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Duso, Tomaso; Gugler, Klaus; Yurtoglu, Burcin B.

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Is the Event Study Methodology Useful for Merger Analysis? A Comparison of Stock Market and Accounting Data

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GESY

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Is the Event Study Methodology Useful for Merger Analysis? A Comparison of Stock Market and Accounting Data

Tomaso Duso*
Klaus Gugler**
Burcin Yurtoglu***

September 2006

*Tomaso Duso, Humboldt University Berlin and WZB, duso@wz-berlin.de
**Klaus Gugler, University of Vienna, klaus.gugler@univie.ac.at
***Burcin Yurtoglu, University of Vienna, burcin.yurtoglu@univie.ac.at

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Speaker: Prof. Konrad Stahl, Ph.D. · Department of Economics · University of Mannheim · D-68131 Mannheim,
Phone: +49(0621)1812786 · Fax: +49(0621)1812785

Is the Event Study Methodology Useful for Merger Analysis? A Comparison of Stock Market and Accounting Data[♣]

Tomaso Duso[*]
Humboldt University Berlin and WZB
duso@wz-berlin.de

Klaus Gugler
University of Vienna
klaus.gugler@univie.ac.at

Burcin Yurtoglu
University of Vienna
burcin.yurtoglu@univie.ac.at

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Abstract

Using a sample of 167 mergers during the period 1990-2002 involving 544 firms either as merging firms or competitors, we contrast a measure of the merger's profitability based on event studies with one based on accounting data. We find positive and significant correlations between them when using a long window around the announcement date and, for rivals, in case of anticompetitive mergers.

Keywords: Mergers, Merger Control, Event Studies, Ex-post Evaluation

JEL Codes: L4, K21, G34

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[*] Corresponding author: Tomaso Duso, Social Science Research Center Berlin (WZB), Reichpietschufer 50, D-10785 Berlin, Germany. Tel: +49 30 25491 403, Fax: +49 30 25491 444, E-Mail: duso@wz-berlin.de.

1. Introduction

The assessment of the competitive effects of large mergers is one of the most important tasks for anti-trust authorities worldwide. Unfortunately, these effects are not observed at the time when the authority must make its decision to allow or block the merger or let the merger through with remedies. In principle, stock markets could help predicting the future profitability, since they are forward looking. However, many economists, in particular industrial organization economists, are skeptical about the markets' ability to correctly anticipate mergers' competitive effects. Thus, the pioneering efforts of Eckbo (1983) have not been widely applied in merger analysis.

This paper tries to close the gap between the finance and industrial organization literatures by estimating (1) (ex ante) announcement effects of mergers on both merging and rival firms, (2) (ex post) balance sheet profit effects of these mergers on merging and rival firms up to five years post-mergers, and (3) comparing these estimates by correlation analysis.

2. Measuring Profitability

2.1. Event Studies

Under the assumptions of efficient markets and rational expectations, the market model predicts that firm *i*'s stock return at time *t* (R_{it}) is proportional to a market return ($R_{it} = \alpha + \beta R_{mt} + \varepsilon_{it}$). We estimate the market model over 240 trading days, starting 50 days prior to the announcement day. We use the estimated values for the model's parameters to predict what firm *i*'s stock price would have been, had the merger not been announced ($\hat{R}_{it}$). For firm *i*, we then calculate the abnormal return around the mergers' announcement day *t* ($AR_{i,t}$) as: $AR_{it} = R_{it} - \hat{R}_{it} = R_{it} - (\hat{\alpha} + \hat{\beta} R_{mt})$. The cumulative abnormal return (CAR) over an event window (*m,n*) is then defined to be: $CAR_{i,m,n} = \sum_{\tau=-m}^{\tau=n} AR_{i,\tau}$. We calculate these measures for each of the merging rival firms.[1]

2.2. Ex-post Profitability

We use the methodology of Gugler et al. (2003) to predict the merger's ex post profit effects. The method compares reported profit levels post merger with predicted profit levels in the *absence* of the merger. Our counterfactual is the development of profits and total assets of the median firm (in terms of profitability) in the same 3-digit industry as the merging firms or their rivals operate. We used a number of other counterfactuals, such as similar size or geographical regions but none changed our results significantly.

[1] See Duso, Gugler, and Yurtoglu (2006) for a description of the literature, the data, and a more complete description of the methodology.

The projected change in the returns on the acquirer's assets from year *t-1* to *t+n* are defined as: $\Delta_{IG,t-1,t+n} = \frac{\Pi_{IGt+n}}{K_{IGt+n}} - \frac{\Pi_{IGt-1}}{K_{IGt-1}}$, where Π_{IGt+n} are the median firm's (income statement) profits and K_{IDt+n} are the median firm's assets both in the same 3-digit industry of the acquired company in year *t+n*. We define $\Delta_{ID\ t,t+n}$ for the acquired firm's industry analogously to $\Delta_{IG\ t-1,t+n}$. The predicted profits of the combined company *M* in year *t+n* is then:

$$\Pi_{Mt+n}^{predicted} = \Pi_{G\,t-1} + \frac{K_{IG\,t+n}}{K_{IG\,t-1}} K_{G\,t-1} \Delta_{IGt-1,t+n} + \Pi_{Dt} + \frac{K_{ID\,t+n}}{K_{ID\,t}} K_{D\,t} \Delta_{IDt,t+n},$$

where Π_{Gt+n} (Π_{Dt}) are the profits and K_{Gt+n} (K_{Dt}) are the assets of the acquiring (acquired) company in year *t+n* (*t*).

The same logic can be applied to the rivals. In fact, antitrust markets are different than industries based on the SIC classification. The advantage of our database is that we have information on the merging firms' *effective* rivals in the involved product markets. These firms are not a good counterfactual, since they are influenced by the merger just as much as the merging firms are. However, the merger should not strongly affect the rest of the industry, which makes the 3-digit SIC classification a good counterfactual for the merger, once we exclude the merging and rivals firms. We can, hence, get a measure of the projected change in the returns and of the predicted profit for the rivals in absence of the merger, which is something novel in the literature.

Our measure of firm *i*'s merger effect (*i=merging entity* or *rivals*) is then the difference between actual (observed) profits in year *t+n* and the predicted profits: $\Delta\Pi_{it+n}^{effect} = \Delta\Pi_{it+n}^{actual} - \Delta\Pi_{it+n}^{predicted}$

3. The Data and Correlations

Our sample consists of 167 concentrations that were analyzed by the European Commission (EC) during the period 1990-2002.[2] We identify 544 different firms either as merging or as rival firms. The relevant markets and, thus, rivals are defined in the EC reports.

Table 1 reports the median values for the CARs based on different event windows and the profitability effects ($\Delta\Pi_{i,t+n}^{effect}$) for merging firms and rivals up to five years after the merger. In the full sample, all median values (with the possible exception for CAR (2,2) for rivals, which is close to zero) have the same sign.

Table 2 reports pairwise correlations among CARs and profitability effects. For merging firms, the correlation coefficients between CAR (50, 5) and firms' profit are always positive and mostly significant. The profit effects four years after the merger seem to be very well captured by all

[2] Our sample includes almost all phase II mergers completed by the EU by the end of 2001, and a randomly matched sample of phase I cases, which run up to June 2002. See Duso, Neven, and Röller (2006).

measures of abnormal returns. However, CARs based on long windows seem to perform better. The picture is different for rivals: CARs based on short windows produce very misleading results, since they are *negatively* and significantly correlated to the real profit effects. However, for rivals the CARs based on long windows (30 or 55 days) also seem to capture very well the long term merger's profit effects.

Table 3 splits the sample into pro and anticompetitive mergers.[3] Interestingly, the market correctly anticipates anti-competitive mergers when using long pre-announcement periods (25 to 50 days), as witnessed by the large and significant correlation coefficients for rivals up to five years post merger. Also, the market predicts merging firms' rents stemming from increased efficiencies (procompetitive mergers) more precisely than those stemming from an increase in market power (anticompetitive mergers).

4. Conclusions

This paper establishes empirical evidence that the event study methodology is useful for the competitive analysis of mergers. In particular, for a large sample of EU mergers during the period 1990-2002, we show that abnormal returns and ex post profitability of mergers are positively and significantly correlated. This is particularly true when using long event windows and, for rivals, in anti-competitive mergers.

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[3] The argument follows Eckbo (1983). We define a merger to be anticompetitive if the aggregated CAR of rivals (i.e. the weighted sum of the CARs of all rivals for each merger) in the (25,5) window is positive. See Duso, Neven, and Röller (2006) for a formal derivation of the correspondence between increase in rivals' profit and decrease in consumers' surplus.

Table 1: Preliminary Statistics

	MERGING FIRMS							
	CAR(2,2)	**CAR(25,5)**	**CAR(50,5)**	$\Delta\Pi^{effect}_{M,t+1}$	$\Delta\Pi^{effect}_{M,t+2}$	$\Delta\Pi^{effect}_{M,t+3}$	$\Delta\Pi^{effect}_{M,t+4}$	$\Delta\Pi^{effect}_{M,t+5}$
Median	9.229	2.359	29.742	62.260	103.521	108.986	203.217	202.620
Obs.	125	126	127	131	132	101	86	66
	RIVALS							
	CAR(2,2)	**CAR(25,5)**	**CAR(50,5)**	$\Delta\Pi^{effect}_{i,t+n}$	$\Delta\Pi^{effect}_{i,t+n}$	$\Delta\Pi^{effect}_{i,t+n}$	$\Delta\Pi^{effect}_{i,t+n}$	$\Delta\Pi^{effect}_{i,t+n}$
Median	-0.571	5.666	4.528	69.256	53.328	74.230	103.467	242.653
Obs.	314	313	311	321	327	221	174	143

Notes: All values are expressed in Million US$. The *CAR(m,n)* variables represent the cumulative abnormal returns over the window spanning from *m* days before the event to *n* days after the event. The $\Delta\Pi^{effect}_{i,t+n}$ variables represent the aggregated profit change from one year before the merger to *n* years after the merger if compared to the median firm in the same SIC3 industry.

Table 2: Pairwise Correlations: all mergers

	MERGING FIRMS					RIVALS				
	CAR(1,1)	**CAR(2,2)**	**CAR(5,5)**	**CAR(25,5)**	**CAR(50,5)**	**CAR(1,1)**	**CAR(2,2)**	**CAR(5,5)**	**CAR(25,5)**	**CAR(50,5)**
$\Delta\Pi^{effect}_{i,t+1}$	-0.1069	0.0144	-0.0357	0.1274	**0.1643**	**-0.1752**	**0.0953**	-0.0662	0.0690	**0.1648**
	0.1870	0.8598	0.6599	0.1131	**0.0411****	**0.0005*****	**0.0571****	0.1878	0.1703	**0.0010*****
$\Delta\Pi^{effect}_{i,t+2}$	-0.0314	0.1281	-0.0537	0.1289	**0.2031**	**-0.2045**	**-0.1488**	-0.0752	-0.0133	0.0611
	0.7284	0.1546	0.5519	0.1488	**0.0225****	**0.0003*****	**0.0082*****	0.1855	0.8150	0.2814
$\Delta\Pi^{effect}_{i,t+3}$	-0.0196	0.0013	0.0210	0.2022	**0.2096**	**-0.2487**	0.0024	-0.0983	0.0856	0.0617
	0.8479	0.9900	0.8375	0.0448	**0.0373****	**0.0002*****	0.9715	0.1462	0.2057	0.3647
$\Delta\Pi^{effect}_{i,t+4}$	**0.3443**	**0.5408**	0.0966	0.1601	**0.4778**	**-0.1521**	**-0.1556**	-0.0462	**0.1802**	0.0818
	0.0013***	**0.0000*****	0.3848	0.1459	**0.0000*****	**0.0464****	**0.0415****	0.5474	**0.0180****	0.2862
$\Delta\Pi^{effect}_{i,t+5}$	0.1947	**0.2882**	0.1894	0.1444	0.0926	**-0.2539**	**-0.1770**	0.0615	**0.4556**	**0.1837**
	0.1201	**0.0199****	0.1309	0.2511	0.4630	**0.0025*****	**0.0364****	0.4704	**0.0000*****	**0.0298****

Notes: We report pairwise correlation coefficients (first row) as well as p-values (second row).***, **, * represent significance at the 1%, 5%, and 10% level respectively.

Table 3: Pairwise Correlations: Mergers split into pro- and anti-competitive

	MERGING FIRMS									
	PROCOMPETITIVE					ANTICOMPETITIVE				
	CAR(1,1)	CAR(2,2)	CAR(5,5)	CAR(25,5)	CAR(50,5)	CAR(1,1)	CAR(2,2)	CAR(5,5)	CAR(25,5)	CAR(50,5)
$\Delta\Pi_{i,t+1}^{effect}$	-0.1711	0.0434	0.0355	0.1252	0.1732	0.0494	-0.0254	-0.1132	0.1601	0.1697
	0.1451	0.7135	0.7639	0.2810	0.1401	0.6638	0.8243	0.3175	0.1560	0.1299
$\Delta\Pi_{i,t+2}^{effect}$	0.0608	**0.2716**	0.0655	0.1669	0.3442	-0.1242	0.0042	-0.1626	0.1104	0.1115
	0.6304	**0.0286****	0.6040	0.1771	0.0050	0.3446	0.9748	0.2145	0.4012	0.3925
$\Delta\Pi_{i,t+3}^{effect}$	-0.0845	-0.0331	-0.0486	0.2177	0.1635	0.1158	0.0688	0.1085	0.1993	**0.2492**
	0.5556	0.8175	0.7350	0.1211	0.2517	0.4384	0.6461	0.4679	0.1793	**0.0877***
$\Delta\Pi_{i,t+4}^{effect}$	**0.5701**	**0.8112**	**0.2547**	**0.2667**	**0.8304**	-0.2472	-0.0637	-0.0456	0.0777	0.0818
	0.0000***	**0.0000*****	**0.0840***	**0.0669***	**0.0000*****	0.1461	0.7123	0.7918	0.6526	0.6304
$\Delta\Pi_{i,t+5}^{effect}$	**0.3888**	**0.3361**	0.2278	-0.0360	-0.0512	-0.2676	0.2903	0.1427	0.2360	0.1708
	0.0210**	**0.0484****	0.1882	0.8374	0.7702	0.1527	0.1197	0.4518	0.2094	0.3668
	RIVALS									
	PROCOMPETITIVE					ANTICOMPETITIVE				
	CAR(1,1)	CAR(2,2)	CAR(5,5)	CAR(25,5)	CAR(50,5)	CAR(1,1)	CAR(2,2)	CAR(5,5)	CAR(25,5)	CAR(50,5)
$\Delta\Pi_{i,t+1}^{effect}$	**-0.2169**	**0.3314**	0.0204	0.0085	0.1264	-0.1414	**-0.1174**	**-0.1455**	**0.1444**	**0.2191**
	0.0032***	**0.0000*****	0.7842	0.9090	0.0899	0.0392	**0.0860***	**0.0334****	**0.0348****	**0.0013*****
$\Delta\Pi_{i,t+2}^{effect}$	**-0.1605**	-0.1222	0.0271	**-0.2188**	-0.0413	**-0.3162**	**-0.2211**	**-0.2676**	**0.3003**	**0.2045**
	0.0447**	0.1262	0.7365	**0.0059*****	0.6077	**0.0001*****	**0.0055*****	**0.0008*****	**0.0002*****	**0.0104*****
$\Delta\Pi_{i,t+3}^{effect}$	**-0.2773**	0.1216	-0.1338	0.0062	0.0402	-0.2000	-0.1353	0.0004	**0.2199**	0.1600
	0.0027***	0.1953	0.1541	0.9478	0.6724	0.0408	0.1687	0.9971	**0.0242****	0.1029
$\Delta\Pi_{i,t+4}^{effect}$	**-0.2204**	**-0.2841**	**-0.2379**	-0.0742	-0.0837	-0.1369	-0.0598	0.1817	**0.4032**	0.1853
	0.0328**	**0.0055***	**0.0210****	0.4770	0.4227	0.2318	0.6029	0.1113	**0.0003*****	0.1043
$\Delta\Pi_{i,t+5}^{effect}$	0.1696	-0.0355	**0.3037**	0.1482	-0.0266	**-0.5945**	**-0.4058**	**-0.3331**	**0.6128**	**0.2933**
	0.1514	0.7656	**0.0090*****	0.2108	0.8234	**0.0000*****	**0.0007*****	**0.0059*****	**0.0000*****	**0.0160****

Notes: We report pairwise correlation coefficients (first row) as well as p-values (second row).***, **, * represent significance at the 1%, 5%, and 10% level respectively. A merger is defined to be anticompetitive (procompetitive) if the aggregated cumulative abnormal returns of the rivals - CAR(25,5) - are positive (negative). The sample includes all observations for which the variable $\Delta\Pi_{i,t+2}^{effect}$ was not missing.