European M&A Regulation is Protectionist

by

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Abstract

Why do regulatory authorities scrutinize mergers and acquisitions? The authorities themselves claim to be combating monopoly power and protecting consumers, but the last two decades of empirical research has found little supporting evidence for such laudatory motives. An alternative is that M&A regulation is actually designed to protect privileged firms. In this paper, we provide a test of protectionism by studying whether European regulatory intervention is more likely when European firms are harmed by increased competition. Our findings are unambiguous: European regulation is protectionist. The results are robust to a variety of statistical difficulties, including endogeneity between investor valuations and regulatory actions.

By means of glasses, hotbeds, and hotwalls, very good grapes can be raised in Scotland, and very good wine too can be made of them at about thirty times the expense for which at least equally good wine can be brought from foreign countries.

(Adam Smith, The Wealth of Nations, Book IV, Chapter II)

Why are mergers and acquisitions (M&A) subject to regulatory scrutiny? Is the answer consumer protection through the maintenance of competition? Letting large producers merge might significantly increase the concentration level in a given industry. This could lead to various anticompetitive practices, such as price increases at the expense of consumers, a phenomenon called the "market power hypothesis" in the M&A literature.

The U.S. Federal Trade Commission (FTC) Chairman, T. Muris, and the European official in charge of competition policy, M. Monti, emphasize the market power hypothesis in their public pronouncements. For example, a typical statement by Mr. Muris is, "The Federal Trade Commission works to ensure that the nation's markets are vigorous, efficient and free of restrictions that harm consumers"[1]. Both authorities recognize that some business combinations are efficient and actually help consumers. Economies of scale or improved opportunities for innovation can justify concentration, but only when such efficiencies more than offset the potential negative consequences of decreased competition.

But two decades of empirical research has been unable to find much support for the official position. James C. Ellert (1976), Espen B. Eckbo (1983), Robert Stillman (1983), and Eckbo and Peggy Wier (1985) test the market power hypothesis. They employ two

key methods: one uses concentration ratios while the other relies on the returns of competitors around the announcement date of the proposed merger and the intervention date of regulators. All of these papers, regardless of method, fail to find support for the market power hypothesis.

A set of alternative tests has emerged during the 1990s. One possibility is that the mere existence of the M&A regulation has deterred most potentially anticompetitive mergers, but Eckbo (1992), by comparing US and Canadian experience, rejects this conjecture. Another idea is that inter-industry studies somehow fail to take account of industry-specific circumstances. But Myron B. Slovin et al., (1991) focusing on the airline industry, conclude that Civil Aeronautics Board interventions during 1965 to 1988 actually reduced competition and favored collusion among existing carriers. Similarly, George Bittlingmayer and Thomas W. Hazlett (2000) study the Microsoft case (54 antitrust enforcement announcements during the period 1991 to 1997). They find compelling evidence against the joint hypothesis that Microsoft conduct is anticompetitive and that antitrust enforcement produces net efficiency gains. Martin Pesendorfer (1988) examines the paper industry. He concludes that the M&A wave within this industry during the 1980s led to positive gains through cost savings and benefits for consumers. Edward C. Fee and Shawn Thomas (2003) provide an explanation for the welfare gains from mergers; they argue that suppliers are subject to more pressure by the merging parties, which brings substantial cost savings.

Competitor firms generally experience positive returns around proposed merger announcement dates. This could be regarded as indirect evidence of greater market power; but Moon H. Song and Ralph H. Walking (2000) have proposed an alternative explanation. Using data from 1982 through 1991, they argue that these positive returns are due to investor anticipations of further M&A activity in the same industry.

A recent contribution by Husayn Shahrur (2004) goes further by examining the impact of horizontal mergers and takeovers on suppliers and customers. Greater monopoly power would harm one or both of these groups of firms, but Shahrur finds no evidence that they have in fact been harmed on average by the 463 combinations in his sample.

All these results leave our initial question open: why does M&A regulation exist? Bittlingmayer and Hazlett (2000) suggest three possible explanations: bureaucratic self-interest, political extraction, and private benefits. We propose in this paper a direct test for one particular private benefit, protectionism; i.e., M&A regulation could shelter local firms from foreign competition. Our proposed test is whether the probability of regulatory intervention is higher for foreign acquirers and also higher when domestic competitor firms are being harmed. Such a finding would be difficult to explain by anything other than protectionism. Negative domestic competitor returns around the merger announcement date are inconsistent with both increased market power and with a higher likelihood of subsequent acquisition. But such negative returns could be explained by increased competition benefiting consumers. There is no reason why an

acquirer's nationality should influence a regulator's inclination to intervene provided that the regulator is genuinely motivated by enhancing competition.

We have chosen to test European regulation for several reasons. First, the European Commission is not free of protectionism suspicion. The American financial press cried foul loudly in the recent General Electric/Honeywell merger case (cf. George L. Priest and Franco Romani (2001)) and in the Microsoft antitrust case. In its edition of July 23 2001, *Business Week* says, "Europe also bears responsibility for the surge in protectionism. The EU fought a ridiculous trade war with the U.S. over bananas, of all things…The EU's focus on competitors rather than consumers makes the Bush Administration suspicious. If Europe goes after Microsoft Corp., as it might, there could be a big U.S. reaction."

Aktas et al., (2003) uncover some troubling traits of European regulators. They find that investors anticipate a far higher cost to the merging parties when the European Commission intervenes against foreign bidders as opposed to domestic (i.e., European) bidders. While insufficient for a definitive conclusion of protectionism, the result is suspicious.

European M&A regulatory legislation is relatively new, dating only from the beginning of the 1990s. Except for a broadening of intervention criteria in 1997, it has also been strikingly stable through time. This allows us to cover the entire period of regulatory activity and to examine all cases for which data are available.

European regulatory procedures are highly standardized in comparison with other jurisdictions. All proposed combining firms must notify the Commission no later than one week after a deal agreement (public announcement of a takeover, an exchange offer, or acquisition of control). The European Commission then has one month to respond. At that point the combination is accepted outright, accepted subject to specific concessions, or is postponed during an in-depth investigation (which can take up to six months)[2]. Each announcement date is well identified, which is critically important for an event study.

Finally, an important feature of European activity is the significant proportion of combinations initiated by non-European bidders (almost 36 percent in our sample).

For all the above reasons, European regulation seems ideally suited for testing the existence of protectionism. Moreover, any protectionist attitude of the European Commission has prime importance for 350 million consumers living in one the largest and most affluent unified economic zones in the World. Any attempt to shelter inefficient European firms from foreign competition would not only be detrimental to consumers but would also damage free trade and global prosperity. It would certainly lead to retaliation from other major commercial zones.

We have collected data about all European Commission regulatory interventions during the period 1990-2000. While more than 1,500 proposed combinations formally notified

the Commission of their intention to combine during this period, data availability limits our final sample to only 290 cases. Each of these includes a publicly listed bidder and a listed target for which quoted competitors can be identified (more on this in section I). Depending on the identification method, we track the price behavior of 814 to 1,840 competitors. Of the 290 proposed combinations in our sample, 55 (19%) were challenged by the European Commission; i.e., approved only after concessions or forestalled during an in-depth investigation.

The main result of our multivariate analysis is both clear and robust: the European Commission is indeed protectionist. We employ a probit model to analyze determinants of the probability of regulatory intervention. The joint effect of bidder nationality and European competitors abnormal returns is significant. For mergers initiated by foreign bidders, the more negative the returns of European competitors around the initial merger announcement date, the higher is the probability of regulatory intervention. As previously mentioned, it is difficult to reconcile such a pattern with anything other than protectionism.

Moreover, the empirical finding is robust to three well known but difficult problems. The first problem concerns possible endogeneity between the probability of regulatory intervention and the observed returns of both the merging parties and the competitors. There is little doubt that investors try to anticipate regulatory actions while regulators simultaneously gauge market price movements in deciding whether to act. This endogeneity problem was pointed out by Eckbo et al., (1990) and further analyzed in

Aktas et al., (2003). We follow here a two-step instrumental variable approach extended to competitors' observed abnormal returns. The Douglas Rivers and Quang H. Vuong (1988) test clearly confirms the presence of endogeneity, but after taking this into account the protectionist nature of European Commission behavior remains. Indeed, after accounting for endogeneity, we uncover an even more flagrant indication of protectionism; the European Commission is more likely to intervene whenever European firms are harmed by a proposed combination, even if the bidder is European.

The second difficulty is known the "weak instrument" problem (see William H. Greene (2003) or Jeffrey M. Wooldridge (2002)). It arises when the original variables are only weakly correlated with their instruments. As shown by Jean-Marie Dufour (2003), this might result in poor small sample properties of the two-step estimator. To check for this effect, we amend the T.W. Anderson and Herman Rubin (1949) procedure for a discrete dependent variable. Again, the results are robust.

The final potential problem involves generated regressors. Observed abnormal returns are derived from a first stage statistical procedure. Estimation errors at this first stage might have an impact on the validity of inferences drawn in a second stage. As asymptotic results would be difficult to obtain, we explore this issue using a bootstrap scheme. Our major findings, once again, are essentially immune to this problem.

Our results extend previous studies of European M&A regulation. Damien J. Neven and Lars-Hendrik Röller (2002) and Tomaso Duso et al., (2003) suggest that a bidder's

nationality might have some impact on the European regulatory decisions but they do not provide clear-cut empirical support. Our results also shed light on M&A regulation in general and contribute to answering the initial question posed above about the real reasons for its existence.

The paper is organized into sections as follows. The sample of proposed combinations and the methods used to identify competitors are described in Section I. Section II reports some preliminary univariate evidence that competitors' returns depend on the nationality of the bidder and on the regulatory outcome. Section III is devoted to a multivariate investigation of protectionism, while accommodating the endogeneity between observed returns and regulatory behavior. Section IV presents robustness checks and Section V concludes.

I. Data and Empirical Procedures

I.A. Data sources and sample selection.

1,573 proposed combinations notified the European Commission[3] from 1990 through 2000 inclusive. Among these, 1275 (81 percent) were approved outright; 72 (4.6 percent) were approved subject to specific concessions (sales of assets or subsidiaries, etc.) after a one-month review process, and 95 (6 percent) were subjected to an in-depth investigation, of which 13 were prohibited and 47 were approved subject to concessions.[4] The remaining 131 (8.3 percent) cases were either withdrawn during the first month of review or resolved by other means (such as referral to the authorities of a single member state.)

Our analysis requires market data for both the bidder and the target, which reduces the sample to 439 proposed combinations. Availability of the control variables used in our multivariate analysis, described at section III, further restricts the sample to 344 combinations. Finally, identification of European listed competitor firms has been possible for only 290 combinations. All our multivariate findings are based on this final sample of 290. Some univariate results reported in section II encompass a larger sample, data requirements being less restrictive in this instance.

Table 1 presents a breakdown of the sample. Panel A reports the type of European Commission regulatory decision and Panel B shows the nationality of the bidder. The number of proposed combinations is strongly increasing over time, with a noticeable

acceleration after the 1997 broadening of regulatory criteria, which made more proposed combinations subject to European Commission review. Twenty-seven of the 30 in-depth investigations occurred in 1998-2000, the latest three years in our sample.

In our final sample of 290 proposed combinations, EC regulators approved 81% outright after a one-month review period; this is lower than the 90% outright approval rate among all 1,573 proposed combinations. Evidently, a somewhat larger fraction of outright approvals involve small companies that do not enter our sample because they are not listed on an exchange.

Our primary source of information is the European Commission Internet site, where final decision reports are freely available. These reports identify the firms involved in all proposed combinations. They also provide several control variables, as described in Section III. Initial announcement dates have been cross-checked in several sources (the above-mentioned final decision reports, the financial press – *Les Echos*, *Financial Times*, *Wall Street Journal*, …, the SDC Database.[5] Market data (prices, dividends, exchange rates, market indexes, …) are from Datastream. The SDC Database also provides several control variables.

I. B. Abnormal return estimation.

Following Aktas et al., (2003), prices of firms listed in different countries are converted into U.S. Dollars. "Normal" returns are generated with the standard market model using a broad local market index in each country. Coefficients of the market model are

estimated using 200 daily observations during a period that ends thirty days before the initial announcement of the proposed combination. The 30-day insulation period is designed to mitigate potential information leakage. The event window extends from five days before to five days after the announcement day. Aktas et al., (2003) document that these choices are robust to several variations (e.g., using the Myron S. Scholes/Joseph Williams (1977) method or local currency returns, *inter alia*.)

When studying M&A, inferences about cumulative (average) abnormal returns are exposed to several econometric problems. Abnormal returns are often both non-Gaussian and auto-correlated. Mergers cluster in time and generate event-induced volatility. Solutions to these problems have been studied extensively; (e.g., see Michael Salinger (1992)). Our methods for handling these problems include:

- Following Jeffrey F. Jaffe (1974) and G. Mandelker (1974), we analyze proposed combinations by forming value-weighted portfolios of the merging parties using as weights the merging parties' market values on the last day of the estimation window (thirty days prior to the initial announcement.) The same weighting schemed is employed to construct a portfolio of competitor firm returns.
- As suggested by Ekkehart Boehmer et al., (1991) and by Richard S. Ruback (1982), the estimated variance of abnormal returns is adjusted to take into account, respectively, event-induced variance and first order autocorrelation.
- All reported *p*-values are the obtained from a percentile-t bootstrap procedure (see Joël L. Horowitz (2001).)

I.C. Identification of Competitor Firms.

To make sure that the results are not sensitive to the identification of competitor firms, we employ and compare three distinct approaches:

- *case-by-case* identification of the target firm's competitors using Hoover's Online Database, the European Commission Web Site, the Datastream table of listed firms by sector and nationality, and the financial press. This provides a small portfolio of direct competitors, six competitors on average per proposed combination, coming from 814 different competitor firms.
- *same industry, same country* identification, i.e., automatic selection of all listed competitors in the same industry as the target and the same country as the bidder. As the European Commission provides NACE industry classifications while Datastream uses SIC codes, we were obliged to construct a table of sector equivalents. This approach produces about nine competitors per proposed combination from 1,021 different firms.
- *same industry, same geographic zone,* automatic selection of firms from three large geographic zones: Americas, Europe and Asia. The average number of competitors per proposed combination is about 38, involving 1,840 different identified competitors.

Some comparisons with previous studies are interesting. Song and Walkling (2000) use the Value Line industrial classification. They identify 2,459 Value Line competitors, associated with 141 takeover targets, giving an average competitor portfolio size of 15. Fee and Thomas (2003), working with four-digit SIC codes, obtain an average competitor

portfolio size of about 75. This suggests that our third procedure lies somewhere between the Song and Walking (2000) and the Fee and Thomas (2003) methods. Our first two procedures lead to far smaller competitor portfolio sizes. The best choice is not obvious. More firms reduce the competitor portfolio's volatility, but perhaps at the cost of including firms that are only distant competitors.

To investigate whether the competitor portfolio is a material issue, Table 2 provides a comparison of competitor portfolio cumulative average abnormal returns (CAARs) around the announcement date. The three procedures display significant negative CAARs during the eleven day event window, -0.31 percent for *case-by-case* identification, -1.11 percent for *same industry, same country* and -0.68 percent for *same industry, same geographic zone*. Since all three procedures give negative CAARs, we hereafter report results only with *case-by-case* identification of rivals, which is the least statistically significant in Table 2 and thus the most conservative. Moreover, since we are interested in studying the potential protectionist dimension of the European Commission regulatory behavior, it seems natural to focus on European competitors of combining firms. The second and third identification procedures, being based on countries or geographic zones, are relatively broad for our narrowly focused question.

II. Return reactions to M&A announcements: bidders, targets, and competitors

For each proposed combination, we assign the role of bidder to one firm and the role of target to a second firm. Most of the time, bidders and targets are specifically identified in

the decision report of the European Commission. If this is not the case, we consult the financial press and make our best effort to ascertain each firm's role. In addition, for each proposed combination we construct a portfolio of competitor firms as described in Section I.C. This section reports the stock price movements of bidders, targets, bidders plus targets, and competitors.

IIA. The initial announcement of a proposed combination.

Table 3 gives initial announcement CAARs for bidders, targets, combinations (bidders plus targets weighted by their respective market values on the last day of the estimation window), and competitors. Our results generally confirm the pattern reported in past studies[6]; a large and statistically significant abnormal price increase for target firms. The target CAAR over the event window is 9.05 percent, which is nonetheless somewhat lower than in previous studies for American combinations. For example, Harold J. Mulherin and Audra L. Boone (2000) find a target CAAR of 20.2 percent during 1990-1999 and Gregor Andrade et al., (2001) report 15.9 percent during 1990-1998.

Our bidding firms have significant negative returns from days –5 through –2. However, over the 11-day window, the bidder CAAR is 0.10 percent and is not significant. This result seems also to contrast slightly with previous finding in the literature. Mulherin and Boone (2000) and Andrade et al., (2001) document insignificant CAARs of -0.37 percent and -1 percent, respectively. For combined firms, (value-weighted bidder plus target), we find significant positive returns on the announcement date itself and on the previous (-1) and all following (0 to +5) days. Over the event window, the combined CAAR is 0.88

percent (as compared with 3.51 percent in Mulherin and Boone (2000) and 1.4 percent in Andrade et al., (2001).)

As already reported in Table 2, our competitor sample shows a negative impact of the proposed combination. This suggests that M&A announcements were bad news on average for our sample of rival firms, a result that contrasts with previous studies. In past literature, acquisition activity within an industry was found to have a positive impact on the stock price of rival firms. For example, Eckbo (1985) finds that horizontal competitors of target firms earn significantly positive abnormal returns of 0.58 percent over the seven-day period surrounding the M&A announcement. Eckbo and Wier (1985) report similar announcement period abnormal returns. More recent studies give the same result. For example, Song and Walkling (2000) report an 11-day abnormal return of 0.56 percent for rival firms. Fee and Thomas (2003) find similar results.

II.B. The initial announcement and regulatory outcome

Table 4 reports the initial announcement stock price impact classified by eventual regulatory outcome, for combinations and competitors. As shown by Aktas et al., (2003), market participants appear to consider eventual antitrust procedures at the time of the initial announcement. But it seems plausible also that regulators themselves are influenced by the initial price response to a proposed deal. For example, suppose on occasion there really is some monopoly rent to be gained from a merger. If the market correctly assesses this possibility, there should be a larger than average price rise of both bidder and target around the initial announcement and also a significant stock price

increase for competitors, who would benefit by the reduction in competition. But if regulators are genuinely encouraging competition, they would react with a more vigorous investigation.

The results in Table 4 are consistent with this idea. Combinations that are eventually subjected to an in-depth investigation by regulators have a large abnormal price increase around the initial announcement date (1.66 percent) and the abnormal return of competitors over the same period is a positive 0.06 percent, though insignificant. Both are possibly understatements of true rents because investors would recognize the threat of regulatory intervention and bid up prices less in the first place. This suggests that announcement date returns should be interpreted cautiously as indicators of market power because they are influenced by an endogenous relation between market participants' evaluations and regulators' decisions.

When regulators authorize the combination subject to concessions, Table 4 shows that the announcement price impact is negative for both the combining parties and for competitors, (but is significant for rivals only at a 10 percent level.) Outright authorization, however, has a significant positive effect on the combination but a negative, though statistically insignificant, impact on rivals. One possible explanation is that no firm within the industry is strong enough to be a price leader and the market consequently anticipates increased competitiveness. Again, these results contrast with previous empirical studies. Eckbo (1985) finds a significant CAAR of 0.48 percent for

rivals of challenged US combinations while Fee and Thomas (2003) document a significant CAAR of 1.13 percent.

II.C. Initial announcement effects by home countries of bidders and competitors.

Suspicions about European Commission motives has been frequently raised in the non-European press, but is there really solid evidence that European regulators are biased against non-European firms? To answer this question definitively, we need a multivariate setting, which is provided in Section III below. First, however, we take a simple look at competitors' abnormal returns while controlling for their home country and the home country of the bidder.

Table 5 Panel A presents results for combinations that are approved outright. They affect European competitors negatively, which is consistent with increased competition (CAAR=-0.53 percent, *p*-value =0.11). This negative effect is considerably larger in magnitude when the bidder is from the EC, though the difference is not statistically significant.

When the bidder is from the EC, outright approval is granted even though the impact on external competitors is positive, (CAAR=0.66 percent, p-value=0.16), which indicates either increased market power from the combination or a greater probability of further acquisitions, (Song and Walkling, 2000). The result is not strongly significant, however. For competitors outside the EC, the sign of the CAAR is reversed when the bidder's home country is also outside the European Community (CAAR=-1.19 percent, *p*-

value=0.13). The difference is strongly significant. This suggests that European regulators tend to ignore the accumulation of market power outside the European Community when the bidder is from inside while they grant outright authorization readily to non-European bidders when competition is greater for non-European competitors.

Table 5, Panels B and C give results for proposed combinations challenged by the European regulator, either by imposing concessions (Panel B) or subjecting the parties to a thorough investigation (Panel C.) The most striking results are the followings:

- the price impact is always negative for non-European competitors and is larger and marginally significant (p-value=.08) when the bidder is also from outside the EC.
- when both the bidder and competitors are domiciled within the EC, the price impact is positive and significant (p-value=.03) when the combination is subject to an in-depth investigation.

The univariate results above lack statistical power except in a few instances. In some cases, the sample sizes are rather low while in other cases power might be lost because of uncontrolled important determinants of the announcement date returns. In an effort to increase the power of these tests and also to take other determinants into account, we now turn to a multivariate approach.

III. A direct test for protectionism

Testing for protectionism must account for various determinants of European Commission regulatory intervention. The type of European Commission intervention is

qualitative by nature: outright authorization at the end of a month-long review, authorization subject to concessions at the end of a month, or an in-depth investigation. The second and third outcomes are potentially burdensome to the combining parties, the first of these because the concessions often involve spin-offs of divisions or other actions that the firms would not have voluntarily elected and the second because of the delay and the implication that something about the proposed combination is objectionable to the regulators. Hence, we decided to distinguish outright authorization from the two other potential regulatory outcomes, which leads to a binary qualitative dependent variable model. Such a model has several advantages. It reduces to a minimum the number of parameters to be estimated, an important consideration given the limited data (290 proposed combinations.) It also allows us to employ an extensive set of econometric methods that has been designed to deal with endogeneity problems within the framework of non-linear models (see Wooldridge (2002) for an review).

Thus, our model has the following form:

(1) $$\Pr(\text{EC Intervention}) = \Phi(X'\beta)$$

wherein the dependent variable, *EC Intervention*, is 1.0 in case of authorization subject to concessions or an in-depth investigation and zero in the case of outright authorization, X is a vector of explanatory variables (including a constant), β is a vector of coefficients

and Φ is the normal cumulative density function. As usual with a standard probit model, estimation is by maximum likelihood[7].

Because our data are limited, all statistical tests are bootstrapped. We follow the percentile-t bootstrap procedure of Bradley Efron and Robert J. Tibshirani (1993). See Horowitz (2001) for a verification of the bootstrap's advantages.

In the analyses to follow, we employ a number of explanatory variables; they are described in Appendix A. *Outside EC Bidder* and *Large EC Bidder Country* are dummy variables for assessing the impact of bidder nationality. *Target Size*, *Deal Value*, and *Bidder Size* are control variables for the potential impact of the proposed combination on the industry's concentration level. *Target to Bidder Size Ratio* gives an idea of the importance of the proposed combination from the bidder's point of view. *Bidder/Target Correlation* and *Competitors/Bidder Correlation* are proxies for pre-combination relatedness of, respectively, the bidder and target and the bidder and competitors. *Tender Offer*, *Cash Offer* and *Stock Offer* measure specific features of the proposed combination. *Bidder Past Performance* tracks bidder returns prior to the deal announcement. *Rumor* indicates whether the proposed combination has been anticipated and, finally, *Competitors' Relative Size* is a proxy for the market power of competitors relative to that of the bidder. We are not really interested in all of these variables *per se* but they are helpful in dealing with endogeneity between our dependent variable (the regulatory decision) and the observed market reaction at the initial announcement date.

III.A. Determinants of the probability of European Commission intervention.

We propose a multivariate test of protectionism to answer the following question: Is the probability of European regulator intervention higher when the bidder is a non-European firm, especially if European competitors will be harmed by the proposed combination? The test relies on the following explanatory variables:

- *Target Size* and *Deal Value*: both variables are proxies for the potential impact of the proposed combination on industry concentration;
- *Bidder/Target Correlation* : the more related the bidder and target, the higher should be the probability of intervention if regulators are striving to promote competitiveness;
- *Proposed combination CAAR*: the European regulator could use the market reaction on the announcement date as a gauge of wealth creation by the proposed combination; (Cf. Eckbo et al., (1990) or Aktas et al., (2003).)

To test for protectionism, we include three other variables: *Outside EC Bidder* (the nationality of the bidder), *EC Competitors' CAAR* (the impact of the proposed combination on European competitors, as perceived by investors) and the product of these two variables to capture their joint effect on the probability of intervention.

Table 6 presents the results. Not surprisingly, the coefficient of *Deal Value* is positive and highly significant: the probability of intervention is greater for larger combinations. *Outside EC Bidder and EC Competitors' CAAR* is negative and significant (p-value=.07), which indicates that European regulators are more likely to intervene when the bidder is foreign and the proposed combination has a negative impact on European competitors.

This answers our main question by clearly implying protectionism on the part of European regulators against external competition. However, European regulators may not be against competition in general because *EC Competitors' CAAR* is positive and significant. In other words, when the bidder is from the European community, regulators are more likely to intervene when they perceive an indication of increased market power.[8] This curious duality of regulatory responses, depending on whether the competition is coming from outside the European Community or from inside, makes the label of protectionism seem all the more appropriate.

Notice also that the variable *Outside EC Bidder* is not statistically significant by itself; i.e., European regulators are about as likely to intervene when the bidder is foreign or domestic, *ceteris paribus*, a finding reported in our earlier paper, Aktas, et al., (2003.) European Commission scrutiny increases only when foreign bidders harm European firms. Of course, this implies also that proposed combinations with foreign bidders that help European firms pass particularly easily through European regulator screening.

Target Size and *Bidder/Target Correlation* are both positive but are not significant at usual levels of confidence in Table 6. These variables, which are intended as proxies for possible market power, are evidently less powerful motivating factors for European regulators.

Though suggestive, the results presented in Table 6 might be influenced by econometric problems. The probit model is consistent if the explanatory variables are exogenous, but

the observed CAARs for the merging parties and for the competitors around the announcement date cannot reasonably be presumed exogenous. At the deal announcement, investors are anticipating the potential value creation (or destruction) for the target, bidder and competitors. They know also that European Community regulation might come into play. At the same time, regulators are looking at market price reactions to assess potential monopoly rents or increased competition along with the benefits and/or harm that the proposed combination might generate for all affected parties. Clearly, the CAAR and European regulator decisions are fundamentally endogenous. We explore this issue and its consequences for the results above in the next sub-section.

III.B. Endogeneity between regulatory intervention and announcement CAARs.

Dealing with endogeneity requires the formation of instrumental variables. We have opted for a standard two-step method. The first step regresses potentially endogenous variables on a set of genuine exogenous variables. Then the fitted OLS values are used as instruments in the probit model[9]. The sets of exogenous variables are[10]:

- for the proposed combination CAAR: *Outside EC Bidder, Large EC Country Bidder, Deal Value, Target Size, Bidder Size, Target to Bidder Size Ratio, Bidder/Target Correlation, Tender Offer, Cash Offer, Stock Offer, Rumor, Bidder Past Performance*;
- for competitors' CAAR: *Outside EC Bidder, Large EC Country Bidder, Deal Value, Bidder/Target Correlation, Competitors Relative Size, Competitors/Bidder Correlation.*

We first perform the Rivers and Vuong (1988) test for the existence of endogeneity between CAARs and regulator actions. This test proceeds in two steps. First, OLS regressions are calculated with the observed CAARs (one regression for proposed combination CAARs and another for competitor CAARs) as dependent variables and exogenous variables described above as explanatory variables. Second, residuals from the first step regressions are included as explanatory variables in the probit. Under the null hypothesis of no endogeneity, the coefficients of the residuals should be insignificantly different from zero. The results, presented in Table 7, clearly reject the null of no endogeneity. This result has implications beyond our paper. It shows that observed abnormal returns as explanatory variables in causal models must be interpreted with great care if endogeneity has not been explicitly taken into account.

Given the presence of endogeneity, we re-estimate the model presented in Table 6, but this time using instrumental variables formed in the first step OLS regression described above in place of the observed combination and competitor CAARs. The results are reported in Table 8. Two main conclusions arise:

- the previous result concerning the joint impact of bidder nationality and European Competitors' CAAR is confirmed. The coefficient is negative and significant (p-value=.08). Again, the more negative the impact of the proposed combination on European Community domiciled competitors, the higher is the probability of an European Commission regulatory intervention, provided that the bidder is <u>not</u> from the European Community.
- *Outside EC Bidder* remains insignificant.

- *EC Competitors' CAAR* is reversed. It is now negative and significant. This surprising results reveals the importance of dealing explicitly with endogeneity. Indeed, it invalidates the conclusion drawn in the previous subsection that European regulators might be intent on fostering competition so long as it comes from within the EC. It now appears, to the contrary, that they are more likely to examine <u>any</u> proposed combination that appears to harm European Community firms (by increasing competition) whether or not the bidder is foreign or domestic.
- On the other hand, *Bidder/Target correlation* is now positive and significant. This seems contrary to the tentative deduction just above because it implies a higher likelihood of intervention when the two parties of the proposed combination are more related, *ceteris paribus*. This appears to be consistent with a notion that European regulators are more concerned when the merging parties are similar, holding constant the impact of the proposed combination on other firms.

IV. Robustness Checks

IV.A. Weak Instruments.

When resolving endogeneity issues by using a two-step instrumental variable approach, the quality of the instruments can be important. If the instruments are poorly correlated with the original variables (the "weak instruments" problem), asymptotic *p*-values might be seriously misleading (see Wooldridge (2002) or Dufour (2003).) Could our results be affected by this condition? It should be emphasized that all our *p*-values are from the

bootstrap (and are not asymptotic) and, as such, should be more robust to the weak instruments problem. Also, the joint impact of bidder nationality and European competitors' CAAR has the same sign (and a comparable level of significance) in Table 6 (direct estimation) and in Table 8 (two-step instrumental variable estimation). Nonetheless, we would be remiss to bypass the weak instrument issue without some direct evidence.

Table 9 presents the first step OLS regressions used to form the instrumental variables, Panel A for proposed combination CAARs and Panel B for competitor CAARs. In Panel A, the regression R^2 is 9 percent and the Fisher test rejects the null hypothesis that all coefficients are zero. In Panel B, the results are not as good. The R^2 is low (around 2 percent) and the null hypothesis of all zero coefficients is not rejected. The source of these difficulties is clear; cumulative abnormal returns are very noisy, so just about any instrument will be "weak."

To study the consequences, we implement a modified version of the Anderson and Rubin (1949) procedure. This procedure, originally developed for linear models, provides a joint test of all endogenous variables while being robust to many problems, including weak instruments; (see Dufour (2003)). The test is designed so that if the coefficients of all endogenous variables are truly zero, specification of the first-step instrumental variable regression is immaterial. Because the Anderson/Rubin test is not intended for a qualitative dependent variable, we have modified the procedure as follows:

- the first step OLS regressions remains unchanged;

- instead of a probit model in the second step, we use a linear probabilistic model[11]. As a classification threshold, we select a value that minimizes the number of classification errors;
- *p*-values are estimated by a percentile-t bootstrap (with 2500 replications), which is necessary because asymptotic values, (Anderson and Rubin (1949)) might be invalid.

This test rejects the null hypothesis that all endogenous variables are jointly equal to zero (t-statistic=3.28, *p*-value=9.1 percent).

In conclusion, although the instruments are relatively weak, the adapted Anderson/Rubin indicates that they are still strong enough to provide significant results.

IV. B. Generated Regressors

The final statistical trap we investigate involves "generated regressors." The CAARs are statistical estimates, not error-free variables. Potentially, sampling noise could have an impact on reported *p*-value.

To investigate this issue, we modify the bootstrap procedure as follows:

- We assume that each proposed combination's CAAR and each competitors' CAAR is a random Gaussian variable with mean equal to the estimated CAAR and variance obtained with the modified Boehmer et al., (1991) method.
- To keep matters simple, we also assume that the CAAR random variables are independent of each other. This is not an overly strong assumption because

CAARs are computed from different periods, so their estimation errors should not be very closely related.

- We then generate 2,500 replications of the full two-step probit analysis presented in Table 8, replacing the observed CAAR in each replication by a random draw from its distribution.

The resulting *p*-values are given in Table 10. They are almost unchanged from those presented in Table 8. Arguably, the results could conceivably change if CAARs are strongly correlated but this seems unlikely given that the 290 proposed combinations in the sample are spread over many countries and years.

V. Conclusions

The impact of a proposed business combination can be measured by the price reactions of rival firms immediately around the initial announcement date of the combination. If the combination were believed by investors to create monopoly power in the industry, rival firms should display price increases around the announcement date. In fact, they display price decreases on average in our sample. This suggests that, on average, our proposed combinations enhance industry competitiveness.

European regulators M&A regulators claim to be fostering competition and thereby protecting European consumers. But we find that the more harm suffered by European rival firms, the greater the likelihood of European regulatory intervention against a proposed combination. To make matters worse, European regulators are even more likely to intervene when the bidding firm is foreign. These results are robust to a variety

of empirical problems including endogeneity between announcement date returns and regulatory intervention.

It is hard to reconcile the actual pattern of EC regulatory intervention with consumer protection. Why should intervention increase with the level of enhanced competition? Why should the bidder's nationality matter at all?

Faced with the empirical facts, a cynical observer might doubt the good intentions of European regulators. If they are actually bent on protecting European firms from domestic competitive pressure and even more anxious to forestall competition from foreigners, they could not behave more appropriately. Their actions protect European firms and harm European consumers. They are *de facto* protectionists. Only one question remains: Is the observed protectionism an unintended consequence of misguided regulatory procedures? Malevolence or incompetence; does it really matter?

REFERENCES

Aktas, Nihat; de Bodt, Eric; Levasseur, Michel and Schmitt, André. 2001 "The emerging role of the European Commission in merger and acquisition monitoring: The Boeing / Mc Donnell Douglas case." *European Financial Management*, December 2001, 7(4), pp. 447-480.

Aktas, Nihat; de Bodt, Eric and Roll, Richard. "Market response to European regulation of business combinations." forthcoming *Journal of Financial and Quantitative Analysis*. 2004.

Anderson, T. W. and Rubin, Herman. "Estimation of the parameters of a single equation in a complete system of stochastic equations." *Annals of Mathematical Statistics*, March 1949, 20(1), pp. 46-63.

Andrade, Gregor; Mitchell, Mark and Stafford, Erik. "New Evidence and Perspectives on Mergers." *Journal of Economic Perspectives*, Spring 2001, 15(2), pp. 103-120.

Bittlingmayer, George; and Hazlett, Thomas W. "DOS Kapital: Has antitrust action against Microsoft created value in the computer industry?" *Journal of Financial Economics*, March 2000, 55(3), pp. 329-359.

Boehmer, Ekkehart; Musumeci, Jim J. and Poulsen, Annette B. "Event-study methodology under conditions of event induced variance." *Journal of Financial Economics*, December 1991, 30(2), pp. 253-272.

Dufour, Jean-Marie. "Identification, Weak instruments and statistical inference in economics." Working Paper N° 2003s-49, CIRANO, Université de Montréal, 2003.

Duso, Tomaso; Neven, Damien J. and Röller, Lars-Hendrik. "The Political Economy of European Merger Control: Evidence using Stock Market Data." Working Paper N° FS IV 02-34, Wissenschaftszentrum Berlin, Humboldt University, 2003.

Eckbo, Espen B. "Horizontal mergers, collusion, and stockholder wealth." *Journal of Financial Economics*, April 1983, 11(1-4), pp. 241-273.

Eckbo, Espen B. "Mergers and the market concentration doctrine: Evidence from the capital market." *Journal of Business*, July 1985, 58(3), pp. 325-349.

Eckbo, Espen B. "Mergers and the value of antitrust deterrence." *Journal of Finance*, July 1992, 47(3), 1005-1029.

Eckbo, Espen B. and Wier, Peggy. "Antimerger policy under the Hart-Scott-Rodino: A reexamination of the market power hypothesis." *Journal of Law & Economics*, April 1985, 28(1), pp. 119-149.

Eckbo, Espen B.; Maksimovic, Vojislav and Williams, Joseph. "Consistent estimation of cross-sectional models in event studies." *Review of Financial Studies*, 1990, 3(3), pp. 343-365.

Efron, Bradley and Tibshirani, Robert J. *An Introduction to the Bootstrap*. Chapman and Hall. 1993.

Ellert, James C. "Mergers, antitrust law enforcement and stockholder returns." *Journal of Finance*, May 1976, 31(2), pp. 715-732.

Fee, Edward C. and Thomas, Shawn. "Sources of gains in horizontal mergers: Evidence from customer, supplier, and rival firms." forthcoming *Journal of Financial Economics*. 2003.

Greene, William H. *Econometric Analysis*, New Jersey, Prentice-Hall, fifth edition, 2003.

Horowitz, Joël L. "The Bootstrap." *Handbook of Econometrics*, Vol. 5 In: James J. Heckman and Edward Leamer (Editors), North-Holland, 2002.

Jaffe, Jeffrey F. "Special Information and Insider Trading." *Journal of Business*, July 1974, 47(3), pp. 410-428.

Jensen, Michael C. and Ruback, Richard S. "The market for corporate control: The scientific evidence." *Journal of Financial Economics*, March 1983, 11(1), pp. 5-50.

Mandelker, G. "Risk and Return: The Case of Merging Firms." *Journal of Financial Economics*, December 1974, 1(4), pp. 303-336.

Mulherin, Harold J. and Boone, Audra L. "Comparing acquisitions and divestures." *Journal of Corporate Finance*, July 2000, 6(2), pp. 117-139.

Neven, Damien J. and Röller, Lars-Hendrik. "Discrepancies between markets and regulators: An analysis of the first ten years of EU merger control." In: *The pros and cons of merger control*, 10th Anniversary of the Swedish Competition Authority, 2002.

Pesendorfer, Martin. "Horizontal mergers in the paper industry." *RAND Journal of Economics*, Autumn 2003, 34(3), pp. 495-515.

Priest, George L. and Romani, Franco. "The GE/Honeywell Precedent." *The Wall Street Journal*, 2001, (June 20), A-18.

Rivers, Douglas and Vuong, Quang H. "Limited information estimators and exogeneity tests for simultaneous probit models." *Journal of Econometrics*, November 1988, 39(3), pp. 347-366.

Ruback, Richard S. "The effect of discretionary price control decisions on equity values." *Journal of Financial Economics*, March 1982, 10(1), pp. 83-105.

Salinger, Michael. "Standard errors in event studies." *Journal of Financial and Quantitative Analysis*, March 1992, 27(1), pp. 39-53.

Scholes, Myron S. and Williams, Joseph. "Estimating betas from nonsynchronous data." *Journal of Financial Economics*, February 1977, 5(3), pp. 309-328.

Sharur, Husayn. "Industry structure and horizontal takeovers: Analysis of wealth effects on rivals, suppliers, and corporate customers." *Journal of Financial Economics*, forthcoming 2004.

Slovin, Myron B.; Sushka, Marie E. and Hudson, Carl D. "Deregulation, contestability, and airline acquisitions." *Journal of Financial Economics*, September 1991, 30(2), pp. 231-251.

Song, Moon H. and Walkling, Ralph A. "Abnormal returns to rivals of acquisition targets: A test of the 'acquisitions probability' hypothesis." *Journal of Financial Economics*, February 2000, 55(2), pp. 143-171.

Stillman, Robert. "Examining antitrust policy towards horizontal mergers." *Journal of Financial Economics*, April 1983, 11(1-4), pp. 225-240.

Wooldridge, Jeffrey M. *Econometric analysis of cross section and panel data*, MIT Press. 2002.

Table 1

The sample of proposed business combinations

The sample period is 1990–2000 inclusive. The 290 proposed business combinations are those with available market data for bidder and target, a complete set of control variables for the multivariate analysis, and an identifiable set of European competitor firms. Proposed combinations are reported by the year of notification to EU regulators, by the type of EU regulatory decision, and by the nationality of the bidder (European or foreign.)

Panel A. Regulatory Decision

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	**Total**
Outright approval	5	3	5	9	10	18	18	33	35	47	52	235
(percent)	1.7	1.0	1.7	3.1	3.4	6.2	6.2	11.4	12.1	16.2	17.9	81.0
Approval after concessions	2	1	2	0	0	2	1	2	2	8	5	25
(percent)	0.7	0.3	0.7	0.0	0.0	0.7	0.3	0.7	0.7	2.8	1.7	8.6
In depth investigation	0	0	0	0	0	1	0	2	8	9	10	30
(percent)	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.7	2.8	3.1	3.4	10.3

Panel B. Nationality of Bidder

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	**Total**
EC Bidder	4	3	6	7	4	13	10	27	28	40	44	186
(percent)	1.4	1.0	2.1	2.4	1.4	4.5	3.4	9.3	9.7	13.8	15.2	64.1
Foreign Bidder	3	1	1	2	6	8	9	10	17	24	23	104
(percent)	1.0	0.3	0.3	0.7	2.1	2.8	3.1	3.4	5.9	8.3	7.9	35.9

Table 2

Comparison of methods for identifying competitor firms

CAARs (cumulative average abnormal returns) are presented from day minus 5 to day plus 5 relative to the initial announcement (day zero) of the proposed business combination. The three competitors' identification methods are *case-by-case* (for each proposed combination, quoted competitors is identified by hand from data sources and the financial press), *same industry, same country* (competitors are listed firms with the same nationality as the bidder and active in the same industry as the target) and *same industry, same geographic zone* (competitors are listed firms from the same geographic zone – Europe, America or Asia – as the bidder and active in the same industry as the target). Reported *p*-values are obtained using percentile-t bootstrap procedure; see Section I.B. N denotes the number of competitor firms that are identifiable by the method indicated.

	Day relative to the announcement date										
	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
	Case-by-case identification, N=650										
CAAR (percent)	0.00	-0.01	-0.15	-0.18	-0.09	-0.10	-0.12	-0.15	-0.29	-0.35	-0.31
p-value	0.79	0.69	0.08	0.07	0.23	0.23	0.17	0.15	0.02	0.01	0.07
	Same industry, same country, N=528										
CAAR (percent)	-0.25	-0.23	-0.31	-0.31	-0.39	-0.40	-0.58	-0.76	-0.91	-0.99	-1.11
p-value	0.00	0.03	0.13	0.18	0.13	0.25	0.07	0.01	0.01	0.00	0.00
	Same industry, same geographic zone, N=628										
CAAR (percent)	-0.17	-0.28	-0.32	-0.36	-0.33	-0.33	-0.36	-0.42	-0.53	-0.58	-0.68
p-value	0.02	0.00	0.00	0.02	0.02	0.03	0.03	0.00	0.00	0.00	0.00

Table 3

Price reaction to initial announcement

This table presents CAARs around the initial announcement date (day 0) of proposed combinations for bidders, targets, combinations (bidders plus targets weighted by their respective market values on the last day of the estimation window), and competitors. The competitors are identified using the *case-by-case* method described in Section I.C. Estimation is by the market model with local indexes converted into US dollars. Reported p-values are obtained from a percentile-t bootstrap based on the modified Boehmer et al., (1991) method as described in section I.B. N denotes the number of firms in each category.

	Day relative to announcement date										
	-5	-4	-3	-2	-1	0	1	2	3	4	5
	Bidders, N=579										
CAAR (%)	-0.25	-0.21	-0.30	-0.38	-0.02	0.19	0.27	0.24	0.23	0.09	0.10
p-value	0.00	0.04	0.05	0.01	0.52	0.06	0.08	0.09	0.14	0.29	0.25
	Targets, N=482										
CAAR (%)	0.63	0.98	1.40	2.18	5.31	8.17	8.72	8.87	8.99	9.01	9.05
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Combinations, N=439										
CAAR (%)	-0.04	0.04	0.00	0.01	0.58	1.09	1.05	1.10	1.08	0.91	0.88
p-value	0.54	0.83	0.95	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Competitors, N=650										
CAAR (%)	0.00	-0.01	-0.15	-0.18	-0.09	-0.10	-0.12	-0.15	-0.29	-0.35	-0.31
p-value	0.79	0.69	0.08	0.07	0.23	0.23	0.17	0.15	0.02	0.01	0.07

Table 4

The initial announcement effect and the eventual regulatory outcome

Initial announcement CAARs for combinations and competitors over the 11-day event window are classified below by the ultimate outcome of regulatory intervention. Three regulatory outcomes are possible: (1) outright authorization from the European Commission (EC) at the end of a one-month review period, (2) authorization subject to concessions after the one-month review, and (3) an in-depth investigation. The CAAR is estimated using the market model with local indexes converted into US dollars; *p*-values are from a percentile-t bootstrap based on the modified Boehmer et al., (1991) method. N denotes the number of combinations or competitors

	N	CAAR (%)	p-value
Outright Authorization			
Combinations	365	0.93	0.00
Competitors	422	-0.19	0.26
Authorization After Concessions			
Combinations	39	-0.27	0.86
Competitors	44	-1.03	0.10
In-depth Investigation			
Combinations	35	1.66	0.00
Competitors	45	0.06	0.57

Table 5

Initial announcement effects and nationality

Panel A presents CAARs for combinations authorized outright by the European Commission (EC) regulators. Panel B presents CAARs for combinations receiving authorization after concessions. Panel C presents CAARs for combinations subjected to an in-depth investigation. CAARs are estimated using the market model with local indexes converted into US dollars; *p*-values are from a percentile-t bootstrap based on the modified Boehmer et al., (1991) method. N denotes the sample size.

	N	**CAAR (%)**	**p-value**
Panel A. Outright Authorization			
EC Competitors	**384**	**-0.53**	**0.11**
EC Competitors with EC Bidders	248	-0.72	0.12
EC Competitors with Non-EC Bidders	136	-0.19	0.33
Difference EC vs. Non-EC Bidders			0.52
Non-EC Competitors	**272**	**-0.24**	**0.97**
Non-EC Competitors with EC Bidders	139	0.66	0.16
Non-EC Competitors with Non-EC Bidders	133	-1.19	0.13
Difference EC vs. Non-EC Bidders			0.01
Panel B. Authorization after concessions			
EC Competitors	**43**	**-0.11**	**0.71**
EC Competitors with EC Bidders	32	0.51	0.54
EC Competitors with Non-EC Bidders	11	-1.92	0.26
Difference EC vs. Non-EC Bidders			0.27
Non-EC Competitors	**38**	**-1.31**	**0.12**
Non-EC Competitors with EC Bidders	28	-0.73	0.81
Non-EC Competitors with Non-EC Bidders	10	-2.92	0.08
Difference EC vs. Non-EC Bidders			0.06
Panel C. In-depth investigation			
EC Competitors	**40**	**1.38**	**0.01**
EC Competitors with EC Bidders	21	1.55	0.03
EC Competitors with Non-EC Bidders	19	1.20	0.14
Difference EC vs. Non-EC Bidders			0.41
Non-EC Competitors	**37**	**-0.97**	**0.06**
Non-EC Competitors with EC Bidders	17	-0.65	0.40
Non-EC Competitors with Non-EC Bidders	20	-1.24	0.08
Difference EC vs. Non-EC Bidders			0.30

Table 6

Determinants of the probability of EC regulatory intervention

Standard probit

The dependent variable is equal to zero if European regulators approve a proposed business combination outright after one month. It is 1.0 if approval is given after concessions or if the EC conducts an in-depth analysis. The independent variables are fully described in Appendix A. Estimation is by maximum likelihood. The LR Statistic provides a likelihood ratio test for the null hypothesis that all independent variables are jointly insignificant. P-values are obtained by a bootstrap percentile-t procedure, using 1,000 replications.

Explanatory Variable	**Estimated Coefficient**	**Bootstrap p-value**
Proposed combination announcement CAAR	0.79	0.37
Target Size	0.00	0.22
Bidder/Target Correlation	0.56	0.13
Deal Value	0.05 E-3	0.00
Non-EC Bidder	-0.15	0.24
Non-EC Bidder AND EC Competitors' CAAR	-4.45	0.07
EC Competitors' CAAR	3.24	0.02
LR Statistic	55.86	0.00
Pseudo R^2	0.19	

Table 7

Rivers/Vuong (1988) endogeneity test

The Rivers/Vuong (1988) endogeneity test is applied to both the proposed combination CAARs and the competitors' CAARs. Instruments are formed for both variables in a first-stage OLS estimation, as described in Section III. The dependent variable is equal to zero if European regulators approve a proposed business combination outright after one month. It is 1.0 if approval is given after concessions or if the EC conducts an in-depth analysis. The independent variables are fully described in Appendix A. Estimation is by maximum likelihood. The LR Statistic provides a likelihood ratio test for the null hypothesis that all independent variables are jointly insignificant. P-values are obtained from a bootstrap percentile-t procedure, using 2,500 replications. Endogeneity is indicated by significant coefficients for the first-stage residuals.

Explanatory Variable	**Estimated Coefficient**	**Bootstrap p-value**
Target Size	0.00	0.61
Bidder/Target Correlation	2.06	0.00
Deal Value	0.05 E-3	0.00
Outside EEC Bidder	0.27	0.12
EC Competitors' CAAR	-27.87	0.01
Residuals from first-stage OLS, EC Competitors' CAAR	29.42	0.01
Proposed combination CAAR	-9.28	0.07
Residuals from first-stage OLS, Proposed combination CAAR	10.12	0.06
LR Statistic	58.33	0.00
Pseudo R^2	*20.71*	

Table 8

Determinants of the probability of EC regulatory intervention

Two-stage instrumental variable probit

The dependent variable is equal to zero if European regulators approve a proposed business combination outright after one month. It is 1.0 if approval is given after concessions or if the EC conducts an in-depth analysis. The independent variables are fully described in Appendix A. Estimation is by maximum likelihood. The LR Statistic provides a likelihood ratio test for the null hypothesis that all independent variables are jointly insignificant. P-values are obtained from a bootstrap percentile-t procedure, using 2,500 replications. Proposed combination CAAR and competitors' CAAR instruments are fitted values from a first-stage OLS estimation, as explained in section III.

Explanatory Variable	**Estimated Coefficient**	**Bootstrap p-value**
Proposed combination CAAR Instrument	-7.52	0.11
Target Size	0.00	0.42
Bidder/Target Correlation	2.12	0.00
Deal Value	0.05 E-3	0.00
Outside EEC Bidder	0.21	0.31
Outside EEC Bidder AND EC Competitors' CAAR Instrument	-45.64	0.08
EC Competitors' CAAR Instrument	-19.81	0.08
LR Statistic	58.43	0.00
Pseudo R^2	20.74	

Table 9

First-stage OLS instrumental variable formation

The instruments used in Table VIII are obtained from the OLS regressions reported below. The dependent variable is the CAAR during an 11-day window around the initial announcement of a business combination. Independent variables are described in Appendix A. The Fisher statistic provides a test that all independent variables are jointly insignificant

Panel A. Dependent variable is proposed combination CAAR

Explanatory Variable	Estimated Coefficient	Asymptotic p-value
Non-EC Bidder	0.01	0.33
Large EC Country Bidder	0.00	0.77
Deal Value	0.00	0.31
Target Size	0.00	0.31
Bidder Size	0.00	0.10
Target to Bidder Size Ratio	-0.35 E-4	0.65
Bidder/Target Correlation	0.08	0.00
Tender Offer	0.01	0.40
Cash Offer	0.01	0.76
Stock Offer	0.30 E-4	0.99
Rumor	-0.14 E-2	0.01
Bidder Past Performance	0.86 E-2	0.54
Fisher Statistic	2.27	0.00
Adjusted R^2	0.09	

Panel B. Dependent variable is EC competitors' CAAR

Explanatory Variable	Estimated Coefficient	Asymptotic p-value
Non-EC Bidder	0.02	0.18
Large EC Country Bidder	-0.16 E-3	0.98
Deal Value	0.00	0.79
Bidder/Target Correlation	0.80 E-2	0.75
Competitors Relative Size	0.82 E-4	0.57
Competitors/Bidder Correlation	0.03	0.18
Fisher Statistic	0.83	0.54
Adjusted R^2	0.02	

Table 10

Determinants of the probability of EC regulatory intervention

Two-stage instrumental variables probit with generated regressor adjusted p-values

This table repeats the probit reported in Table VIII but accounts for the fact that some explanatory variables, the CAARs, are statistically generated estimates. The dependent variable is equal to zero if European regulators approve a proposed business combination outright after one month. It is 1.0 if approval is given after concessions or if the EC conducts an in-depth analysis. The independent variables are fully described in Appendix A. Estimation is by maximum likelihood. The LR Statistic provides a likelihood ratio test for the null hypothesis that all independent variables are jointly insignificant. P-values are obtained from a bootstrap percentile-t procedure, using 2,500 replications adapted for possible estimation error in proposed combination and competitors' CAARs (see Section IV). Proposed combination CAAR and competitors' CAAR instruments are fitted values from a first-stage OLS estimation, as explained in section III.

Explanatory Variable	**Estimated Coefficient**	**Adjusted Bootstrap p-value**
Proposed combination CAAR Instrument	-7.52	0.12
Target Size	0.00	0.44
Bidder/Target Correlation	2.12	0.00
Deal Value	0.05 E-3	0.00
Outside EEC Bidder	0.21	0.35
Outside EEC Bidder AND EC Competitors' CAAR Instrument	-45.64	0.07
EC Competitors' CAAR Instrument	-19.81	0.07
LR Statistic	58.43	0.00
Pseudo R^2	20.74	

Appendix A

Definitions of variables

Variable	Description	Source
Non-EC Bidder	A dummy variable equal to 1.0 if the home country of the bidder is outside the European Community	European Commission Final Decision Report
Large EC Country Bidder	A dummy variable equal to 1.0 if the home country of the bidder is one of the large European Community countries (Germany, France, Spain, Italy or UK)	European Commission Final Decision Report
Target Size	The market value of the target evaluated at the end of the estimation period	Datastream database
Bidder/Target Correlation	The correlation coefficient of target and bidder returns during the estimation period (an indicator of sector and geographic proximity of the target and the bidder)	Datastream database
Deal Value	The deal value in millions of dollars	Securities Data Corporation database
Bidder Size	The market value of the bidder evaluated at the end of the estimation period	Datastream database
Target to Bidder Size Ratio	The target to bidder size ratio, each measured by the market value at the end of the estimation period	Datastream database
Tender Offer	A dummy variable equal to 1.0 if the combination is a public offering	Securities Data Corporation database, Financial Press
Cash Offer	A dummy variable equal to 1.0 if the combination is 100 percent cash paid	Securities Data Corporation database, Financial Press
Stock Offer	A dummy variable equal to 1.0 if the combination is 100 percent stock paid.	Securities Data Corporation database, Financial Press
Rumor	A dummy variable equal to 1.0 if there have been rumors in the financial press during the 6 months preceding the combination	Financial Press
Bidder Past Performance	The accumulated bidder performance during the estimation period	Datastream database
Competitors Relative Size	The ratio of the average competitors'/bidder size on the last day of the estimation window (an indicator of the relative market power of competitors and bidder)	Datastream database
Competitors/Bidder Correlation	The correlation coefficient between competitors' portfolio returns and bidder returns, evaluated during the estimation period (an indicator of the relatedness of competitor and bidder activities)	Datastream database

[1] Quoted in: Guide to the Federal Trade Commission, Federal Trade Commission Web Site, www.ftc.gov.

[2] A detailed discussion of European M&A regulations can be found either in Aktas et al., (2001) or in Aktas et al., (2003).

[3] See http://europa.eu.int/comm/competition/index_en.html.

[4] The remaining 35 cases were either approved without concessions or withdrawn before the end of the in-depth investigation.

[5] The Securities Data Corporation Database provided by Thompson Financial.

[6] See, for example, the review paper by Michael C. Jensen and Ruback (1983), Gregor Andrade et al., (2001) or Harold J. Mulherin and Audra L. Boone (2000).

[7] A logit model gives virtually the same results as the probit model.

[8] We are assuming that EC regulators believe this positive effect arises from market power and not from an increased likelihood of EC competitors becoming targets in subsequent acquisitions

[9] We also have conducted tests using Full Information Maximum Likelihood procedures. As the parameter space dimension is high (31 dimensions, using the simplifying assumption that residuals of proposed combination CAARs and competitor CAARs are independent), numerical convergence is difficult to achieve and depends on the starting values.

[10] The classical order and rank conditions necessary to assure identification of the equation system (see Greene (2003)) are satisfied by such a specification.

[11] This approach is an approximation for qualitative dependent variables but it is accurate near the means of the explanatory variables; (see Wooldridge (2003)).