489	993	1,395	859		419				6,058
Retail	1,930	5,798	2,455	164	5,657	1,421	32		438	1,085	13		1,290	3,289	9,749	1,006	27	730	6,636			41,720
Consumer Staples	12,852	8,449	795	6,858	1,209	3,330	965	794	172	73	444		18,051	795	3,785			45	451			59,066
Telecommunications	3,774			4,215					1,079												22	9,295
<b>Total</b>	<b>18,948</b>	<b>16,821</b>	<b>10,737</b>	<b>20,167</b>	<b>10,998</b>	<b>6,260</b>	<b>6,258</b>	<b>14,249</b>	<b>4,313</b>	<b>5,293</b>	<b>31,025</b>	<b>13,535</b>	<b>30,716</b>	<b>20,381</b>	<b>100,704</b>	<b>111,482</b>	<b>39,306</b>	<b>23,447</b>	<b>9,407</b>	<b>972</b>	<b>495,022</b>	

Table III.4: Mean Real Value (base year 2000) of Horizontal Mergers by Year and Across Industries (\$m)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Mean	
Consumer Products & Services	-	-	315	95	66	-	39	16	284	61	71	1,703	37	65	704	218	1	-	136	-	-	256
Energy & Power	-	1,364	2,950	648	-	248	1,132	15	7	-	1,245	937	2,218	2,047	391	5,418	13	9,066	34	-	-	1,473
Financials	-	-	1,907	-	-	-	-	6,488	-	41	-	90	302	-	36,651	7,963	29,724	-	-	-	-	12,630
Healthcare	-	377	-	16	189	-	114	-	-	-	7,307	420	61	-	-	39,615	-	-	10	-	-	4,892
High Technology	-	-	-	34	25	69	44	49	-	-	213	205	-	29	117	809	28	531	186	52	-	220
Industrials	196	277	349	140	124	39	70	16	23	446	62	325	214	156	125	586	1,263	274	298	354	-	283
Materials	-	-	95	1,734	572	31	153	193	165	259	31	148	57	663	747	162	27	-	-	-	-	355
Media & Entertainment	-	278	-	308	57	121	20	48	592	177	24	43	217	776	598	1,503	296	696	483	43	-	457
Real Estate	-	-	96	126	379	-	111	60	-	-	-	27	122	165	233	859	-	419	-	-	-	189
Retail	965	2,899	491	55	943	711	32	-	438	542	13	-	323	1,096	1,625	252	14	730	2,212	-	-	869
Consumer Staples	2,570	1,408	159	857	302	666	161	265	57	73	444	-	9,025	199	421	-	-	45	451	-	-	882
Telecommunications	1,887	-	-	4,215	-	-	-	-	1,079	-	-	-	-	-	-	-	-	-	206	22	-	1,549
Mean	1,723	1,294	447	611	355	261	196	838	227	294	1,034	451	1,024	510	2,014	3,982	2,184	1,954	627	97	-	1,021

Table III.5: Unchallenged Merger Frequency by Year and Across Industries

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total	
Consumer Products & Services			1	1	1		1	1	3	1	2	2	5	5	3	1	1	1	1	1	1	29
Energy & Power				2		2	3	1	3		9	4	3	3	3	1	1	1	1	1	1	38
Financials			1					1		1		1	1		2	1						8
Healthcare				1							2	5	1			1						11
High Technology				2	2		1	1			2	2		1	1	3	1	1	2	3	3	24
Industrials	1	1	2	2	3	1	4	3	1	3	1		3	7	7	5	4	1	2	2	2	53
Materials			4	1	3	2	3	1	3	1	2	1	2	2	6	2	1	2	1	2	2	34
Media & Entertainment				2	2	3	3	1	2	2	3	4	1	2	5	6	1	3	1	1	2	43
Real Estate			2	4	2		3	1				2	4	6	6	1		1				32
Retail	2	2	5	3	5	2	1	1	1	2	1		2	3	6	4	1	1	1	2	1	43
Consumer Staples	3	2	5	4	3	2	3	1	3	1	1		2	3	8			1	1	1	1	43
Telecommunications																					1	2
Total	6	5	20	22	21	12	22	11	16	11	23	21	24	32	47	25	10	10	13	9	1	360

Table III.6: Total Real Value (base year 2000) of Unchallenged Mergers by Year and Across Industries (\$m)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Consumer Products & Services			315	24	66		39	16	853	9	142	3,406	183	326	2,113	218	1		136		7,847
Energy & Power			1,297			184	3,395	15	21		9,378	5,621	236	5,202	1,173	5,418	13	17,545	34		49,531
Financials			1,907					5,921		41		90	302		73,302	7,963					89,525
Healthcare				16							14,614	541	47			78,775			10		94,003
High Technology				67	49		44	49			426	410		29	117	2,427	28	1,062	559	155	5,422
Industrials	62	277	149	395	55	19	417	97	60	127	296	641	641	728	997	3,497	1,189	274	893	709	10,883
Materials			379	460	1,716	62	583	193	496	259	63	148	113	1,326	4,482	323	81				10,684
Media & Entertainment				449	113	362	67	48	1,184	532	71	208	231	1,515	2,353	4,834	531	2,786	483	86	15,854
Real Estate			191	505	759		334	60				53	489	993	1,395	859		419			6,058
Retail	1,930	5,798	2,455	164	5,151	1,421	32		438	1,085	13		78	3,289	9,749	1,006	27	730	282		33,648
Consumer Staples	1,589	354	795	676	418	694	518	183	172	73	444		18,051	653	3,785			45	451		28,898
Telecommunications																			206	22	228
Total	3,581	6,429	6,192	4,052	8,327	2,743	5,430	6,582	3,223	2,125	25,447	10,477	20,371	14,059	99,466	105,321	1,871	22,861	3,053	972	352,581

Table III.7: Mean Real Value (base year 2000) of Unchallenged Mergers by Year and Across Industries (\$m)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Mean
Consumer Products & Services	-	-	315	24	66	-	39	16	284	9	71	1,703	37	65	704	218	1	-	136	-	271
Energy & Power	-	-	-	648	-	92	1,132	15	7	-	1,042	1,405	79	1,734	391	5,418	13	17,545	34	-	1,303
Financials	-	-	1,907	-	-	-	-	5,921	-	41	-	90	302	-	36,651	7,963	-	-	-	-	11,191
Healthcare	-	-	-	16	-	-	-	-	-	-	7,307	108	47	-	-	78,775	-	-	10	-	8,546
High Technology	-	-	-	34	25	-	44	49	-	-	213	205	-	29	117	809	28	531	186	52	226
Industrials	62	277	75	198	18	19	104	32	60	42	296	-	214	104	142	699	297	274	446	354	205
Materials	-	-	95	460	572	31	194	193	165	259	31	148	57	663	747	162	81	-	-	-	314
Media & Entertainment	-	-	-	224	57	121	22	48	592	266	24	52	231	757	471	806	531	929	483	43	369
Real Estate	-	-	96	126	379	-	111	60	-	-	-	27	122	165	233	859	-	419	-	-	189
Retail	965	2,899	491	55	1,030	711	32	-	438	542	13	-	39	1,096	1,625	252	27	730	141	-	783
Consumer Staples	530	177	159	169	139	347	173	183	57	73	444	-	9,025	218	473	-	-	45	451	-	672
Telecommunications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	206	22	114
Mean	597	1,286	310	184	397	229	247	598	201	193	1,106	499	849	439	2,116	4,213	187	2,286	235	108	979



Table III.8: Challenged Merger Frequency by Year and Across Industries

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total	
Consumer Products & Services				1						2												3
Energy & Power		1	1			1					3	2	1	1				1				11
Financials								1									1					2
Healthcare		1			1		3					2	1			1						9
High Technology						1																1
Industrials	1	3	3	1	7	2	2	3	2	4	4	2	2	3	1	1	3	3	1			40
Materials				2		5	1										2					10
Media & Entertainment		2		2		1	1			1	1	1	2	3	1	1	1	1				16
Real Estate																						0
Retail					1								2				1					5
Consumer Staples	2	4		4	1	3	3	2				2		1	1					1		24
Telecommunications	2			1			1		1													4
Total	5	8	4	11	10	12	10	6	3	7	7	9	6	8	3	3	8	2	2	1		125

Table III.9: Total Real Value (base year 2000) of Challenged Mergers by Year and Across Industries (\$m)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total	
Consumer Products & Services				166						173												339
Energy & Power		1,364	2,930			561					5,564		8,637	2,986				587				22,649
Financials								7,056									29,724					36,780
Healthcare		377			189		342					2,402	75			454						3,838
High Technology						69																69
Industrials	331		1,595	26	1,186	96			10	2,995	14	649		829	2	22	7,650					15,406
Materials				4,743		155	28															4,926
Media & Entertainment		555		783		12						6	421	2,366	1,236	5,686	60					11,126
Real Estate																						0
Retail					506								1,212									8,073
Consumer Staples	11,263	8,095		6,182	791	2,636	447	612						142						6,355		30,168
Telecommunications	3,774			4,215					1,079													9,068
Total	15,368	10,392	4,545	16,115	2,671	3,518	829	7,667	1,089	3,168	5,578	3,058	10,345	6,322	1,238	6,162	37,435	587	6,355	0		142,441

Table III.10. Mean Real Value (base year 2000) of Challenged Mergers by Year and Across Industries (\$m)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Mean	
Consumer Products & Services	-	-	-	166	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	113
Energy & Power	-	1,364	2,950	-	-	561	-	-	-	-	1,855	-	8,637	2,986	-	-	-	587	-	-	-	2,059
Financials	-	-	-	-	-	-	-	7,056	-	-	-	-	-	-	-	-	29,724	-	-	-	-	18,390
Healthcare	-	377	-	-	189	-	114	-	-	-	-	1,201	75	-	-	454	-	-	-	-	-	426
High Technology	-	-	-	-	-	69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69
Industrials	331	-	532	26	169	48	-	-	5	749	4	325	-	276	2	22	2,550	-	-	-	-	385
Materials	-	-	2,372	-	31	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	493
Media & Entertainment	-	278	-	391	-	12	-	-	-	-	-	6	211	789	1,236	5,686	60	-	-	-	-	695
Real Estate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Retail	-	-	-	-	506	-	-	-	-	-	-	-	606	-	-	-	-	-	-	-	-	-
Consumer Staples	5,631	2,024	-	1,546	791	879	149	306	-	-	-	-	-	142	-	-	-	-	-	-	-	1,615
Telecommunications	1,887	-	-	4,215	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,257
Mean	3,074	1,299	1,136	1,465	267	293	83	1,278	363	453	797	340	1,724	790	413	2,054	4,679	293	3,177	0	-	1,140

Figure III.1. Frequency and Mean Real Value (base year 2000, \$m) of Horizontal Mergers by Year

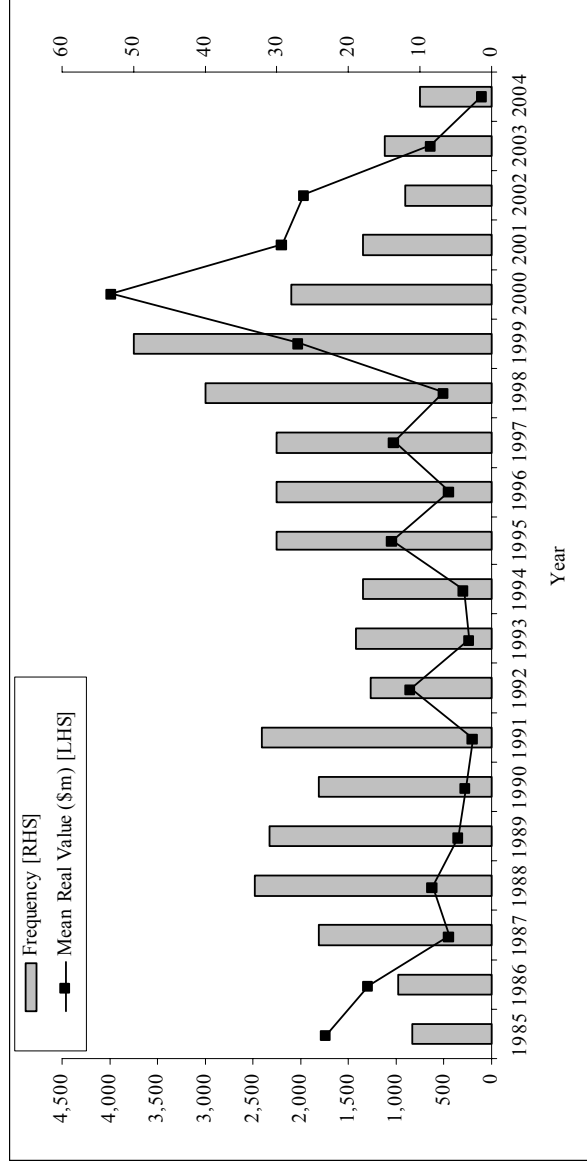


Figure III.2: Scatterplot of Mean Real Value (base year 2000, \$m) against Frequency of Horizontal Mergers

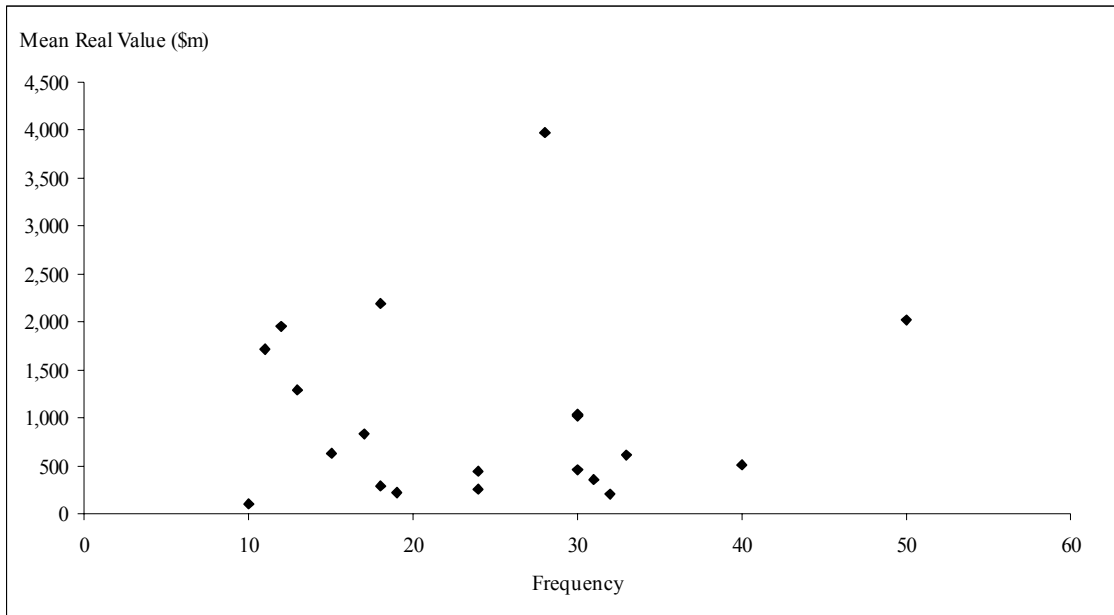
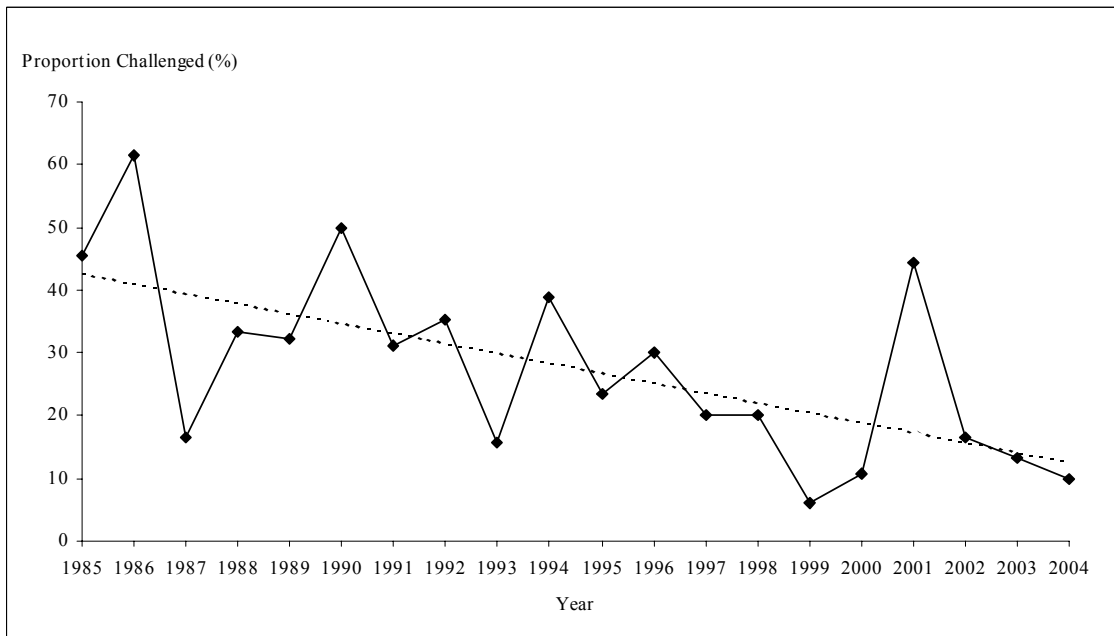


Figure III.3: Proportion of Horizontal Mergers that are challenged by UK Antitrust Authorities by Year



### III.3. Selection of Horizontal Rivals

Having already identified the primary industries of the target and bidder firms, we use these classifications as a reference when selecting the horizontal rivals. With horizontal mergers, a rival of the target will also be a rival of the bidder, in the merger industry. Therefore, following Eckbo (1983), we search for rivals for each target firm. Similar to constructing the raw sample, the rivals are only included if they are listed firms with sufficient daily stock price data available on Thomson Financial DataStream in order to calculate abnormal returns for both the merger (and antitrust investigation) announcement periods. Our rivals data is obtained first from Yahoo! Finance and EuroStockCity. These two sources list the main competitors of a number of listed companies. If the data is unobtainable from these sources, we obtain the corresponding industry component list from DataStream and label all firms on the list 'horizontal rivals'. This is justified because if a target firm is not listed on Yahoo! Finance or EuroStockCity, it is likely to be a smaller firm. Hence, it is to be expected that the firm operates in a less oligopolistic market, and is therefore likely to have many more rivals. That all the firms in the industry are its rivals is indeed a possibility.

By using this selection algorithm, we strive to minimise the inclusion of irrelevant firms in the target's portfolio of rivals. Eckbo (1983) states that the inclusion of irrelevant rival firms is of far greater concern than excluding some relevant firms, as the former will bias the wealth effect of the event towards zero whereas the latter will only provide imprecise estimates of the abnormal returns. Each merger is therefore associated with a mean of 11 rival firms (range 2-24). As a final step before the analysis, we pool the rivals into equally weighted industry portfolios for each transaction.<sup>14</sup> This is to account for any cross-correlation of returns amongst the rivals.

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<sup>14</sup> Following Eckbo (1983).

### III.4. Industry Concentration Ratios

We obtain market share data from the FAME database, which stores financial accounts for 2.8m companies in the UK and Republic of Ireland. A limitation with the database is that its coverage of very small companies may not be exhaustive. However this does not pose too much of a problem as the omission of small companies, with small market shares, is unlikely to greatly impact our concentration ratio calculations. A further limitation is that Real Estate data is unavailable. On balance however, the FAME database is one of the most comprehensive registers available for sourcing this type of data. The data is presented in Table III.11:

*Table III.11: UK Industry Concentration*

	5 Firm	8 Firm	HHI
Telecommunications	69.6	81.4	1,294
Consumer Staples	43.4	59.0	651
High Technology	38.3	50.7	523
Retail	35.9	45.2	381
Energy & Power	32.8	43.5	354
Media & Entertainment	30.6	40.1	333
Materials	30.3	38.1	286
Consumer Products & Services	29.1	38.5	264
Financials	27.8	36.1	281
Healthcare	20.6	29.2	156
Industrials	10.7	15.2	66
Real Estate	-	-	-
Mean	33.5	43.4	417
Mean (excl. Telecommunications)	29.9	39.6	329
Median	30.6	40.1	333

Data is obtained from the FAME database and sorted in descending order by the 5 Firm concentration ratio. All  $n$  Firm concentration ratios are calculated by summing the market shares of the  $n$  largest firms in the industry, and are presented as percentages. The Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared market shares of each firm in the industry. The figures presented are averages over the period 2000-2003 inclusive.

The market concentration hypothesis proposes that the more concentrated an industry is, the more visible are each firm's actions and therefore, the lower the costs of collusion are. It follows that market power motives should be more evident in industries that are already concentrated.<sup>15</sup> This hypothesis is tested in Section V.

<sup>15</sup> The analysis of industry concentration ratios by antitrust authorities on both sides of the Atlantic, to determine if a merger is likely to be anticompetitive, is motivated by this argument.

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**IV: METHODOLOGY**


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We use standard event study methodology to calculate abnormal returns for the shareholders of bidding, target and rival firms, where the abnormal return can be thought of as the additional return generated by the occurrence of the event, over-and-above the normal return expected had the event not taken place.<sup>16</sup>

Firstly, the absolute daily return for security  $i$  is calculated as:

$$R_{it} = \frac{P_{it} - P_{i(t-1)}}{P_{i(t-1)}} \quad (1)$$

where  $R_{it}$  is the period  $t$  return on security  $i$ , and  $P_{it}$  and  $P_{i(t-1)}$  are the closing prices for security  $i$  at period  $t$  and period  $(t - 1)$  respectively.

It is then necessary to formulate a model to measure normal performance. We use the market model as opposed to the constant mean return model, as it leads to a reduction in the abnormal return variance, hence an increased ability to detect the impact of the event. Assuming joint multivariate normality of asset returns, the model takes on a linear specification:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (2)$$

$$E(\varepsilon_{it}) = 0; \quad \text{var}(\varepsilon_{it}) = \sigma_{\varepsilon_i}^2$$

where  $R_{it}$  and  $R_{mt}$  are the period  $t$  returns on security  $i$  and the market portfolio respectively, and  $\varepsilon_{it}$  is the disturbance term.  $\alpha_i$ ,  $\beta_i$  and  $\sigma_{\varepsilon_i}^2$  are the market model parameters estimated using ordinary least squares (OLS) over the 160 day estimation window preceding day -19 relative to the event day (day 0). We use the FTSE All Share Index as our market portfolio because it is the most comprehensive UK stockmarket index available.<sup>17</sup>

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<sup>16</sup> For a detailed discussion of the event study methodology and the relative merits of different normal performance measurement models, refer to MacKinlay (1997) and Campbell, Lo & MacKinlay (1997, ch.4). MacKinlay (1997) argues that the assumption of asset returns being jointly multivariate normal and independently and identically distributed through time, although strong, generally does hold. Under general conditions and this assumption, OLS is both a consistent and efficient estimation procedure for the market model parameters.

<sup>17</sup> The FTSE All Share Index is a value-weighted index constructed using 800 shares and fixed-interest stocks which represent more than 90 percent of the total market capitalisation of listed companies on the London Stock Exchange.

Given the market model parameter estimates, we can then measure the abnormal returns within the event window  $(-19, 20)$ , conditional on the event window market returns, as the forecast error:

$$AR_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau} \quad (3)$$

$$\tau = T_1 + 1, \dots, T_2;$$

$$AR_{i\tau} \sim N(0, \sigma_i^2 (AR_{i\tau}))$$

where  $AR_{i\tau}$  is the period  $\tau$  abnormal return for security  $i$ ,  $T_1$  is the last day of the estimation window, and  $T_1 + 1$  and  $T_2$  are the first and last days of the event window respectively.

We now cumulate the abnormal returns over the period of interest, per security, to analyse the persistence of the event effect:

$$CAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{i\tau} \quad (4)$$

$$T_1 < \tau_1 \leq \tau_2 \leq T_2;$$

$$CAR_i(\tau_1, \tau_2) \sim N(0, \sigma_i^2(\tau_1, \tau_2))$$

where  $CAR_i(\tau_1, \tau_2)$  is the cumulative abnormal return for security  $i$  from  $\tau_1$  to  $\tau_2$ . Finally, in order to yield an aggregate analysis, we compute the cross-sectional average of the  $CARs$ :<sup>18</sup>

$$CAAR(\tau_1, \tau_2) = \frac{1}{N} \sum_{i=1}^N CAR_i(\tau_1, \tau_2) \quad (5)$$

$$CAAR(\tau_1, \tau_2) \sim N[0, \text{var}(CAAR(\tau_1, \tau_2))]$$

where  $CAAR(\tau_1, \tau_2)$  is the cumulative average abnormal return from  $\tau_1$  to  $\tau_2$ , over  $N$  securities.

Our use of multiple event windows around the event date, each differing in size, aims to capture the effect of any information leakages about the proposed merger (or antitrust complaint), while we try to capture any longer term event effects with the  $(5, 20)$  window.<sup>19</sup>

<sup>18</sup> Note that we could have equivalently aggregated across securities first, then through time.

<sup>19</sup> The fact that the majority of  $(5, 20)$   $CAARs$  in our results are statistically insignificant, supports our hypothesis in Section II that using an event study to measure long term event effects is unsound.

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**V: RESULTS**

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Abnormal returns to targets, bidders and (portfolios of) rivals, for each of our samples, are presented in Table V.1.

**V.1. Total Sample**

For the total sample, we find that targets experience significantly positive abnormal returns in reaction to a merger announcement, with an average of 17.29 percent over the (-19, 20) window.<sup>20</sup> A sign test indicates that significantly more target firms experienced gains (172) than losses (39) over this period. This finding is consistent with the extant literature on mergers and acquisitions.<sup>21</sup> Acquiring firms, on the other hand, experience significantly negative returns, with an average of -2.28 percent over the (-19, 20) window. A sign test indicates that more firms experienced losses (116) than gains (97) over the same period (significant at the 10 percent level). This is again consistent with many previous studies, particularly with regard to conglomerate mergers, although it is inconsistent with Eckbo (1983). Rivals also experience negative returns upon announcement of a merger with a significant 1.23 percent fall in value over the (-19, 20) window, again contrasting the findings of Eckbo (1983).

Negative abnormal bidder returns are inconsistent with both the productive efficiency and market power hypotheses that we are testing. This is not to say that our findings dismiss the hypotheses entirely. As Firth (1980) concludes, bidders may indeed experience losses due to the fact that they are likely to have to pay a wealth-destructive premium to acquire a target. Additionally, investors may view the potential acquisition as a sub-optimal use of excess cash. Given that we can offer explanations for the negative bidder returns, the positive target returns and negative rival returns still offer some support for the productive efficiency motive, and are certainly inconsistent with the market power hypothesis.

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<sup>20</sup> Unless otherwise mentioned, results are reported as significant at the 1 percent level.

<sup>21</sup> See Bruner (2002) for a summary of the evidence.



We notice from Figures V.1-V.3 that both the targets and bidders begin adjusting to the merger announcement from day -11. This suggests that some information is leaked before the merger is actually announced. However, the large adjustment that accompanies the actual announcement implies that most of the leakage is rumour, and the market waits for confirmation before reacting fully. Rivals on the other hand seem to adjust to the news over a much longer period of time, possibly explaining why we find significant results for the (5, 20) window.

## V.2. Unchallenged Sample

We find that targets in the unchallenged sample also experience significantly positive abnormal returns upon a merger announcement, with an average of 21.43 percent over the (-19, 20) window. A sign test indicates that significantly more target firms experienced gains (107) than losses (19) over this period. Naturally, this finding is consistent with previous literature. Acquiring firms again experience significantly negative returns, with an average of -3.89 percent over the (-19, 20) window, while a sign test indicates that more firms experienced losses (72) than gains (54) over the same period (significant at the 10 percent level). This is again consistent with many previous studies, although inconsistent with Eckbo (1983). Rivals again experience significantly negative returns upon the announcement of a merger with an average of -2.27 percent over the (-19, 20) window, once more contrasting the findings of Eckbo (1983). As we have now eliminated the offsetting effect of the challenged sample *CAARs*, and given that we can again explain the negative bidder returns, our findings for the unchallenged sample offer stronger support for the productive efficiency motive, and are inconsistent with the market power hypothesis.

We notice from Figures V.1-V.3 that information leakage causes adjustment for both the targets and bidders from day -9, with the large adjustment on the announcement date again implying that the market waits for confirmation before reacting fully. Rivals again seem to adjust to the news over a much longer period of time, with no significant reaction in the (-1, 1) window or on the event day.

Table V.1: CAAR for Targets, Bidders and Rivals in each Sample

Sample	Subject <i>n</i>	Test Statistic	Event Window					
			(-19,20)	(-10,10)	(-3,3)	(-1,1)	0	(5,20)
Total Sample	Targets 211	CAAR	17.29***	16.97***	14.54***	13.11***	9.65***	-0.24
		t-stat	16.85	22.83	33.87	46.66	59.50	-0.37
		Positive, Negative	172, 39***	169, 42***	174, 37***	178, 33***	174, 37***	115, 96*
	Bidders 213	CAAR	-2.28***	-1.68***	-1.87***	-1.58***	-1.17***	-0.01
		t-stat	-2.98	-3.04	-5.84	-7.54	-9.69	-0.02
		Positive, Negative	97, 116*	93, 120**	75, 138***	75, 138***	69, 144***	106, 107
	Rivals 238	CAAR	-1.23***	-0.34	-0.02	-0.02	0.05	-0.68***
		t-stat	-3.47	-1.31	-0.13	-0.21	0.91	-3.04
		Positive, Negative	100, 138***	116, 122	110, 128	123, 115	124, 114	96, 142***
Unchallenged Sample	Targets 126	CAAR	21.43***	20.53***	18.70***	17.49***	12.44***	0.93
		t-stat	15.26	20.17	31.82	45.47	56.00	1.05
		Positive, Negative	107, 19***	105, 21***	111, 15***	109, 17***	104, 22***	69, 57
	Bidders 126	CAAR	-3.89***	-3.18***	-2.87***	-2.12***	-1.48***	-0.10
		t-stat	-3.67	-4.14	-6.47	-7.30	-8.86	-0.15
		Positive, Negative	54, 72*	48, 78***	41, 85***	43, 83***	40, 86***	65, 61
	Rivals 126	CAAR	-2.27***	-0.84**	-0.38*	-0.09	-0.04	-1.27***
		t-stat	-4.87	-2.49	-1.94	-0.68	-0.60	-4.32
		Positive, Negative	47, 79***	56, 70	52, 74**	63, 63	63, 63	47, 79***
Challenged Sample (at Merger Announcement)	Targets 85	CAAR	11.88***	12.34***	8.65***	6.77***	5.70***	-1.85**
		t-stat	8.19	11.75	14.26	17.04	24.87	-2.02
		Positive, Negative	65, 20***	64, 21***	63, 22***	69, 16***	70, 15***	46, 39
	Bidders 87	CAAR	0.05	0.49	-0.42	-0.80***	-0.72***	0.12
		t-stat	0.05	0.63	-0.94	-2.72	-4.24	0.17
		Positive, Negative	43, 44	45, 42	34, 53**	32, 55***	29, 58***	41, 46
	Rivals 112	CAAR	-0.08	0.22	0.38*	0.06	0.16*	0.00
		t-stat	-0.14	0.55	1.65	0.38	1.85	-0.01
		Positive, Negative	53, 59	60, 52	58, 54	60, 52	61, 51	49, 63*
Challenged Sample (at Antitrust Investigation Announcement)	Targets 86	CAAR	-6.76***	-4.73***	-2.17***	-2.03***	-0.75***	-1.96*
		t-stat	-4.16	-4.01	-3.18	-4.55	-2.90	-1.90
		Positive, Negative	37, 49*	31, 55***	36, 50*	33, 53**	39, 47	40, 46
	Bidders 90	CAAR	-0.80	-1.23	-0.89*	-0.68**	-0.34*	0.49
		t-stat	-0.72	-1.53	-1.91	-2.24	-1.97	0.70
		Positive, Negative	41, 49	39, 51	40, 50	34, 56**	41, 49	41, 49
	Rivals 112	CAAR	-0.29	-0.16	-0.33	-0.30**	-0.10	0.09
		t-stat	-0.52	-0.38	-1.40	-1.97	-1.13	0.26
		Positive, Negative	52, 60	50, 62	51, 61	46, 66**	57, 55	52, 60

CAAR represents the cumulative average abnormal return, in response to a merger announcement (or antitrust investigation announcement where specified), presented as a percentage.  $n$  represents the sample size. We use a two-sided t-test to test the significance of CAAR, where the test statistic is given by:

$$t - stat = CAAR(\tau_1, \tau_2) / \text{var}(CAAR(\tau_1, \tau_2))^{1/2} \sim N(0,1).$$

Since the t-test can fail if the returns are not normally distributed, or if some mergers have a positive impact while others have a negative, offsetting impact, we also report the results of a nonparametric sign test. This is used to test the significance of the number of cases where the abnormal return is positive versus the number of negative cases. The test statistic is given by:

$$sign - stat = \left[ \frac{n^+}{n} - 0.5 \right] \frac{\sqrt{n}}{0.5} \sim N(0,1)$$

where  $n^+$  represents the number of cases where the abnormal return is positive and  $n$  represents the total number of cases. \*\*\*, \*\*, \* denotes significance at the 1 percent, 5 percent and 10 percent level, respectively.

### V.3. Challenged Sample

We find that targets in the challenged sample experience significantly positive abnormal returns upon a merger announcement, with an average of 11.88 percent over the (-19, 20) window. A sign test indicates that significantly more target firms experience gains (65) than losses (20) over this period. Figure 3 illustrates that acquiring firms experience remarkable abnormal return volatility over the (-19, 20) window, possibly driven by the dissemination of information relating to the proposed merger. As a result, we find a typically small and insignificant, but positive, reaction by bidders, over the (-19, 20) and (-10, 10) windows, of 0.05 percent and 0.49 percent respectively. Closer to the event, we find relatively small but significantly negative bidder returns, which can again be explained by a perceived wealth destructive premium payment or sub-optimal use of excess cash. Given this array of results, we interpret the bidder response to the merger announcement as generally neutral. The rivals experience generally positive abnormal returns with an average of 0.38 percent and 0.16 percent over the (-3, 3) window and the event date respectively, both significant at 10 percent. This pattern of returns is inconsistent with the productive efficiency motive and offers support for the market power hypothesis. By analysing the reactions of the challenged sample to the subsequent antitrust investigation announcement, we can lend further support to this proposition.

At the announcement of the antitrust complaint, we find that targets experience significantly negative abnormal returns, with an average of -6.76 percent over the (-19, 20) window. The impact of the event even seems to persist, with a 1.96 percent fall in the (5, 20) window that is significant at the 10 percent level. Meanwhile, we find that bidders experience negative abnormal returns with an average of -0.89 percent over the (-3, 3) window (significant

at 10 percent). The significantly negative abnormal returns experienced by both targets and bidders suggest that the antitrust challenge typically comes as a surprise and is likely to increase the costs of collusion. Therefore, we should expect a fall in the market value of rivals in response to a truly collusive merger being challenged, as the probability of them being able to benefit from monopoly rents falls. This is indeed what we find, with generally negative abnormal returns over each of the event windows, and an average abnormal return of -0.30 percent over the (-1, 1) window that is significant at 5 percent. A sign test reveals that significantly more (portfolios of) rivals experience losses (66) than gains (46) over this window, at the 5 percent level. Therefore, our findings at the announcement of a subsequent antitrust investigation further support our proposition that horizontal mergers in our challenged sample are motivated by market power,<sup>22</sup> and are consistent with our suggestion in Section III that larger mergers are more likely to be motivated by market power. It appears that the UK antitrust authorities are indeed targeting the correct mergers.

It is clearly visible from Table V.1 that the firms in the challenged sample experience significantly smaller reactions, in absolute value terms, than those in the unchallenged sample, which again contrasts with the findings of Eckbo (1983). A test of difference in *CAARs* at the merger announcement, between the unchallenged and challenged sample, the results of which are presented in Table V.2, verifies this. We believe this is possibly due to investors already anticipating a subsequent antitrust challenge, and therefore pricing in some of the reversal expected, at the outset (at the merger announcement).

*Table V.2: A test of difference in CAARs at the merger announcement, between the unchallenged and challenged sample*

Sample	Subject <i>n</i>	Test Statistic	Event Window					
			(-19,20)	(-10,10)	(-3,3)	(-1,1)	0	(5,20)
Unchallenged VS Challenged	Targets	z-stat	2.63 ***	2.79 ***	3.99 ***	5.38 ***	3.86 ***	1.78 *
	211							
	Bidders	z-stat	-1.84 *	-2.72 ***	-2.98 ***	-2.13 **	-1.51	-0.20
	213							
	Rivals	z-stat	-2.19 **	-1.60	-1.95 *	-0.51	-1.36	-2.42 **
	238							

<sup>22</sup> Contrast this with Eckbo (1983) who found that it is actually the efficient mergers that are challenged!

CAAR represents the cumulative average abnormal return, in response to a merger announcement, presented as a percentage.  $n$  represents the sample size. We test for no difference in CAAR between the unchallenged and challenged samples, using the test statistic:

$$z - stat = [CAAR_U(\tau_1, \tau_2) - CAAR_C(\tau_1, \tau_2)] / [\text{var}(CAAR_U(\tau_1, \tau_2)) + \text{var}(CAAR_C(\tau_1, \tau_2))]^{1/2} \sim N(0, 1)$$

where subscript  $U$  and  $C$  represent the unchallenged and challenged samples respectively. \*\*\*, \*\*, \* denotes significance at the 1 percent, 5 percent and 10 percent level, respectively.

Figure V.1: Plot of CAAR (%) for Target Firms in each Sample over the (-19, 20) Event Window

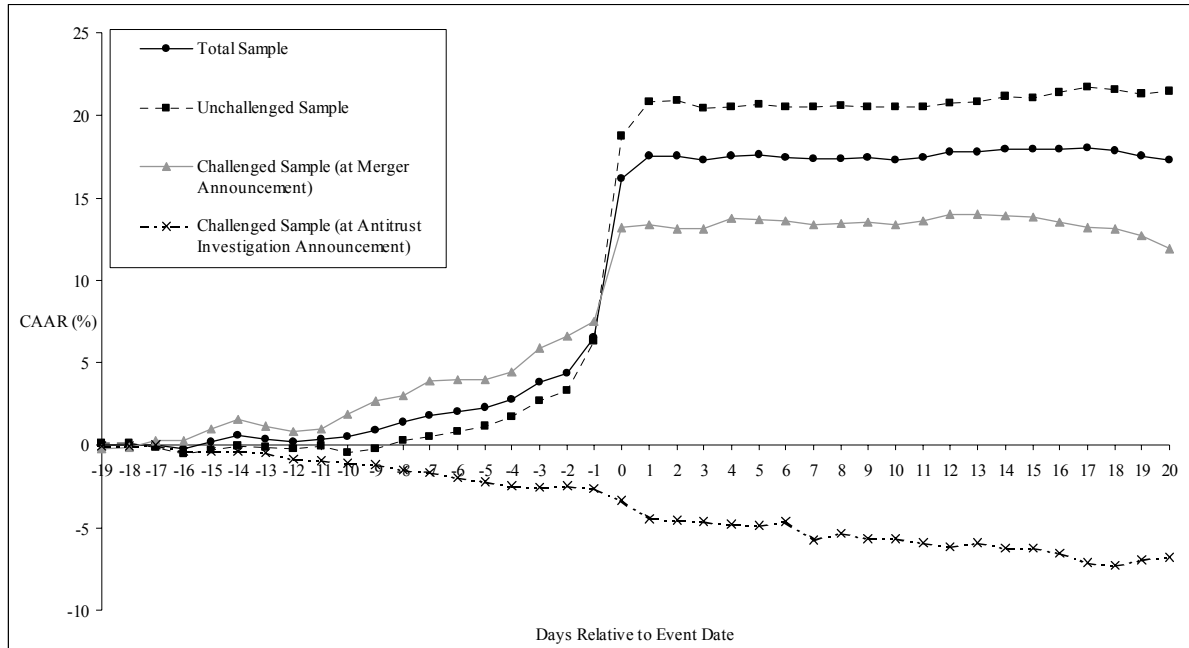


Figure V.2: Plot of CAAR (%) for Bidding Firms in each Sample over the (-19, 20) Event Window

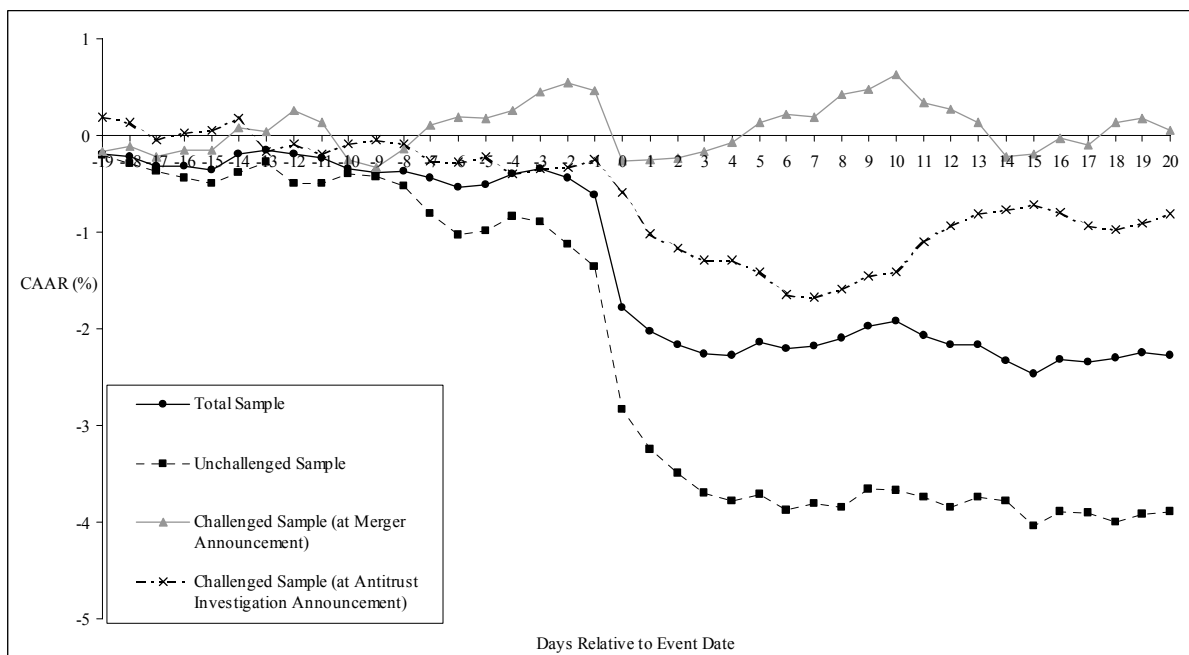
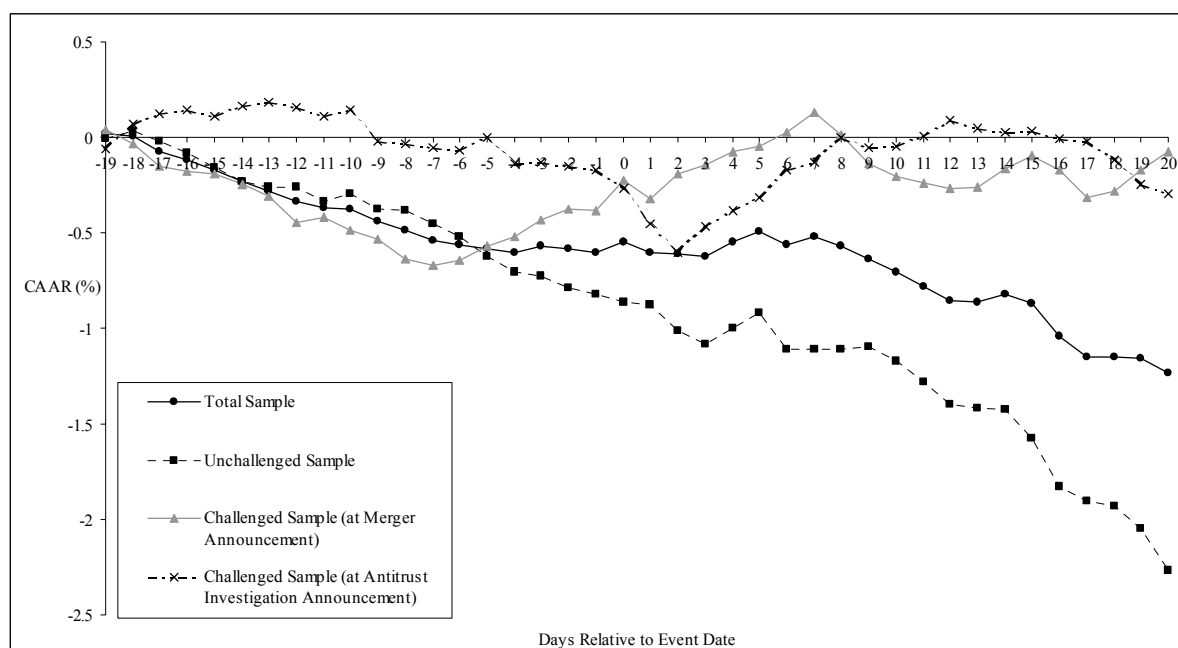


Figure V.3: Plot of CAAR (%) for Rival Firms in each Sample over the (-19, 20) Event Window



#### V.4. Industry Analysis

The results from our industry analysis are presented in Table V.3. We compute and test the CAARs, per industry represented in the total sample, at the merger announcement. Naturally, when our total sample is disaggregated into 12 (industry) subsamples, the small sample size obtained per industry becomes an inherent limitation in the analysis. Nevertheless, this type of analysis is insightful at a general level, and allows us to test the market concentration hypothesis, in Section III, that market power motives will be more evident in industries that are already concentrated.

As expected, we find that targets in all industries experience significantly positive abnormal returns, with the highest CAAR being 28.09 percent over the (-19, 20) window for Consumer Products and Services. However, analysis of the bidder and rival reactions makes for more interesting reading. With an abnormal bidder and rival return of 3.08 percent (significant at 5 percent) and 1.39 percent (significant at 10 percent) respectively over the (-10, 10) window, mergers in Media and Entertainment seem to be motivated by market power. A similar conclusion can be drawn for Retail, where, although statistically insignificant, bidders experience a 1.20 percent gain over the (-19, 20) window and rivals experience typically very

small negative abnormal returns over the larger windows and a 0.09 percent gain on the event day. As Table III.11 illustrates, Media and Entertainment and Retail are also more concentrated than the average industry, therefore these findings offer some support for the market concentration hypothesis.

Meanwhile, with an, albeit insignificant, abnormal bidder and rival return of 5.01 percent and -11.23 percent respectively over the (-19, 20) window, mergers in Telecommunications seem to be motivated by productive efficiency. A similar conclusion can be drawn for High Technology, where the rivals experience a significantly negative abnormal return of -10.63 percent over the (-19, 20) window, and the significantly negative (-19, 20) abnormal bidder return of -13.72 percent is unsurprising given our previous explanations for similar bidder reactions. These findings are reassuring given that we would expect productive efficiency motives to prevail in industries such as these.

However, Table III.11 also indicates that Telecommunications and High Technology are two of the most concentrated industries in our sample. That perceived market power motives do not prevail goes against the market concentration hypothesis, but we propose some explanations for this. These industries have a high degree of turbulence, with new entrants regularly bringing into the market new technologies that can easily cause large shifts in market shares. Therefore, there is less of a concern about market power issues than in a more stable industry like Media and Entertainment or Retail. Also, it is appreciated that the high concentration in these industries could simply be due to the fact that firms have grown large in order to realise the huge potential that exists for economies of scale.

Table V.3: CAAR at the Merger Announcement for Targets, Bidders and Rivals in each Industry

Sample	Subject <i>n</i>	Test Statistic	Event Window					
			(-19,20)	(-10,10)	(-3,3)	(-1,1)	0	(5,20)
Consumer Products & Services	Targets 14	CAAR	28.09 ***	25.26 ***	20.44 ***	20.21 ***	17.63 ***	4.28
		t-stat	6.27	7.78	10.90	16.47	24.88	1.51
	Bidders 12	CAAR	-1.56	-1.33	-5.17 ***	-2.60 **	-0.93	2.47
		t-stat	-0.43	-0.51	-3.41	-2.62	-1.63	1.08
	Rivals 13	CAAR	-2.58	-2.54 **	-0.78	-0.05	0.12	-1.95 *
		t-stat	-1.67	-2.27	-1.21	-0.11	0.49	-2.00
Consumer Staples	Targets 36	CAAR	15.93 ***	11.39 ***	10.28 ***	9.23 ***	5.75 ***	-0.40
		t-stat	8.61	8.49	13.28	18.22	19.64	-0.34
	Bidders 38	CAAR	-2.29	-1.73	-0.84	-0.76 *	-0.45 *	-2.20 **
		t-stat	-1.41	-1.46	-1.23	-1.70	-1.76	-2.13
	Rivals 36	CAAR	-0.85	-0.41	0.22	0.16	0.27 **	-0.43
		t-stat	-1.22	-0.81	0.76	0.85	2.39	-0.97
Energy & Power	Targets 24	CAAR	6.59	12.42 ***	11.94 ***	12.56 ***	8.58 ***	-3.90
		t-stat	2.74	7.14	11.89	19.10	22.59	-2.57
	Bidders 22	CAAR	-3.57	-2.63	-3.55 ***	-2.85 ***	-2.68 ***	0.27 **
		t-stat	-1.41	-1.43	-3.35	-4.11	-6.68	0.17
	Rivals 26	CAAR	-0.69	-0.85	-0.05	0.43	0.22	-0.53
		t-stat	-0.69	-1.17	-0.12	1.57	1.41	-0.83
Financials	Targets 7	CAAR	6.63	7.14	9.34 ***	9.19 ***	7.33 ***	-0.62
		t-stat	1.33	1.98	4.49	6.75	9.33	-0.20
	Bidders 7	CAAR	-12.71 ***	-6.07 *	-2.08	-1.54	-1.69 **	-4.03
		t-stat	-3.53	-2.33	-1.38	-1.56	-2.97	-1.77
	Rivals 7	CAAR	-2.30	1.08	-0.04	0.40	0.58	-1.81
		t-stat	-1.13	0.73	-0.05	0.72	1.79	-1.41
Healthcare	Targets 12	CAAR	14.24 ***	22.56 ***	15.68 ***	12.40 ***	4.30 ***	-6.72
		t-stat	3.54	7.74	9.32	11.26	6.75	-2.64
	Bidders 9	CAAR	-5.52	-3.57	-1.41	-1.81 *	-1.32 **	-0.13
		t-stat	-1.78	-1.59	-1.08	-2.13	-2.69	-0.06
	Rivals 14	CAAR	-0.09	2.28 *	2.72 ***	0.65	0.16	-1.10
		t-stat	-0.05	1.88	3.87	1.41	0.61	-1.03
High Technology	Targets 11	CAAR	21.00 ***	22.60 ***	25.93 ***	22.07 ***	17.12 ***	0.45
		t-stat	3.57	5.30	10.52	13.68	18.39	0.12
	Bidders 11	CAAR	-13.72 **	-9.65 **	-5.29 **	-4.39 ***	-3.04 ***	-4.20
		t-stat	-2.76	-2.68	-2.55	-3.23	-3.88	-1.34
	Rivals 11	CAAR	-10.63 ***	-5.32 **	-2.54 *	-2.53 ***	-1.04 **	-3.49 *
		t-stat	-3.71	-2.56	-2.12	-3.22	-2.28	-1.93



Industrials	Targets 32	CAAR	18.18 ***	16.29 ***	9.28 ***	7.80 ***	6.33 ***	0.33
		t-stat	5.49	6.79	6.70	8.60	12.09	0.16
	Bidders 39	CAAR	-0.34	-0.66	-1.38 **	-1.07 **	-0.67 **	0.89
		t-stat	-0.21	-0.56	-2.04	-2.42	-2.62	0.87
	Rivals 54	CAAR	0.58	0.35	-0.31	-0.22	-0.06	0.29
		t-stat	0.90	0.75	-1.15	-1.23	-0.61	0.70
Materials	Targets 17	CAAR	20.82 ***	23.14 ***	21.15 ***	17.65 ***	8.80 ***	-1.25
		t-stat	8.49	13.02	20.61	26.28	22.68	-0.81
	Bidders 15	CAAR	-7.27 **	-1.97	-0.95	-1.32	-1.15 **	0.08
		t-stat	-2.50	-0.94	-0.78	-1.66	-2.51	0.05
	Rivals 16	CAAR	-3.71 **	-1.84 *	-0.98 *	-0.30	0.22	0.03
		t-stat	-2.89	-1.99	-1.82	-0.87	1.08	0.04
Media & Entertainment	Targets 24	CAAR	17.82 ***	16.71 ***	12.50 ***	11.08 ***	7.87 ***	2.17
		t-stat	5.18	6.70	8.68	11.75	14.46	1.00
	Bidders 28	CAAR	4.37 **	3.08 **	0.00	-0.17	0.10	2.16
		t-stat	2.15	2.09	0.00	-0.31	0.32	1.69
	Rivals 29	CAAR	0.44	1.39 *	0.98 **	0.40	0.01	-0.53
		t-stat	0.45	1.96	2.38	1.47	0.10	-0.86
Real Estate	Targets 14	CAAR	19.31 ***	18.67 ***	19.32 ***	19.06 ***	17.57 ***	2.39
		t-stat	4.12	5.50	9.86	14.85	23.72	0.81
	Bidders 14	CAAR	-3.14	-4.71 **	-2.85 **	-2.58 ***	-1.90 ***	0.77
		t-stat	-1.12	-2.32	-2.43	-3.35	-4.27	0.44
	Rivals 14	CAAR	-2.91 **	-0.64	-0.19	-0.07	-0.17	-2.60 ***
		t-stat	-2.45	-0.75	-0.38	-0.20	-0.92	-3.46
Retail	Targets 16	CAAR	23.12 ***	18.36 ***	16.75 ***	14.05 ***	13.99 ***	0.46
		t-stat	7.36	8.07	12.75	16.33	28.17	0.23
	Bidders 15	CAAR	1.20	-0.67	-1.93	-2.13 **	-2.35 ***	0.58
		t-stat	0.36	-0.27	-1.37	-2.31	-4.42	0.27
	Rivals 17	CAAR	-0.59	-0.44	-0.38	-0.06	0.09	0.10
		t-stat	-0.36	-0.36	-0.54	-0.13	0.36	0.10
Tele- communications	Targets 4	CAAR	17.84	19.94	22.82 ***	21.77 ***	18.79 ***	-1.12
		t-stat	2.48	3.83	7.59	11.07	16.54	-0.25
	Bidders 3	CAAR	5.01	2.38	-1.20	-1.09	-0.83	1.88
		t-stat	1.63	1.07	-0.94	-1.30	-1.71	0.97
	Rivals 1	CAAR	-11.23	-5.10	2.27	1.59	0.62	-7.75
		t-stat	-0.84	-0.52	0.41	0.43	0.29	-0.91

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CAAR represents the cumulative average abnormal return, in response to a merger announcement, presented as a percentage.  $n$  represents the sample size. We use a two-sided t-test to test the significance of CAAR, where the test statistic is given by:

$$t - stat = CAAR(\tau_1, \tau_2) / \text{var}(CAAR(\tau_1, \tau_2))^{1/2} \sim N(0, 1).$$

\*\*\*, \*\*, \* denotes significance at the 1 percent, 5 percent and 10 percent level, respectively.

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## VI: CONCLUSION

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In this paper we investigate the motives behind UK horizontal mergers, using a comprehensive sample drawn from the period 1 January 1985 to 30 June 2004, testing the market power and productive efficiency motives in particular. We construct a dataset that allows us to employ standard event study methodology in order to examine the wealth effects of merger, and subsequent antitrust investigation, announcements on acquirer, target and rival shareholders. The basic proposition is that rivals should benefit from the news of a horizontal merger motivated by market power as they will earn monopoly rents from the new industry structure. Alternatively, news of a horizontal merger motivated by productive efficiency is most likely to yield negative abnormal returns to rivals as they will be at a competitive disadvantage under the new industry structure. A subsequent antitrust investigation announcement should reverse the rivals' reaction in both cases, as it reduces the probability of the merger being consummated.

Our findings for the total sample are generally consistent with the productive efficiency motive, and this support becomes stronger when we consider only the unchallenged sample. Analysis of the challenged sample at both the merger announcement and subsequent antitrust complaint announcement yields results that are consistent with the market power hypothesis. Our findings here suggest that the UK antitrust authorities are indeed targeting the correct mergers.

Two other findings follow from the paper. First, we discover that larger mergers are more likely to be motivated by the search for market power, and second, we find some support for the hypothesis that market power motives are more evident in industries that are already concentrated – the exceptions being the Telecommunications and High Technology sectors where a high degree of turbulence and turnover is common.

A natural extension to our analysis would be to examine Europe-wide horizontal mergers, investigating if motives differ between countries and between domestic and cross-border transactions. We also propose investigating what factors explain the abnormal returns to targets, bidders and rivals as a potentially fruitful area for further research. Indeed, it will serve to answer the billion dollar question, “What makes a successful merger?”

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