Market Response to European Regulation of Business Combinations

by

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Abstract

Acquisitions, mergers and other business agreements are facing increasing regulatory scrutiny, even when they are among firms domiciled outside the territory of the regulatory authorities. Some noteworthy recent examples involve mergers between American firms that were prohibited by regulators from the European Commission. Reciprocation by regulators from other jurisdictions seems a likely future trend. There are obvious consequences for the successful completion of proposed global business arrangements.

This paper explains the regulatory procedures of the European Commission with respect to business combinations. It documents the price reactions of subject firms on various dates from the initial announcement to the final regulatory decision. It tests the hypothesis that European regulators are actually motivated by protectionism of European Community (EC) firms against foreign competition. Finally, it studies the market's anticipation of regulatory outcomes at the initial announcement of the proposed business combination.

The empirical results are: (1) the market clearly reacts to European regulatory intervention; (2) the probability of intervention is not related to the nationality of the bidder. However, (3) when intervention does occur, the market anticipates that it is more costly when the bidder is a non-EC firm, so protectionism cannot be rejected outright. Finally, (4) the market incorporates regulatory intervention into its initial evaluation of the proposed business combination. The initial market reaction is a wealth effect conditioned by the probability and costs of intervention.

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I. The Setting, Past Literature, and Our Contribution

The summer of 2001 witnessed an unprecedented event in the history of business combinations. Two American companies, General Electric and Honeywell, obtained approval to merge from all American regulatory agencies, but regulators in Europe blocked the merger. There have been few, if any, events that point so vividly to global market integration. Two decades ago, Europeans would have scarcely noticed mergers beyond their borders, yet they are now paying close attention and have erected a system of severe sanctions against non-European firms who might be tempted to defy their regulatory edicts.[1]

European challenges to the GE/Honeywell merger were followed closely in the American financial press and, because of its size and especially the outcome; it is probably one of the best-known situations of its kind to date. It is, however, far from the first.[2] Beginning in September 1990 through the end of December 2000, the regulatory authorities of the European Commission received 1,573 notifications of proposed business combinations of all types[3].

I.A. Literature Review.

The activities of public regulators in the field of M&A have long attracted the attention of the academic community. Eckbo (1983) finds no clear evidence of increased market power after 55 horizontal mergers covering the years 1963 to 1978. He concludes that antitrust policy has protected high-cost producers from relatively low-cost competitors.

[1] Sanctions include fines and/or exclusion of offending companies from European markets.
[2] Two other widely publicized recent cases were the Boeing/McDonnell Douglas merger of 1997, which was finally approved after a number of concessions by the companies involved (see Aktas, *et al.*, 2001), and the proposed EMI/Time Warner deal of 2000, which was scuttled, (see *Wall Street Journal,* 2000.) A complete list is available at http://europa.eu.int/comm/competition/mergers/cases/.
[3] Business combinations include mergers, acquisitions, joint ventures, and agreements to share assets. Through the end of July, 2002, the number of notifications had grown to 2,055. However, because of the

His analysis is based on the stock market price reactions of rivals on the deal announcement date and on the Federal Trade Commission (FTC)/Department of Justice (DOJ) intervention date. This approach has become almost standard in subsequent empirical work. Stillman (1983) also finds no anticompetitive effect in eleven horizontal mergers from 1964 to 1972.

Eckbo (1985) uses sector concentration measures (a concentration ratio and the Herfindahl index) to test for anticompetitive effects in 196 horizontal mergers as compared to a control group of 70 non-horizontal mergers. He concludes that Department of Justice merger guidelines pertaining to concentration levels and market shares are unlikely to identify truly anticompetitive mergers.

Eckbo and Wier (1985) test whether the results of Eckbo (1983, 1985) and Stillman (1983) can be explained by legal constraints imposed on FTC/DOJ data collection activities before the 1978 introduction of the Hart-Scott-Rodino Act. Once again, no evidence of market power uncovered.

Slovin et al. (1991) focus attention on the airline sector where regulation is by the Civil Aeronautics Board (CAB). Examining rivals' returns around 42 horizontal airline acquisition bids from 1965 to 1988, they find that CAB activity limited competition and favored collusion among existing carriers.

Eckbo (1992) looks for an endogenous "deterrence effect"; i.e., whether firms self-select in anticipation of regulatory intervention. Business combinations facing a high probability of intervention might not even be attempted. Comparing the U.S. experience to that of Canada, where antitrust regulation was almost absent before 1982, Eckbo finds no evidence of a deterrence effect.

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delay in accessing both regulatory and market data, we were obliged to restrict our sample to notifications through the end of 2000.

Bittlingmayer (1992) finds that antitrust regulation has a significant impact on stock market prices, both in the long term (1904-1945 using quarterly returns) and upon the announcement of regulatory interventions (41 decisions from 1929 to 1931).

Song and Walkling (2002) advance an alternative explanation (to market power) for the positive reactions of rivals' stock prices on a merger announcement date. They hypothesize that rivals' stock prices react positively because the deal signals an increased probability that they too will become targets.

Bittlingmayer and Hazlett (2000) focus on the Microsoft case. They analyze 54 antitrust enforcement announcements involving Microsoft over the years 1991-1997. The authors conclude, "The financial markets reveal compelling evidence against the joint hypothesis that Microsoft conduct is anticompetitive and antitrust policy enforcement produces net efficiency gains".

Most of this literature finds little evidence that antitrust activities foster competition. Why, then, does it exist? Bittlingmayer and Hazlett suggest three possibilities: private advantages from antitrust regulation, bureaucratic self-interest, and political extraction. We propose a fourth: protectionism.

Since the eighties, antitrust regulations have propagated around the world. Bris and Cabolis (2002) identify 42 countries that have enacted merger laws. They refer to the Wilkinson Sword/Gillette case, where 14 different agencies were involved. Reciprocity among the national and supra national regulators seems likely to become more common[4] because the impetus behind cross-border regulatory action is quite understandable. If local consumers will be harmed when products from abroad become more expensive because of monopoly power acquired through merger, governments might seem justified in attempting a remedy in advance.

[4] For example, American regulators recently blocked a merger between France's Air Liquide and Britain's BOC Group, even though it had been approved in Europe.

But the adoption of merger regulations by several jurisdictions could become a serious barrier to efficiency-enhancing global business combinations, unless regulators agree to harmonize their interventions. Some cooperation already exists between the US and European regulatory agencies but, nonetheless, their approaches remain fundamentally different. Given the widespread diffusion of such regulations and the diverse national interests of numerous countries, perfect harmonization seems unlikely.

Imagine two merging firms doing business in, say, five regions. If regulatory theories and actions are roughly independent across regions, even a modest probability of blockage by any single regional regulator could translate into a very large probability of blockage by at least one.[5] A study of interventions by European regulators, who have been highly active over the past decade, should be informative with respect to the long-term consequences of the growing regulatory trend.

I.B. European Regulation.

We do not assert that potential monopoly power actually did exist in any of the combinations thus far challenged by the European Commission. US studies have not uncovered any eradication of market power by FTC/DOJ regulatory activity, so it seems *a priori* unlikely that the DGC (Directorate General for Competition of the European Commission) would be materially different. Indeed, European regulators could be as motivated by a desire to shelter local firms from foreign competition as by a desire to protect consumers; (Cf. Priest and Romani (2001)). Whatever their true motives, the pretext for regulatory challenge is politically persuasive and must therefore be tempting to regulators in Europe and elsewhere.

[5] An interesting recent example involves Microsoft, which last year settled an antitrust case brought by U.S. authorities without making any egregious concessions. On February 12, 2003, the financial press reported that Microsoft competitors including Nokia, Sun Microsystems, and AOL Time Warner, had filed a 260-page anti-competition complaint with the European Commission, which, according to Microsoft, "…contains the same arguments that were made by our competitors in the U.S. proceedings." Some commented that Microsoft faces a higher hurdle in Europe than it leaped over in the U.S., because "…the EC is looking for a way to distinguish itself from the U.S." in regulatory matters. If true, this situation appears to represent exactly the type of multiple jeopardy engendered by diverse regulatory jurisdictions.

Our first goals are to provide a systematic account of the stock market's response to European regulatory activities and to test for the existence of protectionism. In this endeavor, we also come upon another important issue; viz., to what extent do investors anticipate regulatory activities. Do returns observed on a merger announcement date include market anticipations of regulatory intervention? If anticipations of regulatory activities have a significant influence on returns, they should be taken into account when interpreting event studies of M&A. The observed return should be interpreted as the true wealth effect of the merger less the anticipated cost of regulatory intervention.

We have collected a virtually complete record of European Commission regulatory actions through 2000 involving publicly traded companies, along with stock price and volume responses in the respective local markets around action announcement dates. One thing is clear immediately: although the extent of European regulation was not widely appreciated by the U.S. public prior to the GE/Honeywell event, stock markets seemed to understand it very well. There are strong price reactions to European regulatory announcements. The specifics, to be described in detail in the paper, are fascinating. Our results contrast with those of Brady and Feinberg (2000), who are working with a sample of 27 firms for which they do not find significant stock price reactions around European regulatory interventions (what they call "case specific effects").

The data reveal that mergers with greater promise of value creation attract closer scrutiny from EC regulators, which is consistent with their stated anti-monopoly objective[6]. Non-European firms are not scrutinized more <u>often</u> than European firms, which is evidence against protectionism. But when a firm <u>is</u> subjected to an in-depth investigation, the market anticipates a much higher cost when it is non-European. In essence, there appears to be a protectionist dimension in European regulatory activities, perhaps arising from more stringent attitudes against foreign bidders or from less effective lobbying by foreigners, or both. We find also that investors anticipate regulatory activities. After

[6] As shown by Eckbo (1983), this is necessary but not sufficient condition to validate the market power hypothesis.

controlling for the impact of wealth creation on the probability of intervention, it appears that regulatory intervention is anticipated and that investors think intervention imposes additional costs on the merging parties.

I.C. Methodological Innovations.

We offer some enhancements to existing empirical methods. For statistical tests of cross-sectional returns, we rely on the approach of Boehmer et al. (1991), which explicitly accounts for event-induced volatility. We alter the approach in two ways. First, following a suggestion by Ruback (1982), we allow for first-order auto-correlation of returns. Second, we use a percentile t bootstrap procedure to generate *p*-values, which essentially finesses the problem of thick-tailed return non-normality. Our method is an alternative to the Corrado (1989) rank test; (see also Cowan and Sergeant (1996)).

For the potential problem of event clustering in time, we propose another bootstrap, a alternative more tractable in large samples than the joint estimation method of Salinger (1992).

To study determinants of regulatory intervention, we adopt an ordered probit model. Our approach controls for endogeneity between a merger's wealth creation and the probability of intervention. The Eckbo et al. (1990) proposition does not allow for such endogeneity.

Finally, we use both linear and truncated regressions when studying determinants of returns. The truncated method was advocated by Eckbo et al. (1990) but has not been used frequently in later empirical work.

The paper is organized into sections as follows: Section II provides a summary of the legal authority vested in the DGC of the EC and describes the procedures specified by law; Section III describes the data in more detail; Section IV presents an event study for a comprehensive sample and for sub-samples categorized by size, country, and other pertinent attributes of individual cases; Section V studies the determinants of the probability of regulatory intervention and the impact of anticipated regulatory activities'

on the observed returns. Section VI is dedicated to robustness checks. Section VII concludes.

II. European control of combinations: a brief summary

The European Commission's interventions against business combinations are governed by recent regulations, the first one coming into effect only in 1990. These regulations specify the size and type of combination subject to EC jurisdiction and the procedures to be followed in the event of an intervention. This section describes the legal context and summarizes some important differences between European and American procedures.

II.A. The scope of intervention

An important novelty introduced by *regulation EC n°4064/89* (passed in 1989 and first implemented in 1990) is the one shop principle. In general, Pan-European regulations about business agreements and dominant position abuses allow for concurrent enforcement of national regulations. But EC regulation takes exclusive precedence for mergers and acquisitions of European "dimension." According to article 1.2 of *n°4064/89*, a combination is considered to be of European dimension when the two following conditions are met:

1. The total world wide gross sales[7] of all concerned firms exceed 5 billion euros.[8]
2. The European individual gross sales of at least two of the concerned firms exceed 250 million euros, unless every concerned firm makes at least 2/3 of its gross sales in a single member State.

Significant alterations were made in 1997 to the basic regulation by the passage of *Regulation n° 1310/97*. The thresholds were broadened so that a proposed combination would have a European dimension, even if it did not satisfy the original two conditions above, provided that it did satisfy the following four conditions:

1. The total world wide gross sales of all concerned firms exceed 2500 million euros;
2. The combined gross sales of all the concerned firms exceed 100 million euros in each of at least three EC member states;
3. In each of at least three member states satisfying condition (2), the individual gross sales of at least two different firms each exceed 25 million euros;

[7] The original French language regulation specifies the criterion in terms of "chiffres d'affaires" which is translated in the English language version as "turnover." We believe this is the same accounting number as gross sales.

[8] Originally, the threshold was denominated in ECUs. This changed one-for-one to Euros in 1998.

4. The individual EC-wide gross sales of at least two firms each exceed 100 million euros;

   Unless every firm makes more than two-thirds of its aggregate EC-wide sales within the same member state.

These criteria sweep under EC purview most significant business combinations. They imply that national regulations by the individual member states have been relegated to a role of secondary importance.

The latest change in the regulations is rather minor. On 29 July 2000, *Regulation No 4064/89* introduced a simplified procedure for treatment of certain concentrations. The concerned combinations are those almost automatically accepted.

II.B. Juridical Competence.

The EC's exclusive authority might explain the favorable reception of these new regulations by major European firms, simply because they shorten the length of anti-trust procedures. The EC's decisions are final and need the approval of no higher judicial authority. Indeed, there is no appeal other than to a 'tribunal de première instance' (a country court) or to the EU court. This allows the Commission to negotiate remedial actions from a strong position; the firms involved usually wish to avoid a prolonged court appeal of uncertain outcome, (Cf. Winckler and Brunet, 1998, p.14).

Here is one important difference between European and American combination control systems. The American system stipulates that the authorities (Department of Justice and Federal Trade Commission) must obtain the consent of a judge for every ban, whereas the EC on its own authority can block what it considers an objectionable combination.

II.C Procedures.

A combination must advise the Commission no later than one week after a deal agreement (public announcement of a take over, an exchange offer, or acquisition of control.) There are some noteworthy differences from American procedures:

- Notification to the EC can be given only after the official signing of a deal agreement.

- European regulators are supposed to maintain full confidentiality about all information received following a notification. Confidentiality is obligatory until the authorities decide to block the combination or allow it to proceed.
- A combination cannot be completed before the initial notification and to take effect it must be declared acceptable after the investigation.

As specified in article 10 of *regulation 4064/89*, the commission has one month to complete its preliminary analysis; (time runs from the moment it receives complete information). This period is called phase I. It culminates in a decision based mainly the information contained in the notification[9]. Four decisions are possible:

1. the combination does not constitute a combination of European dimension and hence is not subject to review (article 6.1.a of *regulation 4064/89*);
2. the combination is compatible with the rules of the common market (article 6.1.b of *regulation 4064/89*) and is therefore approved;
3. although the combination is basically compatible with the rules of the common market, the combination will be permitted only if certain conditions are met (article 6.1 bis of *regulation 4064/89*, and article 1.5.a of *regulation 1310/97*);
4. doubts are cast on the proposed combination. A more detailed analysis will be undertaken. This extended investigation is called Phase II (article 6.1.c of regulation 4064/89). The criteria that bring this denouement have never been clarified.

Once the detailed (Phase II) investigation is underway, the Commission has four additional months to complete its investigation and to rule on the compatibility of the combination with European law. At the end of the (up to) four-month period, the Commission may issue three possible rulings:

1. the combination is approved;
2. the combination is approved subject to certain conditions;
3. the combination is unacceptable.

[9] The Commission also sends questionnaires to the clients and suppliers that might be affected.

If the combination has already been consummated, the Commission can order the separation of the firms or of the grouped assets, the end of common control, or any action that could restore competition.

The last two outcomes supposedly reflect doubts the Commission has concerning the compatibility of the combination with competition. In such an event, the Commission must communicate its objections to the parties involved and provide them the opportunity to present their points of view[10]. As stressed by Winckler and Brunet (1998, p. 65) "such a communication of grievances plays an important part in the procedure, since the Commission can base its final decision only on objections for which the interested parties were given the opportunity to put forward their observations." The interested parties have the right to examine the case file and can demand a hearing[11].

Leparmentier (2001) discusses differences in the objectives of American and European regulations. The DGC takes into account only the potential creation of a dominant position. The FTC/DOJ looks at the interests of consumer in a broader sense and efficiency considerations are taken into account.[12] Such fundamental differences justify fears that global business combinations could become more and more difficult if regulatory authorities fail to harmonize their approaches in the future.

[10] Regulation n° 4064/89, article 18.1.
[11] Regulation n° 447/98, relating to notifications, to delays and to hearings, article 13.3.
[12] Some recent research has questioned whether efficiency should be a regulatory objective; (see Lagerlöf and Heidhues (2002)).

III. Data.

III.A. Actions by the DGC (Directorate General for Competition of the European Commission.)

Table 1 provides summary information on proposed combinations that notified the EC since the inception of regulations in 1990 through the latest month in our data sample, (December, 2000.) The entries after the last column show the number of outcomes by type of decision. As of December 2000, 78 proposed mergers and acquisitions were taken through Phase II by the Commission. Among them, 15 were approved without conditions, 47 were approved subject to various conditions, and 13 were declared incompatible with EU conditions and were therefore forbidden. Another three cases were resolved by a different type of decision (partial referral to an individual EC member state or restoration of effective competition).

III.B. Market price, volume data and deal features.

Stock price and volume data were obtained from Datastream accessed at the *Université de Lille* II. For announcement dates, four separate sources were checked: Reuters, Bloomberg (through Dexia bank), the SDC Database edited by Thomson Financial and, depending on the country, the financial press (*Les Echos, Financial Times, Wall Street Journal*, etc.). The SDC Database and the financial press have also been used to collect supplementary information such the size of the deal, the means of payment, the type of combination, the presence of rumors in the months preceding the combination, etc.

Much information is available on http://www.europa.eu.int/comm/competition, the official DGC web site. These include

- Statistics on interventions by the DGC;
- Current legislative amendments;
- Final decision reports (lots of them are even downloadable in *.pdf).

Among the interesting information in these reports, there are diagnostics provided by the DGC, which allows one to classify combinations in four categories:

- Category 1: the firms do not operate in the same sector;

- Category 2: the firms operate in the same sector but not in the same geographical area;
- Category 3: the firms operate in the same sector, and in the same geographical area, but they have only limited sales volume there.
- Category 4: the firms operate in the same sector, in the same geographical area, and they have significant sales volume.

Because we do not have sector concentration measures such as the Herfindahl index[13], this information is particularly valuable. Only firms in category 4 represent a risk that the combination will increase sector concentration as evaluated by the DGC experts[14].

Because the firms involved were traded on various national exchanges, it was necessary to collect local market information about each exchange and to select a market index (which will be employed in the usual way to construct abnormal returns.) The countries involved, the stock market indexes selected, and the local currencies are listed in Table 2. We also collected currency exchange rates, short-term interest rates (we use the UK Cash Deposit US$ one-month rate for some robustness checks) and MSCI World Price Index data from Datastream.

III.C. Firms and cases with available data.

It usually takes quite a while after the intervention for the EC to file an official report on its web site. Consequently, we were obliged to restrict our analysis to notifications from 1990 through 2000 inclusive; later cases were mostly incomplete. The total number of notified combinations during this period was 1573 (see Table 1).

Of these 1573 notifications, 1560 final decisions, comprised of 1505 major decisions and 55 "other" decisions[15], were reached by the end of 2000[16]. We study only the major

[13] We have not found any standardized source of data for concentration measures during the 1990-2000 period covering all sectors involved in our sample.
[14] Since it could be argued that the DGC experts could manipulate this classification in order to justify their decisions, we will also use other variables such as the deal value, the size of the target, the size ratio of the target to the bidder,….
[15] As described in the footnotes of Table 1.
[16] Thirteen were carried over for resolution into calendar year 2001.

decisions. Many proposed business combinations involve small or closely held firms with no readily available market price information, so they could not be included in this study. To be included, at least one of the subject firms must be quoted on a national stock exchange; 874 of the 1505[17] major decisions, involving 1535 different firms, satisfy this requirement. Table 2 provides a breakdown by year of notification and by final decision, and for the 1535 individual firms involved, by home country. We decided further to require that both the bidder and the target be quoted and, because this requirement is almost never met for joint ventures, we excluded them (except in some preliminary tabulations). This leaves 443 combinations and 886 firms. Of these, 169 involve a bidder domiciled outside the European community, 68 are public offerings, 64 are mergers and 311 are acquisitions.

Our final sample size varies slightly from analysis to analysis depending on two factors: the calendar date and the set of explanatory variables. The date matters because sometimes firms are delisted prior to the final regulatory decision. Hence, they must be dropped from the calculations. The explanatory variables are sometimes not available; e.g., the deal value, the means of payment, etc. We will report the actual size of the analyzed sample in each table. When the inclusion of some variable has a significant impact on the composition of the sample (for example, changing drastically the repartition between public offerings, mergers and acquisitions), we will point this out.

IV. Market Response to EC Regulatory Actions.

This section reports observed abnormal returns around the announcement date and around several DGC decision dates. It also tests for significant differences when splitting the sample by the home country of the bidder. Finally, it studies whether the observed announcement effect predicts the final regulatory outcome.

[17] 1990-2000 inclusive.

IV.A. Methods

The accepted method for isolating the impact of a particular event on market valuations is the "event" study, which consists of two complementary filters. First, "abnormal" returns are estimated for each individual firm. These are obtained by removing concurrent general market movements and average long-term returns. Second, abnormal returns are averaged across firms for calendar dates relative to the event date. Since the origination of events studies by Fama et al. (1969), there have been many variations on this basic theme, all consisting of statistical procedures designed to measure the event more precisely. In the sequel below, we employ several variants in an effort to assure that the results are robust.

The first step in isolating the effect of an event is to construct a model for "normal" returns; i.e., individual firm returns that would have occurred in the absence of the event. We decided to try three different procedures, each of which has appeared many times in other papers and each possessing various merits and possible problems. These are (1) the simple market model; (2) the market model with parameters estimated by the method of Scholes and Williams (1977); and (3) the constant mean return model.

The simple market model is

$$R_{j,t} = \alpha_j + \beta_j R_{M,t} + \varepsilon_{j,t}, \qquad (1)$$

where $R_{j,t}$ is the observed return for firm j on day t (in local currency), $R_{M,t}$ is a concurrent local country stock market index[18], α_j and β_j are, respectively, the estimated OLS regression intercept and slope, and $\varepsilon_{j,t}$ is a regression residual. The returns are all continuously compounded; (i.e., log price relatives.)

Regression (1) is estimated using 200 daily observations from a period prior to the initial announcement. Thirty days immediately preceding the announcement event window are excluded since they might be contaminated by information leakage. Eleven observations constitute our event window, five days before and five days after the event date, which is

[18] When working at the business combination level and using the market model with local indexes, we include in the regression the local indexes of both the target and the bidder.

day zero. Hence, the regression sample period is -235 through day -36 relative to the announcement date. The regression uses these observations only, even for events other than the initial announcement (such as the final resolution disclosure), because data subsequent to the initial announcement are possibly abnormally influenced by the proposed combination.

Table 3 presents regression summary statistics for the 1535 different individual firms in the sample (using the market model with the local index and after converting stock prices into US dollars). These regressions do not adhere very well to the spherical Gaussian specification. The disturbances are significantly non-normal in a large majority of instances (which typical for financial returns), and there is also a lesser though still significant amount of autocorrelation. These are good justifications for trying alternative statistical approaches. The explanatory power is quite good with an average R-square around 25 %, somewhat higher than in the usual market model regression for an individual firm. This probably reflects the larger firm sizes stipulated by EEC regulations for examination.

The Scholes/Williams method is similar except that the coefficients in the market model take account of asynchronous trading.[19]

The constant mean return model computes for each firm j the average return $\overline{R}_j$ in the 200-day estimation period and then estimates abnormal returns during the event window by

$$\varepsilon_{j,t} = R_{j,t} - \overline{R}_j \qquad (2)$$

The cumulative average abnormal return is computed from the regression (1) residuals or with the mean deviations (2), first averaging across firms relative to the announcement dates and then accumulating the averages from the day prior to the event window; i.e., for day T relative to the announcement date, t_j, for firm j

[19] An alternative would have been Dimson's (1979) method, which might have more stable sampling properties but requires an adjustment to deliver consistency; (Cf. Fowler and Rorke (1983)).

$$CAAR_T = \sum_{\tau=-5}^{T} \frac{1}{N} \sum_{j=1}^{N} \varepsilon_{j,t_j+\tau} \quad (3)$$

where N is the number of firms in the sample or sub-sample. Note that average abnormal returns can be cumulated over time by simple addition because they are continuously compounded.

Inferences about the observed CAAR face four difficulties already mentioned above: the abnormal returns are frequently correlated (at least of order one), they appear to be non-Gaussian, mergers and acquisitions are known to generate event-induced variance, and they cluster in time. Solutions to these problems have been extensively studied in the literature. Ruback (1982) proposes a simple adjustment of estimated CAR[20] variance that takes into account autocorrelation of order one. Corrado (1989) introduces a rank based test robust to the distribution of abnormal returns. Boehmer et al. (1991) improve the standard method to take into account event-induced volatility. Salinger (1992) analyzes the problem of clustering and shows that, when firms undergo the event on the same day (the event windows overlap perfectly), the portfolio formation procedure used by Mandelker (1974) and Jaffe (1974) is adequate. But, when the overlap is only partial, a joint estimation procedure must be used.

Despite these contributions, there has heretofore been no procedure for resolving all four problems simultaneously. Cowan and Sergeant (1996) show that the Corrado (1989) approach is sensitive to event-induced volatility while the original Boehmer et al. (1991) method is not very powerful. The joint estimation procedure advocated by Salinger (1992) becomes quickly intractable in large samples. The procedure we propose should help ameliorate this unsatisfactory situation. We build on the Boehmer et al. (1991) method. In the case of the market model[21], the Boehmer et al. (1991) estimate the variance of the cumulative abnormal returns is

[20] CAR refers to the cumulative abnormal return for a single stock as opposed to CAAR, the average CAR for the sample of stocks.

[21] The Boehmer et al. (1991) approach is easily extended to the constant mean return model and the Williams et Scholes method (1977) by applying the generic formula for the variance of a sum of forecasts

$$\mathrm{Var}[\mathrm{CAR}_T] = T\sigma^2\left[1 + \frac{T}{U} + \frac{T\left[\frac{r_{m0}^T}{T} - \bar{r}_m\right]^2}{U\,Var(r_m)}\right] \tag{4}$$

where U is the estimation period length, $\bar{r}_m$ is the mean of the market return over the estimation period, $Var(r_m)$ is its variance, and r_{m0}^T is the cumulated market return from the beginning of the event window up to time T. In its original version, σ^2 is the estimated residual variance. To take into account the first order autocorrelation of abnormal returns, following Ruback (1982), we modify (4) to become

$$\mathrm{Var}[\mathrm{CAR}_T]^* = \mathrm{T}\sigma^2\left[1 + \frac{\mathrm{T}}{\mathrm{U}} + \frac{\mathrm{T}\left[\frac{\mathrm{r}_{m0}^{\mathrm{T}}}{\mathrm{T}} - \bar{\mathrm{r}}_m\right]^2}{\mathrm{U}\,\mathrm{Var}(\mathrm{r}_m)}\right] + 2(\mathrm{T}-1)\mathrm{Cov}[\mathrm{R}_t, \mathrm{R}_{t-1}] \tag{5}$$

where $\mathrm{Var}[\mathrm{CAR}_T]^*$ is the modified estimation of the CAR variance and $\mathrm{Cov}[\mathrm{R}_t, \mathrm{R}_{t-1}]$ is the estimated first order autocovariance during the estimation window[22]. As in the standard Boehmer et al. (1991) method, $\mathrm{Var}[\mathrm{CAR}_T]^*$ is then used to standardize the observed $\mathrm{CAR_T}$. Standardized $\mathrm{CAR_T}$'s for the N stocks are then averaged cross-sectionally to obtain the $\mathrm{CAAR_T}$, whose standard error will be $1/\sqrt{\mathrm{N}}$ by construction (provided that the individual elements of the average are cross-sectionally uncorrelated and that the residuals variance does not change during the event window.) The resulting t statistics are robust to event-induced variance, this being taken into account by the cross-sectional estimation of the standardized $\mathrm{CAR_T}$.

$Var[c\varepsilon_T] = T\sigma^2 + X_T\left[\sigma^2(X'X)^{-!}\right]X_T'$ where $c\varepsilon_T$ is the sum of forecast residuals between *0* and *T*, σ² is the residual variance, *X* is the matrix of explanatory variable, including a column of ones for the constant and X_T is a vector formed by the constant *T* and the cumulated sum of the explanatory variables between *0* and *T*.

[22] An alternative approach would have been to use an heteroscedastic and autocorrelation robust estimation of the residual variance, such as the one of Newey-West, but this would have required the added complication of GMM; (see Greene (2000) for more on this).

To tackle the normality problem and to improve the power of the test, we do not rely on an asymptotic *p*-value but use a percentile t bootstrap approach (see Efron and Tibshirani (1993)). The procedure is very intuitive. From the original data matrix, we draw with replacement 500 bootstrap samples of the same size as the original[23]. For each bootstrap sample, we apply the corrected Boehmer et al. (1991) method. The estimated bootstrap t statistics provide an empirical distribution to which the t statistic obtained from the original data can be compared. This produces a bootstrap *p*-value estimate. As shown by Horowitz (2002), this substantially improves the speed of convergence of the estimated *p*-value and does not rely on normality. Hence, our approach is an alternative to Corrado's (1989) and is robust to both departures from normality hypothesis and to event-induced volatility.

Event clustering in time remains an issue. In some cases, there is perfect overlap because several firms are involved in the same proposed combination. In that situation, we adopt the Mandelker (1974) and Jaffe (1974) procedure of forming one portfolio for each combination. Each firm is weighted in the portfolio by its market value as of the last day of the estimation window. Most of our results are at combination level and hence are resolved by the perfect overlap portfolio method[24]. For partial overlap, the joint estimation procedure advocated by Salinger (1992) is computationally complex (it would imply estimating a matrix of size 88,600 x 886!). Instead, we propose in section VI a robustness check, based also on a bootstrap procedure, which shows that our results are not sensitive to this problem.

Finally, we stress that our abnormal returns capture only the unanticipated part of the information release around event dates (see Malatesta and Thompson (1985) for a method

[23] Five hundred samples are far more than the number recommended by Efron and Tibshirani (1993).
[24] For analyses at the firms level, bidders and targets are separated, which also resolves the clustering problem since the firms are in different sub-samples.

adapted to partially-anticipated events) and that all statistical tests of differences between sub-samples are based on a presumption of independence.[25]

IV.B. Preliminary results.

Our first results, shown in Panel A of Figure 1, depict cumulative average abnormal returns (CAAR) for all firms in the sample at the initial announcement date. Note that both the bidder and target firms along with joint ventures are included. All returns are converted into US dollars at spot exchange rates. Local market indexes are used as proxies for the market portfolio.

As could be expected, a sizeable price movement occurs on the first announcement of a proposed business combination. It exceeds two percent on the day of the announcement and the two preceding days. Evidently, there is leakage or insider trading in some cases.

The figure clearly highlights the robustness of CAAR estimation to the choice of a specific normal return model[26]. Since the three methods of computing cumulative abnormal returns give similar results, we will henceforth present only those obtained with the market model, but will provide some additional robustness checks in section VI.

Panel B of Figure 1 shows the impact of currency (local versus US dollar) and of the index (MSCI World Price Index versus local indexes.) There is little difference between using local currencies and dollars because exchange rate movements are virtually independent across event periods and are swamped by stock price movements. Similarly, the results are not very influenced by the index.[27] Consequently, hereafter we present results only in US dollar using Local Indexes.

[25] This could raise some concerns when comparing CAARs of bidders and targets for which a paired t-test could be more appropriate.
[26] This is well known since Brown and Warner (1980, 1985) and it remains valid in our sample where the occasional thin market and associated asynchronous trading could be more prevalent.
[27] The disproportionate weights of a few large firms in some small markets do not appear to represent a significant problem.

IV.C. Return effects around announcements and DGC decision dates

Initial Announcement Date

For each business combination, we assigned the role of "bidder" to one firm and the role of "target" to a second firm. Usually, the notification to the European Commission explicitly states which firm is the bidder. If this were not true in a particular combination, we consulted the financial press and made a best effort to ascertain each firm's role.

Figure 2 Panel A depicts the initial announcement date. Not surprisingly given past empirical studies of mergers[28], there is a large abnormal price increase for target firms and it is statistically significant; (See Table 4 for bootstrap *p*-values.) Target firms have significant abnormal positive performance up to five days prior to the announcement. Bidding firms have significant negative returns from days –5 through –2. Evidently, there is leakage in some countries about the pending announcement. For the combined firms, bidder plus target, there are significant positive returns on the announcement date itself and on the previous (-1) and following (+1) days. Table 4 also reports tests of differences between targets and bidders, which are not surprisingly highly significant.

Later, we focus mainly on the combination level. This choice is dictated both by econometric considerations (forming portfolios at the combination level allows us to solve the clustering problem for perfect overlap windows, as pointed out in section IV.A) and by the motivation for our study. We are not trying to uncover the determinants of becoming a target or a bidder, but rather to understand the impact of DGC intervention on combinations in the field of M&A.

End of Phase I

Panel B of Figure 2 shows cumulative average abnormal returns for combined firms at the end of Phase I by decision type; (Table 5 presents the bootstrap *p*-values.) Outright authorization is apparently no surprise since the CAAR is insignificant. The most

[28] See, for example, the review paper by Jensen and Ruback (1983) and the other studies in the same special issue of the *Journal of Financial Economics.*

striking result is the clear difference (statistically significant at a 5% level as show in Table 5) between the market's reaction to authorization with conditions and an in-depth investigation. The former is good news even though the conditions could imply costs to the involved firms, because the combination is tentatively acceptable and the DGC investigation is closed. The latter is bad news; (a Phase II investigation takes time and its outcome is uncertain).

End of Phase II

Table 6 presents results for the end of Phase II. There is a positive reaction around the decision date, which could signify that the end of uncertainty is good news, but nothing is significant. This is essentially due to the small sample size (30 combinations) and to the fact that the CAAR mixes different types of decision (prohibition, authorization, authorization subject to conditions). Splitting the analysis by decision type would not help because sub-sample sizes are so small.

IV.D. Announcement effects by home country of the bidder

Suspicion about EC motives has been frequently articulated in the non-European press. Do EC anti-merger activities differentially impact non-European firms, perhaps reflecting *de facto* protectionism of European rivals?

To shed some light on this issue, Figure 3 presents the results for bidders and for combinations after dividing the sample between EC and non-EC bidders. The figure includes 5 panels. Panel A presents the CAAR around the initial announcement date; Panel B, outright authorization after Phase I; Panel C, authorization subject to conditions after Phase I; Panel D, announcement of a Phase II investigation at the end of Phase I and Panel E, decisions at the end of phase II. Statistical tests are given in Table 7.

Figure 3 Panel A shows no significant difference upon original deal announcement, a result confirmed statistically in Table 7. Panel B reveals that, in case of outright authorization, combinations involving non-EC bidders seem to undergo slight wealth destruction (around -1% on the 11-day event window) while those involving EC bidders

show no significant reaction. The difference between EC and non-EC bidders is, however, not significant and, at the combination level, it is only marginally significant in the few days following the announcement date.

Panel C provides a more interesting result. There is a clear domicile difference in case of authorization subject to conditions at the end of phase I. For EC bidders and combinations involving them, there is almost no reaction. For non-EC bidders and combinations involving them, there is a strong positive (up to 9% for bidders) impact. Table 7 confirms moreover that differences between EC and non-EC sub-samples are significant, both at the bidder and the combination levels. Clearly, the market interprets an authorization subject to conditions as good news for non-EC bidders. This result might at first sight seem surprising but, at the light of what follows, it can probably be interpreted as follows: authorization subject to conditions is good news for non-EC bidders because investors had feared an in-depth investigation.

Panel D shows what is probably the most important result of this section. While the value destruction around the announcement of a Phase II investigation (at the end of Phase I) is insignificant for EC bidders and combinations involving them, it is significantly negative for non-EC bidders and combinations involving them, (more than -2.5% with a *p*-value less than 1% for non-EC combinations)[29]. Moreover, as shown in Table 7, the differences between the two sub-samples are significant. Evidently the market anticipates a much higher cost for non-EC bidders as a result of a Phase II investigation.

One might have argued that this result is attributable to a systematic differences between the deals initiated by EC and non-EC bidders. But such a justification can be ruled out by the results in Panel A. If there were systematic differences, they would have influenced value creation on the initial announcement date, which is clearly not the case. This leaves two possible explanations: (1) the market initially anticipates more costly DGC decisions for non-EC bidders or (2) the market anticipates a better lobbying effort by EC

[29] Ellert (1976) found a negative reaction to the announcement that the merger of two U.S. firms was to be challenged by American regulators. We thank J. Fred Weston for reminding us of Ellert's work.

bidders (presumably supported by their home country authorities). Either case represents protectionism. This finding also opens another question: Is the probability of DGC intervention higher for combinations involving non-EC bidders? Section V will investigate this issue in a multivariate setting.

Finally, panel E depicts the end of Phase II. Phase II termination seems to convey slightly better news for combinations involving non-EC bidders, but most of the results are insignificant. Interpretations should therefore be made with care, keeping in mind the mix in the sample of several decision types (see section IV.C).

IV.E. Announcement effects as predictions of final outcome.

On the initial announcement of a proposed business combination, market participants much surely consider the likely outcome of regulatory action. But it seems possible also that the regulators themselves might be influenced by the initial price response to a proposed deal. For example, suppose that there really is on occasion some monopoly rents to be gained from a merger; if the market assesses this possibility correctly, there should be a larger than average price rise of both bidder and target around the initial announcement. But if European regulators are doing a good job, this should be associated with a higher probability of a Phase II investigations and subsequent prohibition.

Figure 4, Panel A, seems consistent with this idea. Combinations that eventually proceed to an in-depth Phase II investigation by the regulators have substantially larger price increases on the initial announcement date. Perhaps regulatory suspicion is aroused by the announcement date return or, alternatively, the potential for monopoly rents is independently determined by the regulators to be worthy of a Phase II investigation. Table 8 shows that the differences are statistically significant.

In Panel B of Figure 4, firms are classified by the final outcome after either Phase I or II. Surprisingly, firms that will eventually be prohibited from merging exhibit clear negative abnormal returns in the few days before the initial announcement. This might lead one to

surmise that the market predicts, even as early as the initial announcement, that a proposed combination will be disallowed. Table 8 shows, however, that the sample size is very small (three combinations) so such a surmise is merely conjecture at this point since the results are not statistically significant.

V. Determinants of the probability of intervention and of value creation

To this point, we have relied mainly on univariate statistics of price reactions around various announcement dates. Even though some interesting results have emerged, there are important questions whose answers seem likely to be provided only by a multivariate approach. For example, to properly answer the question raised in section IV.D, (Does the bidder's home country influence the probability of DGC intervention?), we should control for other possible determinants of the probability of intervention. It would also be interesting to uncover variables that influence the magnitude of the price movement around the initial announcement of the proposed combination.

These questions raise serious endogeneity problems. As pointed out in section IV.C, we cannot rule out an endogenous relation between the observed CAR and the probability of DGC intervention. We first introduce a method to resolve this particular conundrum.

V.A. A Method to Alleviate Endogeneity.

Eckbo et al. (1990) are probably the first to directly address the endogeneity problem. Those authors develop a model to take into account (1) self-selectivity bias in voluntary corporate events and (2) the simultaneous estimation of CAR determinants and the probability of intervention by the regulatory institution. They apply their model to US mergers and acquisitions.

With respect to self-selectivity bias, their argument is the following: When corporate events result from voluntary management decisions (such as corporate acquisitions, IPOs, SEOs,…) and given that management is rational and has a direct financial interest in the success of the combination, only combinations that are anticipated to be value-creating

will be undertaken[30]. Hence, self-selection truncates the distribution of the observed CAR[31]. To account for this phenomenon, the authors advocate truncated regressions of the following form[32]:

$$E[y_i | y_i > a] = \beta' x_i + \sigma \frac{\varphi[(a - \beta' x_i)/\sigma]}{1 - \Phi[(a - \beta' x_i)/\sigma]} \quad (6)$$

where y_i is the dependent variable for observation i, x_i is the vector of independent variables, φ is the normal density function, Φ is its cumulative, a is the truncation point, σ is the standard deviation of the disturbances, and β is the set of coefficients. Estimation is by maximum likelihood.

The results presented by the authors indicate the importance of self-selectivity. Using truncated regression, they show, *inter alia*, that the larger the bidder relative to the target, the smaller the gain to the bidder, while ordinary (non-truncated) estimation does not find a significant effect. Despite its apparent power, the truncated regression approach has not been widely employed[33]. In section V.C, we present results using both techniques.

Consider next the simultaneous estimation of CAR determinants and the probability of regulatory intervention. Eckbo et al. (1990) tackle the same problem but base their analysis on an assumption that investors and regulators possess independent sets of information. This seems at odds with the reality[34].

Section V.B studies determinants of the probability of intervention while section V.C looks for determinants of the initial announcement CAR. To resolve the endogeneity

[30] Of course, this does not mean that, *ex-post*, all such combinations will be value creating..
[31] Interestingly, a similar argument (truncation of the observed CAR) is a foundation of the hubris hypothesis (Roll (1986)). But, in this case, takeover bids are truncated when they are below the prevailing market price.
[32] We reproduce here the formulation presented by Greene (2000, pp. 901-905), which differs somewhat from that in Eckbo et al. (1990).
[33] Except Eckbo's (1992) contribution, we cannot find any mention of it, but perhaps our literature survey has missed something.

problem, we employ a two-step instrumental variable approach. Also, as in the univariate analysis, we undertake a bootstrap corresponding to each multivariate model. Moreover, we enlarge the bootstrap to 2,500 replications to accommodate the double source of variability implicit in the two-stage instrumental variables estimation.

V.B. Determinants of the DGC's probability of intervention

Considering the limited sample size and the nature of the dependent variable (whether or not there is an intervention), we code intervention as a qualitative variable with three possible levels. This variable, denoted "PROB", takes the value 1 in case of outright authorization after phase I, the value 2 in case of authorization subject to conditions at the end of Phase I and the value 3 in case of an in-depth (Phase II) investigation. PROB does not reflect the final outcome after Phase II.

To estimate the determinants of PROB, we fit an ordered probit model of the form

$$\begin{aligned} \Pr(\text{PROB} = 1) &= \Phi(\mu_1 - \beta' X) \\ \Pr(\text{PROB} = 2) &= \Phi(\mu_2 - \beta' X) - \Phi(\mu_1 - \beta' X) \\ \Pr(\text{PROB} = 3) &= 1 - \Phi(\mu_2 - \beta' X) \end{aligned} \tag{8}$$

where X is a vector of explanatory variables and β is a corresponding vector of coefficients, the μ_i coefficients are thresholds and Φ denotes the normal cumulative density function. Estimation is by maximum likelihood.

The explanatory variables are:

- DIAGOK: a dummy variable that takes the value one if the DGC experts determine that the involved firms either are not in the same sector, in the same geographical area or have insufficient sales (see section II for details about the intervention criteria);
- NEEC: a dummy variable that takes the value one if the home country of the bidder is outside the EEC;
- BIG: a dummy variable that takes the value one if the home country of the bidder is one of the BIG EEC countries (Germany, France, Spain, Italy or UK);

[34] Discussions with representative of the DGC M&A task force clearly reveal their keen interest in financial market data. Moreover, our univariate results suggest that these regulators seem to base their decisions partly on stock price movements around the announcement date.

- TSIZE: the market value of the target evaluated at the end of the estimation period;
- CORREL: the correlation coefficient of the target and bidder returns evaluated during the estimation period (a proxy for the sector and geographical proximity of the target and the bidder).
- DEALVAL: the deal value in millions of dollars.
- ECAR (see below);

To alleviate concerns about endogeneity, we employ a two-stage estimation, first forming an instrument for the CAR by regressing it on the following variables:[35] NEEC, BIG, DEALVAL, TSIZE, CORREL, which are all described above;

- BSIZE: the market value of the bidder evaluated at the end of the estimation period;
- SIZER: the target to bidder size ratio;
- OPA: a dummy variable taking the value one if the combination is a public offering;
- CASH: a dummy variable taking the value one if the combination is 100% cash.
- STOCK: a dummy variable taking the value one if the combination is 100% stock.
- RUM6M: a dummy variable taking the value one if there have been rumors in the financial press during the 6 month preceding the combination;
- BPERF: the accumulated bidder performance during the estimation period.

The instrument included in the second stage is ECAR, the fitted value regression value of CAR. We present results with and without DIAGOK, since this variable might be manipulated by the DGC.

The results are in Table 9. Panel A reports the full model. Panel B explores the impact of removing DIAGOK. Being nonlinear, an ordered probit model does not provide coefficients that directly measure the marginal effects of explanatory variables, but the procedure advocated in Greene (2000, p. 879) can be used to estimate these marginal effects. They are reported in the Marginal Effects section of the Table.[36]

[35] Two-stage estimation with a qualitative dependent is studied in Maddala (1983). He shows that the classical rank and order conditions must be met for the model to be identified; which is clearly the case here. Calculation of an asymptotic *p*-value involves an adjustment to take account of the two-stage procedure. The Murphy and Toppel (1985) theorem, presented in Greene (2000), provides the basis for the adjustment under maximum likelihood estimation.

[36] The marginal impact of variable X_i on probability Pr(PROB=j) is an estimate of $\partial Pr(PROB=j)/\partial X_i$.

The main conclusions are the following:

- The NEEC dummy variable has no impact on the probability of intervention, (in either version of the model.) While section IV found evidence that higher costs are imposed on non-EEC bidders by DGC intervention, there is no greater **probability** of intervention. The combination of these two results suggests that EEC bidders engage in more effective political lobbying once the DGC has intervened.

- The BIG dummy variable is also not significant at usual statistical levels. Its bootstrap *p*-value is around 17% to 18%. In the Marginal Effects section of the table, BIG is negative for PROB=1 and positive for PROB=3; i.e., bidders from the larger European countries are (insignificantly) less likely to receive outright authorization and more likely to be subjected to an intensive investigation.

- ECAR, the instrumental variable, is not significant.

- DIAGOK, CORREL and DEALVAL are all significant in Panel A. DIAGOK has a negative effect on the probability of intervention (and a bootstrap *p*-value of 0.033) while CORREL and DEALVAL are positive. As shown in Panel B, removing DIAGOK does not change the conclusions; hence there is little evidence to conclude that the DGC willfully manipulates its characterization of the combination.

- CORREL measures the return correlation of the two subject companies prior to the announcement, a "smoking gun" that the combination might be anti-competitive. Hence, it not surprisingly makes DGC intervention more likely. Similarly, the size of the proposed combination, DEALVAL, increases DGC scrutiny.

V.C. Determinants of announcement date returns.

The previous section found that the probability of regulatory intervention is predictable to some extent from determinants known as of the announcement date of the deal. Investors surely realize this and exploit it when coming to a consensus about the deal's value,

including any expected costs of regulatory intervention. This implies that CAR itself should depend on the anticipated probability of intervention on the announcement date.

The ordered probit model of the previous section provides direct estimates of intervention probabilities by type of intervention. Denote by E[Pr(PROBj)] the probit model's estimated probability of an intervention of type j, where j=1 for outright approval after phase I, j=2 for approval subject to conditions after phase I, and j=3 for a phase II proceeding. Since the three probabilities sum to unity by construction, we can include only two in a regression to explain CAR. Thus, we regress the observed CAR against DEALVAL, OPA, CASH, STOCK, RUM6M and BPERF (all variables as defined in the previous section) and also against E[Pr(PROB2)] and E[Pr(PROB3)].

Determinants of CAR were estimated with both a standard linear model and with the truncated model advocated by Eckbo et al. (1990). Table 10 summarizes the results. Panel A (B) uses OLS estimation (truncated regression.)

In Panel A, the OLS estimation:

- The two intervention variables, E[Pr(PROB2)] (probability of being authorized subject to conditions) and E[Pr(PROB3)] (probability of being subjected to an in-depth investigation) have significant positive coefficients. This suggests that investors take into account the likelihood of regulatory intervention when evaluating proposed business combinations. The impact of an in-depth investigation is the more significant of the two effects but its coefficient is slightly smaller. The positive impact of these probabilities might at first seem surprising since they signify more probable regulatory intervention; but remember that most interventions end with approval, even after Phase II, and an intervention probably signals a belief by the regulatory authorities that considerable value is to be created by the proposed combination. In Figure 2, Panel B above, we showed that authorization subject to conditions after Phase I is actually good news, even better than outright authorization. The same figure showed that going into a Phase II investigation was bad news, but this is still consistent with the positive effect of E[Pr(PROB3)] in Table 10 since a

higher *ex ante* probability implies more value creation (not counting the costs of intervention.) When the Phase II investigation does occur, there is a resolution of uncertainty about its likelihood, which implies an increase in regulatory costs. Note too, Table 1, that Phase II proceedings are relatively rare.

- The existence of previous rumors, (RUM6M) has a negative and (almost) significant impact. When the market anticipates the combination, part of the value creation is already incorporated in prices before the official announcement.
- STOCK financed combinations create less value. This is a well-known result in the M&A literature (see e.g. Travlos, 1987), payment in stock is supposedly a signal of overvaluation.
- OPA creates more value, a well-known result.
- Lastly, the size of the combination (DEALVAL) has a negative and fairly significant impact on the value creation. In percentage return terms, large deals create less value.

Are these results robust to self-selection bias? Panel B of Table 10 attempts to answer this question. The coefficients of E[Pr(PROB2)] and E[Pr(PROB3)] remain positive and retain their significance. DEALVAL remains negative but drops in significance. OPA keeps its positive sign and STOCK keeps its negative sign but neither remains significant. RUM6M drops from marginally significant to insignificant. CASH is insignificant in both Panels. We conclude that standard CAR results should be interpreted with care, at least in the context of voluntary corporate events decided by economically motivated managers (see Eckbo et al., 1990). Some apparently important determinants of CAR can vanish when truncated regression is employed.

VI. Robustness Checks.

We have already checked the sensitivity of CAAR estimation to the method used for establishing a normal return (using the constant mean return, the simple market model and the Scholes and Williams (1977) specification). We have also examined the sensitivity with respect to the use of local currencies versus US dollar and to the use of local stock price indexes versus the MSCI World Price index (see section IV.B). In this

section, we present some additional checks of robustness against other potential problems.

IV. A. Bidders' price run-up.

Previous literature has found bidders generally experience abnormally good returns before the announcement of a proposed combination. This could bias the intercept of the simple market model. To check the robustness of our previous results to this potential problem, we replace the estimated intercept by the risk-free rate multiplied by 1-β. Our proxy for the risk-free rate is the UK Cash Deposit US$ one-month rate. The MSCI World Price Index is our market portfolio proxy here. Table 11, Panel A compares the results for the 1535 firms sample. There is virtually no difference.

VI. B. Quotation suspension.

In a significant number of cases (23 business combinations) reported volumes are zero around the event date. We inquired about this puzzling circumstance with Datastream and learned that the zero volume usually corresponds to quotation suspension. To assure this did not influence our results, we reran our tests without these cases. Table 11, Panel B compares the results; again, no significant differences appear.

VI. C. Clustering.

As discussed in section IV.A, event clustering can be treated in two different ways. If there is perfect overlap, one can adopt the portfolio formation procedure introduced by Mandelker (1974) and Jaffe (1974). When the overlap is only partial, Salinger (1992) advocates a joint estimation procedure. But his procedure is not well suited to large sample sizes, even with cheap computing power (see section IV.A for more about this).

So to evaluate the potential impact of partial overlap, we have bootstrapped the initial data matrix by including each observation in the bootstrap sample only if it does not overlap with other observation. This procedure provides bootstrap samples without any clustering. Table 11, Panel C compares the bootstrap *p*-values obtained using the original procedure and the new procedure excluding any event clustering. The slight variations

observed between the two sets of *p*-values are not sufficient to raise doubt about the results already presented in this paper.

VII. Summary and Conclusions.

Government regulation of business combinations is becoming an international phenomenon. Over the past decade, for example, regulators from the European Commission have increasingly intervened in proposed mergers and acquisitions, even for entirely non-European combinations fully approved by their home countries. EEC regulators have the power to block combinations from virtually any country if the subject companies do significant business within Europe. It likely that other jurisdictions will reciprocate and some, such as the U.S., have already done so.

This regulatory trend poses obvious potential difficulties for the efficient organization of global industry. Imagine that on some future date there are, say, five separate regulatory blocks, each with its own approach to approving or prohibiting business arrangements. To the extent that regulators act independently, the probability of simultaneous approval could be small, even if authorization is likely within each single jurisdiction. Some degree of regulatory harmonization will undoubtedly arise, but it would be altogether utopian to anticipate perfect cooperation.

To our knowledge, this paper is the first to present global evidence about market reactions to EEC regulatory events during the period 1990 - 2000. We first describe the regulatory process in Europe, which conforms to a strict timetable and thus allows accurate measurement of market price reaction to regulatory decisions. According to current EC regulatory law, only the larger proposed business combinations are subject to intervention. Intervention then proceeds in two stages; Phase I provides for a preliminary investigation with four possible outcomes: not subject to EC intervention, approval, approval subject to conditions, and further investigation. Most investigations terminate without further investigation. However, a significant number of proposals are subjected

to a more thorough examination, called Phase II, which terminates definitively in approval, approval subject to conditions, or prohibition.

We examine the abnormal market price movements of 1535 firms (874 business combinations) from 19 countries as they moved through the EC regulatory process. To estimate observed cumulative abnormal returns and their associated *p*-values, we adopt the Boehmer et al. (1991) approach, which takes account of event-induced variance in returns. We modify this approach to accommodate first-order auto-correlation of returns by employing a percentile t bootstrap procedure. Our multivariate estimation controls for endogeneity between regulatory intervention and wealth creation. We also check whether self-selectivity bias, (Eckbo et al. (1990)), and event date clustering have influenced the results.

We find clear confirmation that investors take anticipated regulatory intervention into account when considering a business combination. Observed cumulative abnormal returns around business combination announcements must therefore be interpreted conditionally with respect to the probability and costs of regulation. We find that mergers with greater promise of value creation attract closer scrutiny from EC regulators, which is consistent with their stated anti-monopoly objective.

Non-European firms have not been subjected to extensive scrutiny more often than European firms. (Although they have probably already been subjected to scrutiny in their own countries.) However, when non-European firms are subjected to an in-depth investigation by EC regulators, the market anticipates a much higher cost than for European firms. This suggests a protectionist dimension in European regulatory activities, arising either from a stricter attitude toward foreign firms or from more effective lobbying by European firms, or both.

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Table 1

European Commission (EC) Regulatory Outcomes for Proposed Business Combinations

Number of proposed business combinations that have notified EC regulatory authorities each year since the inception of the legal requirement in 1990 through the latest month in our data sample (December 2000). Entries in the last column give the total number of outcomes by type of decision. Phase I termination cases end after a one-month investigation period. Phase II cases are subjected to an in-depth investigation, which can take up to four additional months.

	90	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**00**	**Total**
Number of cases notifying the EC	**12**	**63**	**60**	**58**	**95**	**110**	**131**	**172**	**235**	**292**	**345**	**1573**
Cases withdrawn – Phase I			**3**	**1**	**6**	**4**	**5**	**9**	**5**	**7**	**8**	**48**
Termination after Phase I	**7**	**55**	**57**	**54**	**86**	**102**	**118**	**131**	**229**	**260**	**328**	**1427**
Outside EC jurisdiction	2	5	9	4	5	9	6	4	6	1	1	52
Approved without conditions	5	47	43	49	78	90	109	118	207	236	293	1275
Approved subject to conditions		3	4		2	3		2	12	19	28	73
Other decisions after Phase I[37]			1	1	1		3	7	4	4	6	27
Phase II proceedings initiated		**6**	**4**	**4**	**6**	**7**	**6**	**11**	**12**	**20**	**19**	**95**
Cases withdrawn – Phase II				**1**			**1**		**4**	**5**	**6**	**17**
Decision after Phase II		**5**	**4**	**3**	**5**	**7**	**7**	**11**	**9**	**10**	**17**	**78**
Approved		1	1	1	2	2	1	1	3	0	3	15
Approved subject to conditions		3	3	2	2	3	3	7	4	8	12	47
Prohibited		1			1	2	3	1	2	1	2	13
Other decisions of Phase II[38]								2		1	0	3
Other decisions[39]	**1**	**2**	**2**	**4**	**1**	**3**	**4**	**6**	**14**	**13**	**5**	**55**

Source: DGC, "Merger Task Force"

[37] Partial or full referral to an individual EC member state.
[38] Partial referral to an individual EC member state or restoration of effective competition.
[39] Previous decision revoked, imposition of fines, or relief from prior suspension.

Table 2

Timing, Final Decisions, Domiciles of Proposed Combinations

The panels below break down the sample by (A) year of notification of the proposed combination to the EC, (B) final regulatory decision type, and (C) country of domicile. Panels A and B pertain to combinations while Panel C 1535 reports individual firms in the combinations. Panel C also gives the local market index used in the study and local currency that was converted into U.S. dollars at the spot exchange rate.

Panel A. Year of notification

90	91	92	93	94	95	96	97	98	99	00	Total
12	44	37	40	53	66	59	86	105	150	222	874

Panel B. Final decision

Prohibition	Approval Subject to Conditions	Outright Approval	Referral	Total
9	102	759	4	874

Panel C. Home country, local market index and currency

Country	N	Index	Currency[40]
Australia	5	S&P ASX 200	Dollar
Austria	8	Weiner Boerse Index	Schilling*
Belgium	24	Brussels all Shares	Franc*
Bermuda	2	MSCI World Price Index	Dollar
Canada	21	Toronto 300	Dollar
Denmark	11	Copenhagen SE	Kröne
Finland	24	HEX	Markka*
France	221	CAC40	Franc*
Germany	267	DAX Kurs Price Index	Mark*
Greece	2	DJ Euro Stoxx Price Index	Euro
Hong Kong	1	Hang Seng	Dollar
Ireland	2	Ireland SE	Punt*
Italy	74	Milan Comit	Lira*
Japan	35	NIKKEI 225	Yen
Luxembourg	1	Luxembourg SE 13	Franc*
Netherlands	88	CBS All Share	Guilder*
Norway	11	Oslo SE General	Kröne
Portugal	3	DJ Euro Stoxx Price Index	Euro
Singapore	1	Singapore DBS 50 Price Index	Dollar
South Africa	7	JSE Industrial	Rand
Spain	26	Madrid SE General	Peseta*
Sweden	61	Affarsvarlden weighted all shares	Kröne
Switzerland	57	Swiss Market Index	Franc
UK	250	FTSE 100	Pound
USA	334	S&P 500	Dollar
Total	1535		

[40] Since January 1, 1999, euroland countries indicated by an asterisk have maintained fixed exchange rates with the euro (and hence with each other).

Table 3

Market Model Regression Summary Statistics and Specification Tests

Panel A presents regression summary statistics for the 1535 different individual firms in the initial sample. Estimates are from the market model with local indexes converted into US Dollars. The average R-square is about 25%. Panel B gives percentages of individual regressions for which various null hypotheses are rejected. For the JB (Jarques-Bera) test the null hypothesis is "normal disturbances" and for the Ljung-Box statistic of order 1, Q(1), the null hypothesis is "no autocorrelation of order one." The regressions clearly do not adhere well to the spherical Gaussian specification

Panel A. Regression summary

	α ($X10^3$)	β	R^2
Mean	-0.115	0.839	0.249
Std. Dev.	1.411	0.439	0.193
Minimum	-9.738	-1.373	0.000
1st quartile	-0.832	0.591	0.086
Median	-0.050	0.856	0.216
3rd quartile	0.620	1.085	0.370
Maximum	5.923	3.955	0.867

Panel B. Hypothesis and Specification Tests

	Hypothesis Rejected (%)			
p-level	**α=0**	**β=0**	**JB**	**Q(1)**
1%	0.46	88.39	78.02	19.24
5%	3.33	91.52	83.11	28.25
10%	6.85	92.43	85.78	34.70

Table 4

Price Reaction to the Initial Announcement of a Business Combination

CAARs around the initial announcement date (day 0) of proposed combinations for bidders, targets, and combinations (bidders plus targets weighted by their respective market values on the last day of the estimation window prior to the announcement.). Estimation is by 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. method as described in section IV.

Relative Date	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
						Bidders (N=583)					
CAAR (%)	-0.22	-0.32	-0.36	-0.38	-0.04	0.07	0.14	0.65	0.00	-0.04	-0.15
p-value	0.00	0.00	0.01	0.01	0.97	0.20	0.18	0.02	0.62	0.66	0.74
						Targets (N=487)					
CAAR (%)	0.58	0.88	1.24	2.04	5.58	8.20	8.70	8.96	9.12	9.10	10.15
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=441)					
CAAR (%)	0.03	0.01	-0.01	-0.05	0.53	1.02	0.96	1.66	1.01	0.99	1.51
p-value	0.37	0.95	0.29	0.45	0.00	0.00	0.00	0.11	0.00	0.00	0.13
						Mean Difference, Target - Bidder					
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 5

Announcement of Phase I termination

CAARs around the announcement date (day 0) at the end of a European Commission Phase I investigation, categorized by decision type (outright authorization, authorization subject to conditions and in-depth investigation). Estimation is by 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. method as described in section IV.

Relative Date	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
	Outright Authorization (N=348)										
CAAR (%)	0.04	0.04	-0.20	-0.32	-0.20	-0.13	-0.20	-0.26	-0.28	-0.36	-0.48
p-value	0.23	0.31	0.35	0.16	0.48	0.57	0.71	0.79	0.61	0.39	0.13
	Authorization with Conditions (N=38)										
CAAR (%)	0.18	0.91	1.19	1.07	1.22	1.69	1.96	1.73	1.44	1.33	1.48
p-value	0.79	0.02	0.04	0.06	0.03	0.03	0.03	0.09	0.12	0.21	0.19
	In-depth (Phase II) Investigation (N=32)										
CAAR (%)	0.08	-0.80	-0.61	-0.65	-0.72	-1.33	-1.61	-1.78	-1.78	-2.33	-2.65
p-value	0.81	0.09	0.13	0.18	0.21	0.15	0.07	0.05	0.02	0.01	0.01
	Tests of Differences in CAARs										
	Outright Authorization = Authorization with Conditions										
p-value	0.72	0.04	0.00	0.02	0.06	0.03	0.06	0.10	0.13	0.21	0.13
	Outright Authorization = In-depth Investigation										
p-value	0.53	0.09	0.23	0.28	0.27	0.16	0.07	0.04	0.03	0.02	0.03
	Authorization with Conditions = In-depth Investigation										
p-value	0.73	0.01	0.03	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.00

Table 6

Announcement of Phase II termination

CAAR for all proposed combinations at the end of a European Commission Phase II investigation, announced on day 0. The results here mix different decisions (prohibition, outright authorizations, and authorizations subject to conditions.) Estimation is by 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. method as described in section IV.

Relative Date	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
	All outcomes (N=30)										
CAAR (%)	-0.40	0.00	0.01	-0.35	0.15	0.13	0.30	0.20	-0.26	-0.72	-0.43
p-value	0.12	0.97	0.57	0.60	0.61	0.96	0.83	0.72	0.73	0.35	0.59

Table 7

Price Reactions for European and Non-European Bidding Firms

CAARs and their associated *p*-values are reported around various announcement dates (day 0) for bidders and for business combinations after dividing the sample between EC and non-EC bidders. Panel A presents the CAAR at the initial announcement; Panel B, outright authorization after Phase I; Panel C, authorization subject to conditions after Phase I; Panel D, Phase II investigation at the end of Phase I and Panel E, the end of phase II. Tests of differences are also given for both bidders and combinations. Estimation is by 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. method as described in section IV.

Relative Date	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
					Panel A. Initial Announcement of Business Combinations						
					EC Bidders (N=367)						
CAAR (%)	-0.30	-0.44	-0.44	-0.41	0.16	0.17	0.20	1.03	0.02	0.07	-0.21
p-value	0.00	0.00	0.01	0.03	0.35	0.18	0.17	0.02	0.84	0.58	0.44
					Non-EC Bidders (N=216)						
CAAR (%)	-0.09	-0.10	-0.21	-0.32	-0.38	-0.08	0.04	0.00	-0.04	-0.23	-0.06
p-value	0.18	0.33	0.17	0.16	0.28	0.57	0.41	0.61	0.57	1.00	0.60
					Combinations with EC Bidders (N=272)						
CAAR (%)	0.01	-0.07	-0.09	-0.27	0.49	0.80	0.79	1.90	0.88	0.94	1.75
p-value	0.39	0.29	0.18	0.44	0.01	0.00	0.00	0.09	0.00	0.00	0.13
					Combinations with Non-EC Bidders (N=169)						
CAAR (%)	0.05	0.12	0.11	0.30	0.60	1.38	1.24	1.28	1.22	1.07	1.13
p-value	0.57	0.23	0.89	0.13	0.01	0.00	0.00	0.00	0.00	0.00	0.00
					Difference, EC vs. Non-EC Bidders						
p-value	0.18	0.12	0.32	0.50	0.21	0.60	0.74	0.05	0.75	0.73	0.41
					Difference, Combinations with and without EC Bidders						
p-value	0.93	0.27	0.38	0.13	0.86	0.17	0.23	0.24	0.31	0.28	0.25
					Panel B. Announcement of Outright Authorization after Phase I						
					EC Bidders (N=305)						
CAAR (%)	1.20	-0.09	-0.22	-0.30	0.10	0.15	0.34	0.46	0.37	0.45	0.24
p-value	0.09	0.23	0.08	0.14	0.60	0.37	0.13	0.06	0.13	0.08	0.24
					Non-EC Bidders (N=183)						
CAAR (%)	0.10	0.02	-0.21	-0.27	-0.28	-0.07	0.02	-0.13	-0.23	-0.17	-0.29
p-value	0.35	0.39	0.61	0.40	0.60	0.71	0.45	0.88	0.53	0.74	0.39
					Combinations with EC Bidders (N=212)						
CAAR (%)	-0.05	0.07	-0.06	-0.28	-0.07	0.02	0.06	0.07	0.09	-0.08	-0.32
p-value	0.55	0.35	0.99	0.25	0.72	0.67	0.39	0.29	0.49	0.85	0.28
					Combinations with Non-EC Bidders (N=136)						
CAAR (%)	0.18	-0.02	-0.42	-0.37	-0.40	-0.37	-0.60	-0.79	-0.84	-0.79	-0.74
p-value	0.27	0.58	0.13	0.18	0.44	0.25	0.11	0.08	0.12	0.10	0.09
					Difference, EC vs. Non-EC Bidders						
p-value	0.15	0.20	0.41	0.66	0.42	0.65	0.41	0.15	0.17	0.16	0.20
					Difference, Combinations with and without EC Bidders						
p-value	0.59	0.74	0.25	0.85	0.87	0.27	0.13	0.09	0.13	0.18	0.41

Table 7, (Continued)

Relative Date	-5	-4	-3	-2	-1	0	1	2	3	4	5
Panel C. Announcement of Authorization subject to conditions after Phase I											
	EC Bidders (N=35)										
CAAR (%)	0.34	1.11	1.29	0.72	0.36	0.18	0.33	0.30	-0.08	-0.02	0.34
p-value	0.95	0.07	0.05	0.23	0.61	0.91	0.62	0.69	0.89	0.68	0.74
	Non-EC Bidders (N=12)										
CAAR (%)	1.10	1.80	4.31	5.83	7.72	8.26	9.30	9.17	9.17	9.68	9.60
p-value	0.06	0.03	0.02	0.00	0.00	0.00	0.00	0.02	0.04	0.04	0.03
	Combinations with EC Bidders (N=29)										
CAAR (%)	0.23	0.84	0.75	0.29	0.19	0.65	0.81	0.87	0.58	0.41	0.70
p-value	0.37	0.07	0.31	0.83	0.61	0.61	0.67	0.67	0.87	0.69	1.00
	Combinations with Non-EC Bidders (N=9)										
CAAR (%)	0.03	1.11	2.62	3.56	4.55	5.05	5.65	4.48	4.19	4.32	4.01
p-value	0.42	0.05	0.01	0.03	0.01	0.01	0.03	0.05	0.09	0.11	0.11
	Difference, EC vs. Non-EC Bidders										
p-value	0.08	0.09	0.02	0.01	0.01	0.01	0.00	0.01	0.02	0.02	0.02
	Difference, Combinations with and without EC Bidders										
p-value	0.33	0.41	0.05	0.03	0.03	0.06	0.04	0.10	0.12	0.13	0.11
Panel D. Announcement of Phase II Investigation											
	EC Bidders (N=23)										
CAAR (%)	-0.51	-0.26	0.24	0.10	0.11	0.02	0.22	0.05	-0.40	-0.78	-0.74
p-value	0.15	0.56	0.32	0.28	0.19	0.19	0.13	0.11	0.18	0.27	0.53
	Non-EC Bidders (N=21)										
CAAR (%)	-0.20	-0.91	-0.43	-0.95	-1.14	-1.40	-1.29	-1.66	-1.42	-1.92	-2.71
p-value	0.36	0.07	0.19	0.06	0.03	0.01	0.02	0.01	0.03	0.02	0.01
	Combinations with EC Bidders (N=17)										
CAAR (%)	0.36	0.12	0.16	0.36	0.18	-0.50	-1.02	-1.14	-1.51	-1.96	-1.58
p-value	0.25	0.53	0.49	0.39	0.45	0.58	0.95	0.85	0.33	0.22	0.37
	Combinations with Non-EC Bidders (N=15)										
CAAR (%)	-0.24	-1.84	-1.49	-1.80	-1.73	-2.27	-2.28	-2.51	-2.08	-2.75	-3.87
p-value	0.19	0.01	0.02	0.01	0.03	0.09	0.01	0.01	0.01	0.06	0.05
	Difference, EC vs. Non-EC Bidders										
p-value	0.54	0.24	0.16	0.06	0.02	0.02	0.02	0.01	0.02	0.03	0.03
	Difference, Combinations with and without EC Bidders										
p-value	0.16	0.01	0.02	0.01	0.00	0.01	0.03	0.03	0.09	0.08	0.01

Table 7, (Continued)

Relative Date	-5	-4	-3	-2	-1	0	1	2	3	4	5
Panel E. Announcement of decision after Phase II											
	EC Bidders (N=25)										
CAAR (%)	-0.04	1.11	1.04	1.10	1.10	1.23	1.48	1.52	1.82	1.27	0.84
p-value	0.78	0.07	0.11	0.15	0.20	0.20	0.25	0.19	0.10	0.29	0.52
	Non-EC Bidders (N=21)										
CAAR (%)	-0.15	0.39	0.86	0.68	2.18	2.46	2.88	3.11	1.89	1.93	2.34
p-value	0.89	0.48	0.25	0.36	0.04	0.04	0.01	0.01	0.07	0.06	0.06
	Combinations with EC Bidders (N=17)										
CAAR (%)	-0.61	-0.50	-0.75	-1.01	-0.98	-0.75	-0.64	-0.94	-0.99	-1.08	-1.38
p-value	0.09	0.25	0.22	0.11	0.26	0.31	0.35	0.34	0.37	0.21	0.21
	Combinations with Non-EC Bidders (N=13)										
CAAR (%)	-0.13	0.65	0.99	0.53	1.63	1.29	1.53	1.70	0.68	-0.25	0.80
p-value	0.52	0.43	0.23	0.40	0.15	0.26	0.21	0.21	0.53	0.87	0.47
	Difference, EC vs. Non-EC Bidders										
p-value	0.98	0.37	0.93	0.78	0.23	0.19	0.13	0.13	0.59	0.20	0.14
	Difference, Combinations with and without EC Bidders										
p-value	0.57	0.29	0.20	0.22	0.13	0.21	0.20	0.19	0.39	0.42	0.24

Table 8

Initial Deal Announcement Effect and Eventual Regulatory Outcome

Panel A presents the CAAR at the initial announcement date for business combinations ending in Phase I and those proceeding through Phase II. Panel B gives the CAAR at the initial announcement date classified by final outcome (outright authorization, authorization subject to conditions or prohibition.) Estimation is by 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. method as described in section IV.

Relative Date	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
Panel A. Combinations Ending in Phase I and Phase II Proceedings											
	Phase I Combinations (N=406)										
CAAR (%)	0.01	-0.02	-0.05	-0.14	0.35	0.86	0.86	1.62	0.94	0.91	1.49
p-value	0.71	0.55	0.19	0.99	0.00	0.00	0.00	0.15	0.00	0.00	0.07
	Phase II Combinations (N=35)										
CAAR (%)	0.21	0.34	0.45	0.95	2.59	2.83	2.11	2.20	1.74	1.88	1.78
p-value	0.08	0.11	0.25	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Difference, Phase II vs. Phase I Combinations										
p-value	0.11	0.11	0.15	0.10	0.00	0.00	0.02	0.43	0.07	0.03	0.30
Panel B. Combinations classified by Final Outcome (after either Phase I or Phase II)											
	Outright Authorization (N=364)										
CAAR (%)	0.03	0.03	0.04	-0.04	0.39	0.92	0.96	1.80	1.00	1.01	1.67
p-value	0.24	0.63	0.65	0.41	0.00	0.00	0.00	0.16	0.00	0.00	0.11
	Authorization Subject to Conditions (N=70)										
CAAR (%)	0.07	0.07	-0.04	0.08	1.51	1.70	1.05	1.00	1.01	0.87	0.75
p-value	0.73	0.93	0.45	0.63	0.01	0.00	0.02	0.01	0.01	0.04	0.04
	Prohibition (N=3)										
CAAR (%)	-0.41	-1.29	-1.92	-0.95	-3.04	-2.77	-0.75	0.04	0.80	1.07	1.23
p-value	0.23	0.27	0.15	0.33	0.23	0.21	0.35	0.77	0.25	0.39	0.39
	Difference Authorization with Conditions vs. Outright Authorization										
p-value	0.81	0.91	0.60	1.00	0.09	0.14	0.53	0.29	0.47	0.52	0.35

Table 9

Determinants of the Probability of Regulatory Intervention

The estimated model is an ordered probit. The dependent variable takes the value 1 for outright authorization after Phase I, 2 for authorization subject to conditions after Phase I and 3 for a Phase II investigation. To build an instrument for the observed CAR, we use the following explanatory variables: NEEC (a dummy variable, 1.0 if the home country of the bidder is outside the EEC), BIG (a dummy variable, 1.0 if the home country of the bidder is one of the BIG EEC countries), DEALVAL (the deal value in billions of dollars), TSIZE (the market value of the target at the end of the estimation period in billions of dollars), CORREL (the correlation of the target and bidder returns during the estimation period), BSIZE (the market value of the bidder at the end of the estimation period), SIZER (the target to bidder size ratio), OPA (a dummy variable, 1.0 if the combination is a public offering), CASH (a dummy, 1.0 if the combination 100% cash), STOCK (a dummy variable, 1.0 if the combination is 100% stock), RUM6M (a dummy variable, 1.0 if there have been rumors in the financial press during the 6-month period preceding the combination) and BPERF (the accumulated bidder performance during the estimation period). The independent variables of the ordered probit model are ECAR (the instrument for CAR), DIAGOK (a dummy variable, 1.0 if DGC experts determine that the involved firms are not in the same sector, not in the same geographical area, or have sufficient sales), NEEC, BIG, TSIZE, CORREL and DEALVAL. Panel B presents the estimation without DIAGOK. Estimation is by maximum likelihood. Marginal effects are evaluated as in Greene (2000, p. 879).

	Panel A			Panel B		
	Coefficient	**t-value**	**p-value**	**Coefficient**	**t-value**	**p-value**
ECAR	-2.014	-0.39	0.417	-1.661	-0.33	0.501
DIAGOK	-0.272	-1.53	0.033			
NEEC	0.001	0.01	0.992	0.011	0.04	0.939
BIG	0.199	0.74	0.177	0.202	0.75	0.161
TSIZE	0.0026	0.71	0.240	0.0021	0.59	0.293
CORREL	0.960	1.80	0.026	0.951	1.79	0.026
DEALVAL	0.0138	4.52	0.000	0.0141	4.70	0.000
Threshold 1	1.245	4.79	0.000	1.353	5.34	0.000
Threshold 2	1.737	6.25	0.000	1.842	6.81	0.000
LR		33.9			31.3	
p-value		0.000			0.000	

Marginal Effects[41]

	Pr(1)	**Pr(2)**	**Pr(3)**	**Pr(1)**	**Pr(2)**	**Pr(3)**
ECAR	0.4805	-0.2219	-0.2586	0.4013	-0.1830	-0.2183
DIAGOK	0.0637	-0.0296	-0.0341			
NEEC	-0.0003	0.0002	0.0002	-0.0026	0.0012	0.0014
BIG	-0.0478	0.0219	0.0259	-0.0493	0.0223	0.0270
TSIZE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CORREL	-0.2291	0.1058	0.1233	-0.2299	0.1048	0.1250
DEALVAL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

[41] In a few cases, the probabilities do not sum exactly to 1.0 because of rounding error.

Table 10

Determinants of CAR at the Initial Announcement Date

A linear model (Panel A) and the truncated regression model advocated in Eckbo et al. (1990) (Panel B) are estimated. The dependent variable is the CAR around the initial announcement of the business combination. To measure the marginal impact on the observed CAR of anticipated regulatory intervention, predicted values for the probabilities of intervention were obtained from an ordered probit model estimated upon the announcement date of the proposed combination. E[Pr(PROB2)] is the estimated probability of ending Phase I with approval subject to conditions. E[Pr(PROB3)] is the estimated probability of an in-depth Phase II investigation. Other determinants of the CAR are DEALVAL (the deal value in billions of dollars), OPA (a dummy variable taking the value one if the combination is a public offering), CASH (a dummy variable taking the value one if the combination is 100% cash), STOCK (a dummy variable taking the value one if the combination is 100% stock), RUM6M (a dummy variable taking the value one if there have been rumors in the financial press during the 6 months preceding the combination) and BPERF (the accumulated bidder performance during the estimation period). The truncated model is estimated is by maximum likelihood and σ is the estimated standard deviation of the disturbances. The t-values and p-values are obtained from a bootstrap procedure. Sample size is 348 in both panels.

	Panel A. Linear			**Panel B. Truncated**		
	Coefficient	**t-value**	**p-value**	**Coefficient**	**t-value**	**p-value**
Intercept	-0.106	-2.247	0.009	-0.582	-2.941	0.006
E[Pr(PROB2)]	0.894	1.886	0.035	2.815	2.307	0.016
E[Pr(PROB3)]	0.762	2.150	0.013	2.243	1.991	0.023
DEALVAL	-0.004	-1.427	0.068	-0.011	-1.296	0.094
OPA	0.018	1.881	0.010	0.039	0.687	0.240
CASH	0.004	0.318	0.590	-0.014	-0.257	0.478
STOCK	-0.023	-1.228	0.040	-0.023	-0.305	0.411
RUM6M	-0.001	-1.301	0.144	0.001	0.182	0.681
BPERF	-0.015	-0.973	0.108	0.013	0.254	0.506
σ				0.004	0.967	0.216
R-square		0.375				
F		25.417				

Table 11

Checks of Robustness

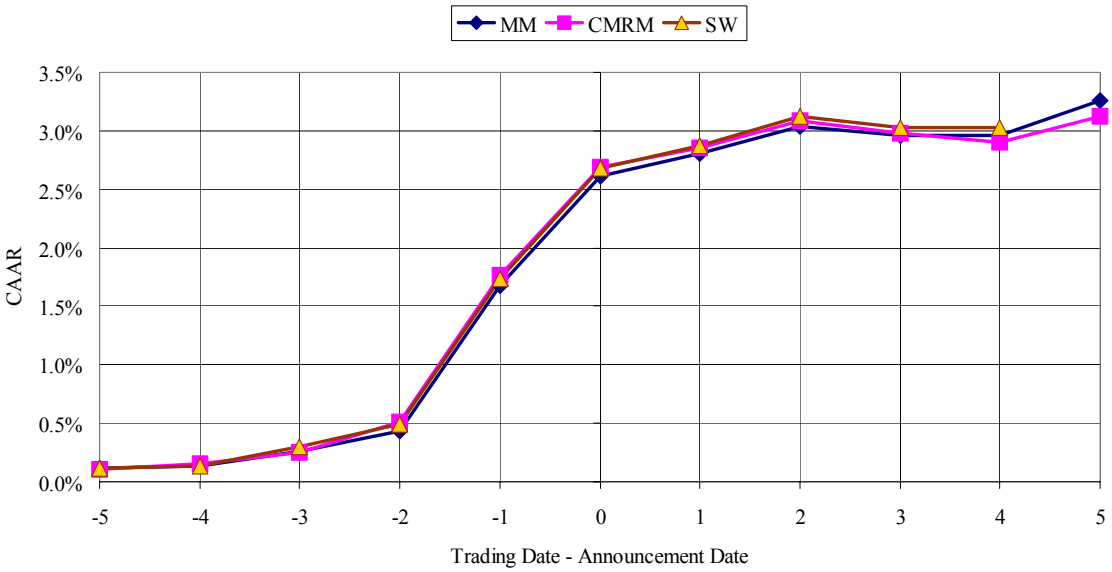
Panel A examines whether bidder price increases before the business combination affect the results by biasing the intercept of the market model. Panel B presents results obtained with and without cases where there has been a quotation suspension. Panel C explores the potential bias that partial event clustering could generate by comparing bootstrapped *p*-values with and without event clustering.

Relative Date	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
Panel A. Are the results robust to the bidder price run-up?											
Market Model, Estimated Intercept (N=1535)											
CAAR (%)	-0.09	-0.14	-0.27	-0.19	0.46	0.91	0.85	1.46	0.73	0.48	1.05
p-value	0.30	0.14	0.03	0.33	0.00	0.00	0.00	0.04	0.00	0.00	0.01
CAPM with Riskless Rate (N=1535)											
CAAR (%)	-0.09	-0.14	-0.26	-0.19	0.47	0.92	0.86	1.47	0.74	0.49	1.06
p-value	0.26	0.15	0.03	0.24	0.00	0.00	0.00	0.05	0.00	0.01	0.01
Panel B. Are the results robust to quotation suspensions?											
With quotation suspensions (N=267 Combinations)											
CAAR (%)	-0.02	-0.16	-0.30	-0.20	0.59	0.89	0.80	0.64	0.72	0.39	0.39
p-value	0.63	0.22	0.08	0.40	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Without quotation suspensions (N=244 Combinations)											
CAAR (%)	-0.01	-0.11	-0.28	-0.15	0.64	0.92	0.79	0.62	0.74	0.37	0.34
p-value	0.44	0.39	0.10	0.71	0.00	0.00	0.00	0.00	0.00	0.02	0.02
Panel C. Are the results robust to event clustering?											
Not accounting for event clustering (N=1535)											
CAAR (%)	-0.09	-0.14	-0.27	-0.19	0.46	0.91	0.85	1.46	0.73	0.48	1.05
p-value	0.27	0.14	0.05	0.30	0.00	0.00	0.00	0.07	0.00	0.00	0.01
Taking account of clustering (N=1535)											
CAAR (%)	-0.09	-0.14	-0.27	-0.19	0.46	0.91	0.85	1.46	0.73	0.48	1.05
p-value	0.23	0.02	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 1

Panel A plots cumulative average abnormal returns (CAARs) for all firms in the sample around the initial deal announcement date, for three different methods of estimating abnormal returns (MM: Market Model, CMRM: Constant Mean Return Model and SW: Scholes and Williams model). All prices are converted into US dollars. Local market indexes are used as proxies for the market portfolio. Panel B shows the impact of the currency (local versus US dollar) and the index (MSCI World Price Index versus local indexes), using the market model.

Panel A. Initial Announcement of Combination, All Firms, US$, Local Indexes



Panel B. Initial announcement of Combination, All Firms, Market Model

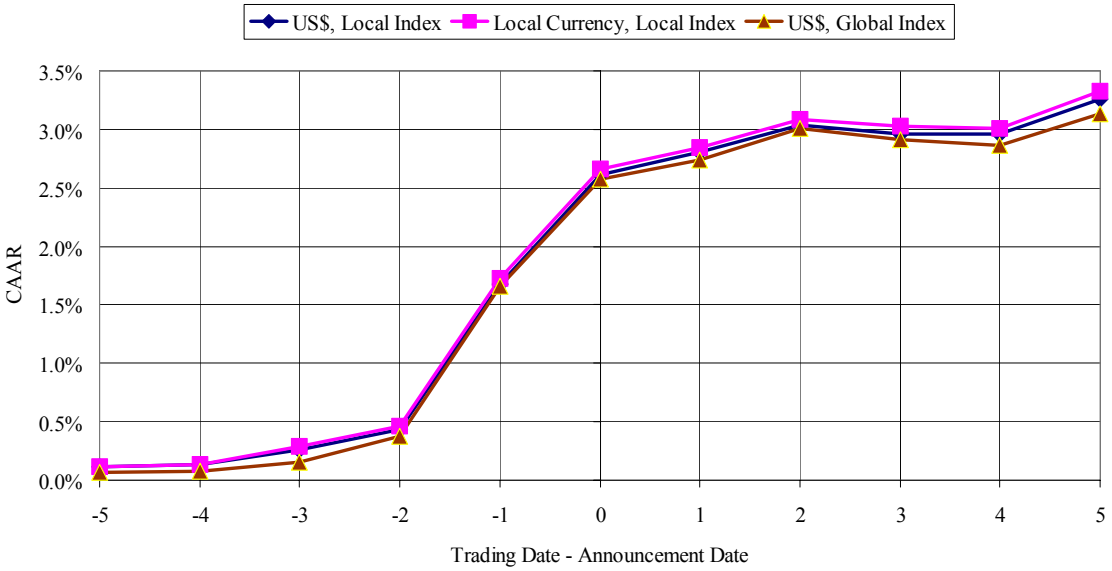
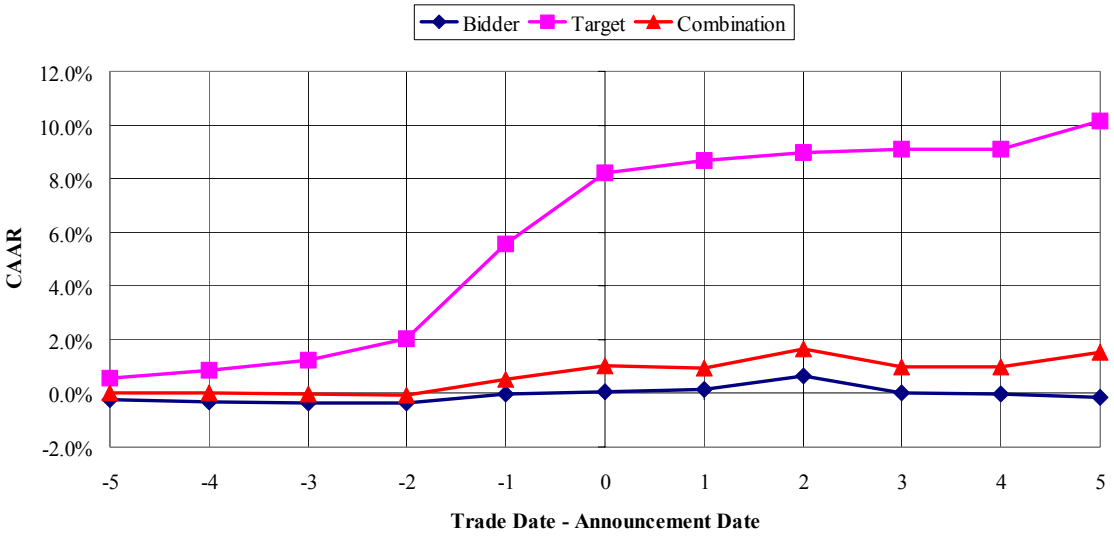


Figure 2

Panel A shows the CAAR for all firms around the initial announcement date. Panel B shows the CAAR by the regulatory decision after Phase I (outright authorization, authorization subject to conditions, in-depth investigation). The CAAR is estimated using the market model with local indexes after conversion into US dollars. *p*-values are provided in table 4.

Panel A. Initial announcement of Business Combination



Panel B. Announcement of Decision after Phase I

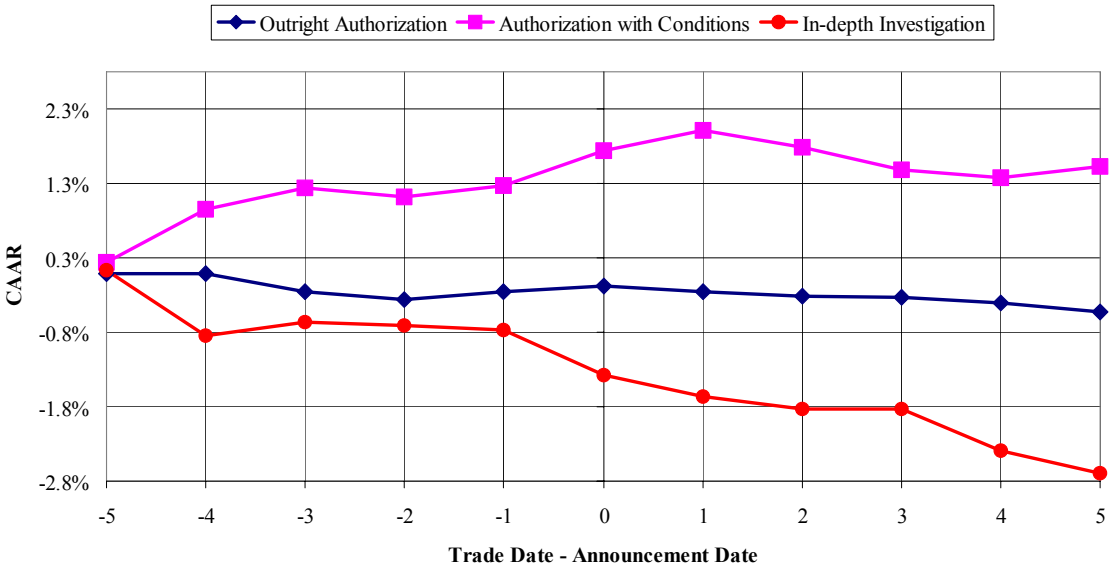
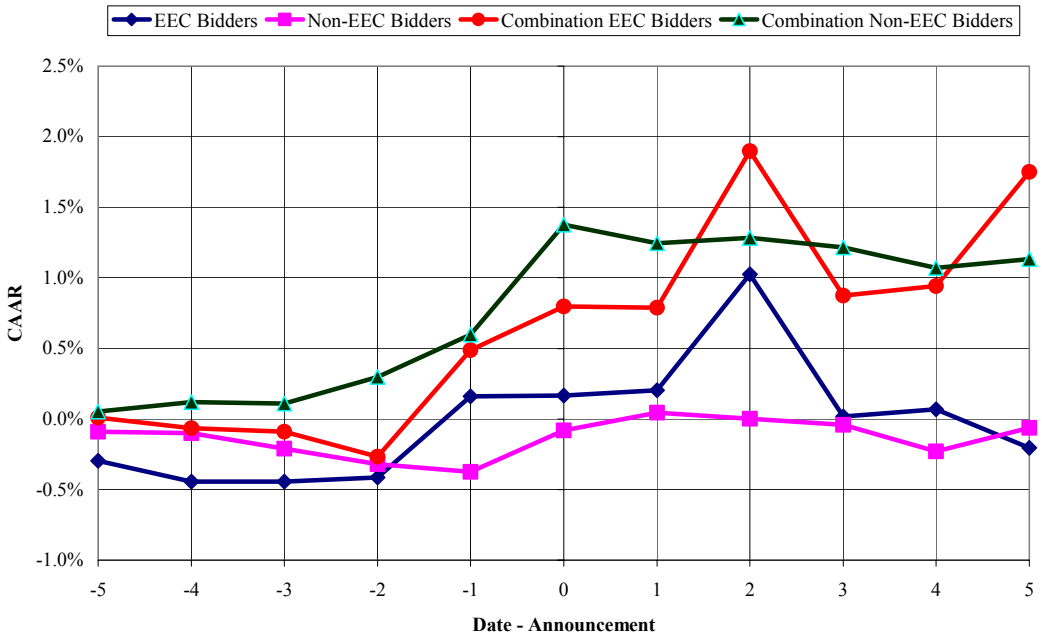


Figure 3

CAARs are shown for bidders and for business combinations after splitting the sample into EC and non-EC bidders. The five panels are for different announcements. Panel A is the initial deal announcement; Panel B, outright authorization after Phase I; Panel C, authorization subject to conditions after Phase I; Panel D, Phase II investigation initiated at the end of Phase I; and Panel E, the conclusion of phase II. Tests of difference between EC and non-EC are given in Table 7. CAARs are estimated using the market model with local indexes and all returns converted into US dollars.

Panel A. Initial announcement of Business Combination



Panel B. Announcement of Outright Authorization after Phase I

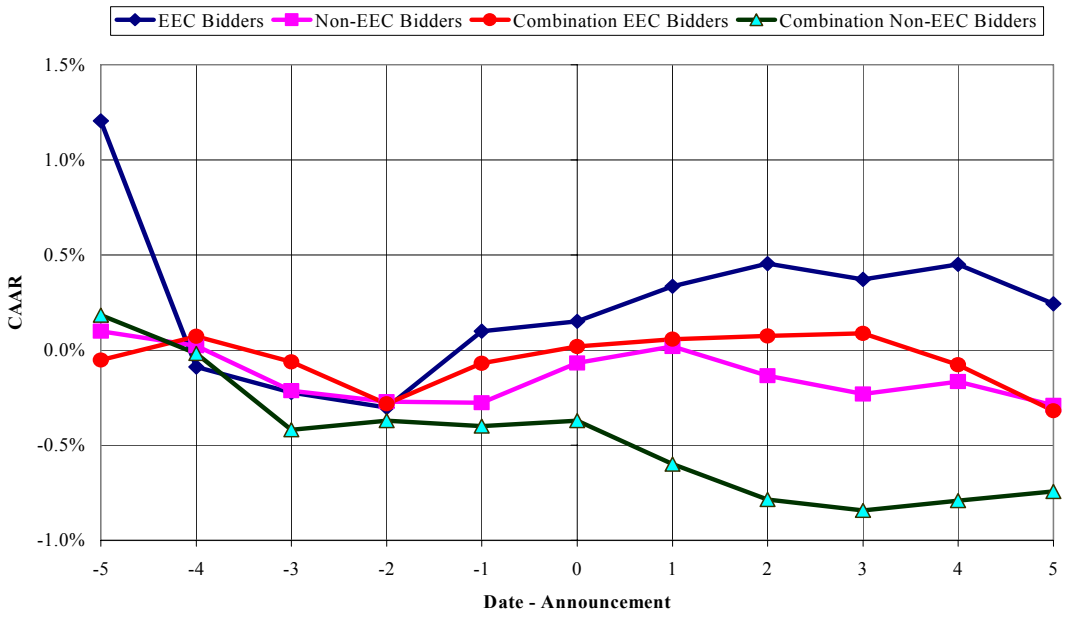
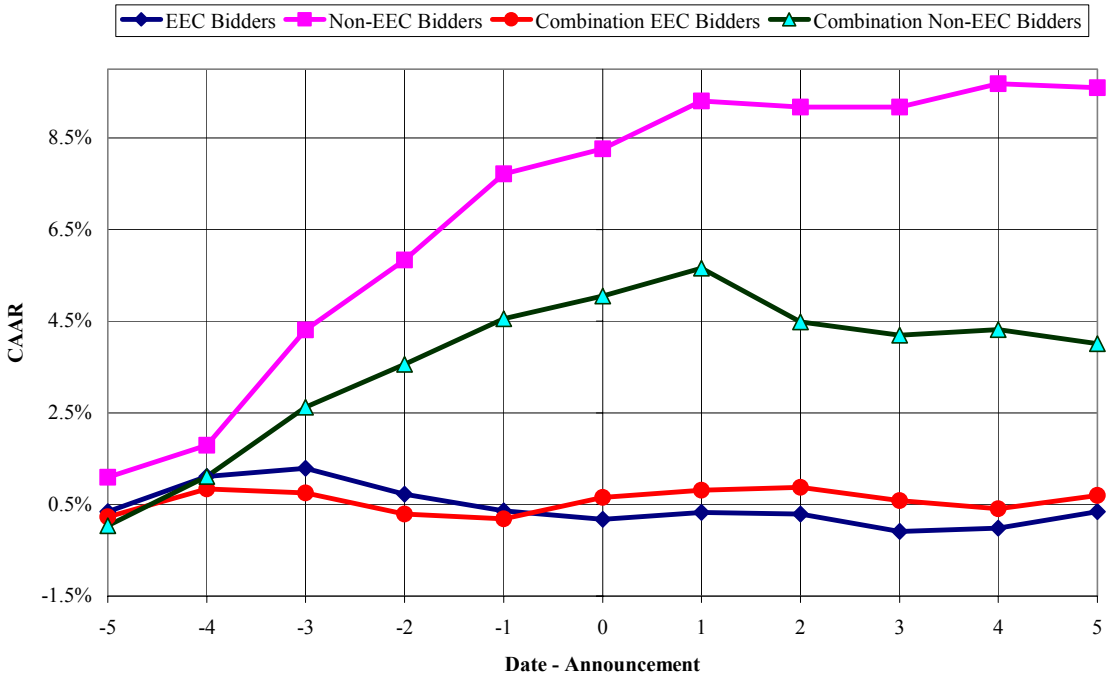


Figure 3, Continued

Panel C. Announcement of Authorization with Conditions after Phase I



Panel D. Announcement of Phase II Investigation

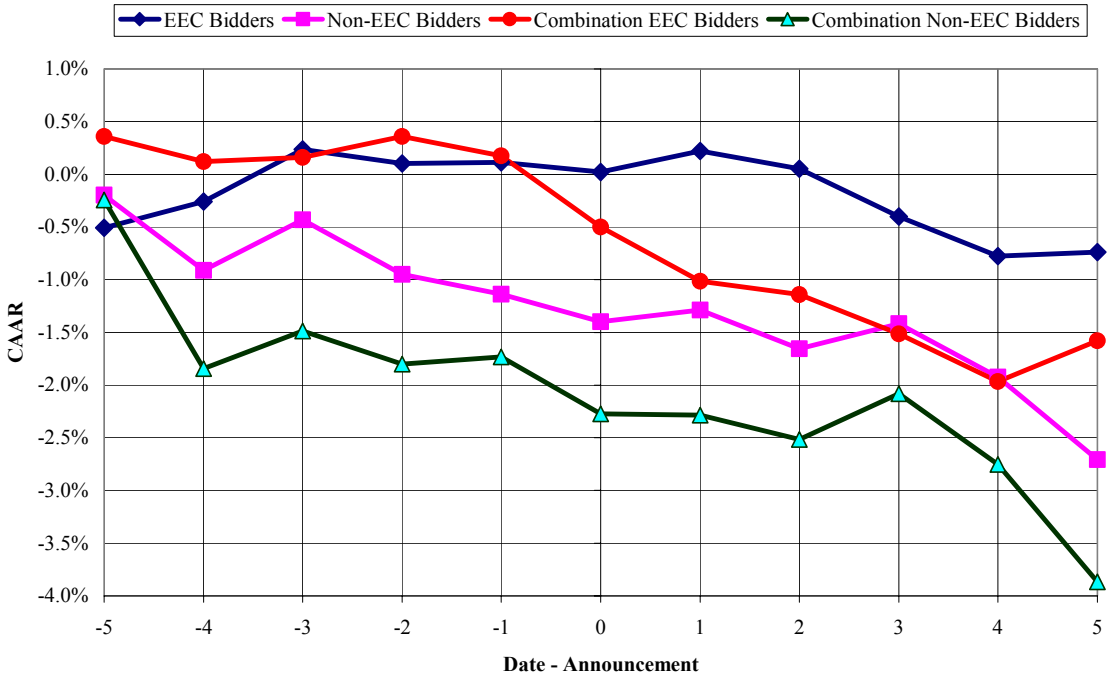


Figure 3, (Continued)

Panel E. Announcement of Decision after Phase II

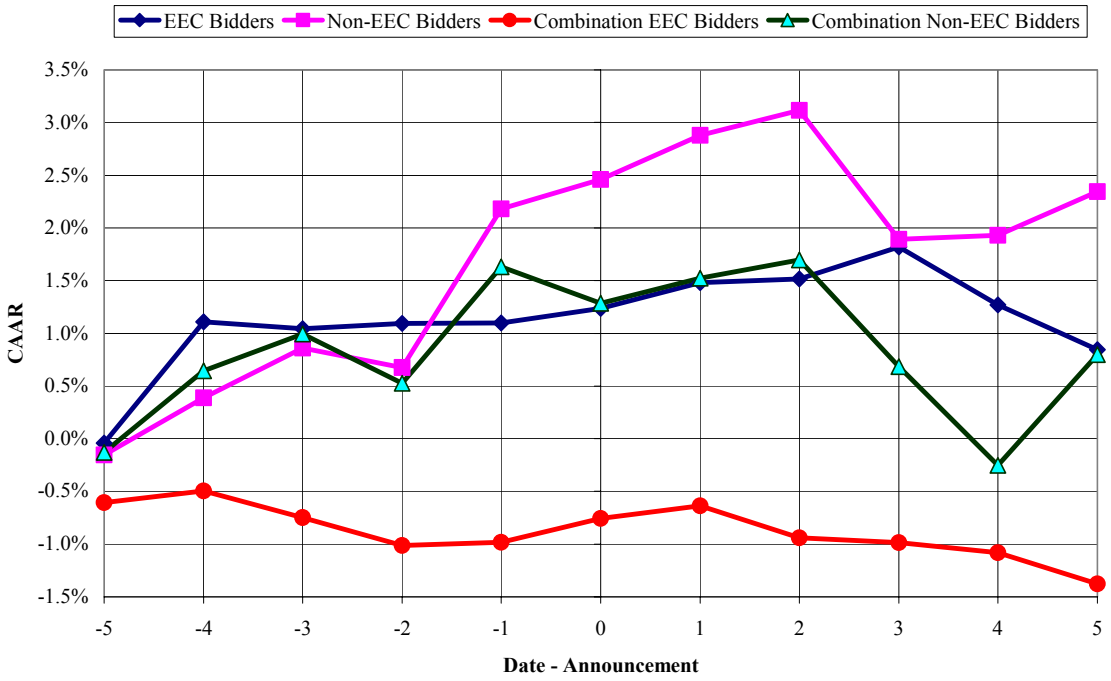
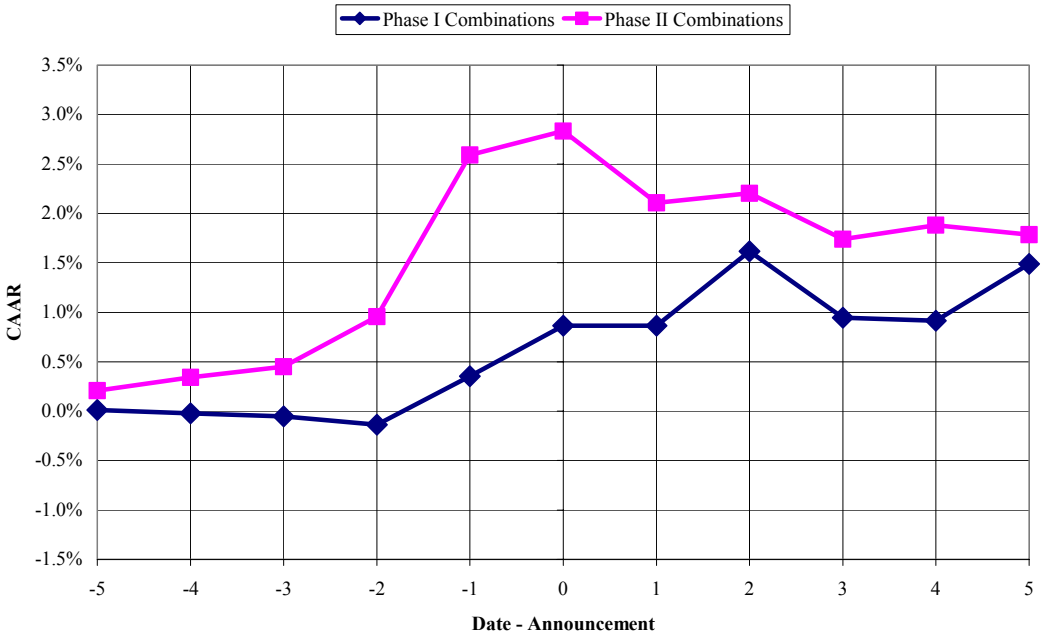


Figure 4

This figure relates the initial deal announcement to later regulatory events. Panel A shows the initial announcement CAARs for business combinations ending after Phase I and proceeding through Phase II. Panel B shows initial announcement CAARs classified by regulatory decision ; i.e., outright authorization, authorization subject to conditions, or prohibition, (after either Phase I or Phase II.) Associated *p*-values are presented in table 8. CAARs are estimated using the market model with local indexes and all returns converted into US dollars.

Panel A. Initial Announcement of Deals Ending in Phase I and Phase II



Panel B. Initial Deal Announcements Classified by Regulatory Decision