

Horizontal, downstream and upstream effects of merger & acquisition operations in the car industry

by

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Abstract

Since several years, an important stream of mergers and acquisitions has been observed in the automobile sector. This sector remodelling is due to the fact that constructors have to produce vehicles that are better equipped, less expensive (due to economies of scale and synergistic effects) and respecting numerous norms. These mergers lead to a higher concentration of the market. Eckbo (1983), Stillman (1983), and Eckbo and Wier (1985) have treated the problem of the competitors reaction within the framework of the Antitrust Policy in the U.S. But we would like to go a step further and, based on Mulin *et al.* (1995) who studied the customers' reaction, we are going to assess the effects of horizontal mergers (i.e. between constructors) firstly on the horizontal rivals, and then on the suppliers and customers, taking thus also into account upstream and downstream effects. As the results of the previous empirical studies lead to the rejection of the Market Power Hypothesis (no evidence of value reduction for the competitors of the merging firm, Eckbo (1983)), it seems that there is no reason to limit this kind of operations unless other partners would suffer from these actions. Therefore we plan to study downstream and upstream effects, which would be highlighted by the potential existence of abnormal returns for these actors during the period following the operation.

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I. Introduction

Since several years, an important stream of mergers and acquisitions has been observed in the automobile sector. Some well-known examples are Ford Motor / Mazda Motor (1996), Daimler-Benz / Chrysler (1998), Renault SA / Nissan Motor (1999), Volvo AB / Mitsubishi Motor (1999) or Daimler Chrysler / Hyundai Motor (2000). This sector remodelling is due to the fact that constructors have to produce vehicles that are better equipped, less expensive (due to economies of scale and synergistic effects) and respecting numerous norms. These mergers lead to a higher concentration of the market. The thrust of the literature on mergers' effects has concentrated on short-term effects for the bidders and the targets (for a review, see the article by Jensen and Ruback (1983), Brown and Warner (1980, 1985), Mac Kinlay (1997)). In this paper, we will however take another point of view. Our goal is indeed to assess the effects of horizontal mergers (i.e. between constructors) firstly on the horizontal rivals, and then on the suppliers and customers, taking thus also into account upstream and downstream effects. Eckbo (1983), Stillman (1983), and Eckbo and Wier (1985) have treated the problem of the competitors reaction within the framework of the Antitrust Policy in the U.S. Mullin *et al.* (1995) have extended this problem to the customers reaction in the case of the U.S. Steel dissolution suit (1911-1920). The main concern that lies behind these studies is to know whether we have to regulate the m&a acquisition market. The results of the previous empirical studies lead to the rejection of the Market Power Hypothesis. Eckbo (1983) concluded by stating "no evidence that proposed horizontal mergers are expected to reduce the value of the competitors of the merging firm." So it seems that there is no reason to limit this kind of operations unless other partners would suffer from these actions. Therefore we plan to study downstream and upstream effects. The present investigation will thus try to asses the impact of m&a operations on the returns of different partners operating at the same as well as at different levels. This impact will be highlighted by the potential existence of abnormal returns for these actors during the period following the operation.

Our paper will be organized into five sections. Firstly, we will outline the relevant literature, then we will provide a brief description of the automobile sector and its main actors. Secondly targeting suppliers and customers, a few key hypotheses will be proposed. Afterwards we will present the data, their source and explain the event-study selected methodology. Finally we will focus on the main results.

II. Background

II. 1. Literature review

The first studies related to mergers and acquisitions in finance concentrated on short-term effects of these operations for the merging firms (Fama *et al.*, 1969; Brown & Warner, 1980, 1985; MacKinlay, 1997). Their main conclusions were that the shareholders of both firms realize on average a creation of value, essentially collected by the shareholders of the target firm (Jensen and Ruback, 1983). A recent contribution by Aktas *et al.* (2003) studies the effects of the merger on business combinations. Using a sample of 443 business combinations these authors show that the wealth creation is positive and statistically significant.

After this first stream of investigation, researchers extended their studies to firms other than targets and bidders, for example stressing the effects on the horizontal rivals (e.g., Eckbo, 1983; Stillman, 1983; Eckbo and Wier, 1985). In general, these studies took place within the framework of the Antitrust Policy in the US and, despite some differences, the key question remains the same: does it exist abnormal performance for the horizontal rivals in response to two public announcements? And if so, why ? The first announcement is the merger proposal announcement whereas the second is a complaint against the merger filled by the Federal Trade Commission or the Antitrust Division of the Justice Department. The paper by Eckbo and Wier (1985) is about the guts of this problem. They develop two sets of hypotheses, the Market Power Hypotheses and the Economic Efficiency Hypotheses, and their implications for the behaviour of the stock prices of bidders, targets and competitors.

Table I

Abnormal returns to the merging firms and their rivals as predicted under the Market Power and Economic Efficiency Hypotheses.		
A. Probability-increasing events : merger proposal or prodefendant decision		
Theory Predicting the Source of the Merger Gains	Abnormal returns to merging firms	Abnormal returns to rival firms
Market Power :		
- Collusion, Cournot Model	- positive (monopoly rents)	- positive (monopoly rents)
- Predatory pricing model	- positive (monopoly rents)	- negative (cost of price war)
Economic efficiency:		
- productivity increases (synergy)	- positive (cost savings)	- negative (competitive disadvantage)
- information	- positive (undervalued resources)	- zero or positive (undervalued resources, and/or possible productivity increases)
B. Probability-decreasing events : Antitrust complaint or progovernment decision		
Market Power :		
- Collusion, Cournot Model	- negative (loss of monopoly rents)	- Negative (loss of monopoly rents)
- Predatory pricing model	- negative (loss of monopoly rents)	- Positive (avoiding price war)
Economic efficiency:		
- productivity increases (synergy)	- Negative (loss of cost savings)	- Positive (avoiding competitive disadvantage)
- information	- Zero	- Zero

Source : Eckbo and Wier (1985)

As clearly pointed out in Table I, on one hand the events increasing the probability that a merger will occur or, once completed, will survive (merger proposal or prodefendant decisions), will be associated with positive abnormal returns for merging firms. On the other hand, probability-decreasing events (complaints and progovernment decisions) will have a negative impact on merger partners' stock prices. The merger-related price effects on rival firms will depend on the competitive effect of the merger and can therefore be used to discriminate among alternative sets of hypotheses : Market Power Hypotheses (MPH) and Efficiency Hypotheses (EH). According to Eckbo and Wier (1985), within MPH, we can distinguish two sub-hypotheses:

- The *collusion hypothesis*: the challenged mergers would have promoted tacit or explicit cooperation among the members of the merger partners' industries and so the rival's share price would rise.
- The *predatory pricing model*: the mergers could help the new, larger firm to engage in predatory conduct and so the rival's stock prices will fall as survival of merger becomes more likely.

The EH is more complex. Two different effects can be distinguished:

- The *productivity effect*: the two merged firms can implement a scale-increasing technological innovation that decreases their average cost and reduces the rival's market value.
- The *information effect*: the rivals will use the same technology as the merged firms, so they will reduce their cost and their share price could increase.

To test these hypotheses, Eckbo and Wier (1985) selected a sample of 82 horizontal mergers challenged under Section 7 of the Clayton act¹ between January 1963 and December 1981. They found that the rivals (of their sample), on average, earn significantly positive abnormal returns relative to the merger proposal announcement. They did not show any evidence of significant abnormal performance by the rivals after the occurrence of a probability-decreasing event. They concluded that these results are inconsistent with the collusion hypothesis but can be consistent with the information hypothesis: "An efficient merger can convey new information that benefits other firms in the same industry as the merging firms."

Solvin et al. (1991) focus their attention on the airline sector regulated by the Civil Aeronautics Board (CAB). Examining rivals' returns around 42 horizontal airline acquisition bids from 1956 to 1988, they find that CAB activity limited competition and favour collusion among existing carriers. Eckbo (1992) examines the deterrence hypothesis, i.e. does the rigid market share and concentration criteria of the U.S. antitrust policy effectively deter a significant number of potentially collusive mergers? His sample consists of 471 US and Canadian domestic mergers and the results do not support the deterrence hypothesis. Bittlingmayer (1992) finds that

¹ "With the Celler-Kefauver amendment in 1950, Section 7 of the Clayton Act of 1914 replaced Section 2 of the Sherman Act of 1890 as the principal federal antitrust law regulation corporate mergers and acquisitions. A potential threat to competition constitutes an offense under this law, and is not necessary to prove a horizontal relationship between the combining firms. Furthermore, anticipated or demonstrated economic efficiencies are not a defense against the illegality of a merger that may lessen competition. Prior to the Celler-Kefauver amendment, Section 7 applied to the transfer of corporate stock only and was applied exclusively to horizontal mergers" (Eckbo And Wier, 1985, p.119)

antitrust regulation has a significant impact on stock market prices, both in the long term and upon the announcement of regulatory interventions. Song and Walking (2002) suggest an alternative explanation to market power (The Acquisition Probability Hypothesis, APH) for the positive reactions of rivals' stock prices on a merger announcement date. They hypothesize that rival's stock prices react positively because the deal signals an increased probability that they will become targets too. This last hypothesis turns upside down what precedes to the extent that the discrimination between the MPH (collusion) and the APH is no more possible. So the interest of our research is that – by taking into account suppliers and customers reactions – it would make easier this discrimination.

Considering Porter's five forces schema, all these studies are about firms that are operating at the same level: the merging firms and their horizontal rivals. Oberg and Anderson (2002) explain that in the literature on mergers and acquisitions, the effects for the involved companies' trading partners are left out. It mainly focuses on the acquirer and the acquired company overlooking the fact that the merging companies' customer and supplier relationships influence the outcome of a merger/ an acquisition. So a key question is to study the merger's effects at vertical levels, downstream and upstream. According to Lommerud, Straume and Sogard (2002), it is often claimed that mergers affect not only output prices, but also input prices. They develop a theoretical model dealing with how a merger affects the rivalry between firms and the profitability of such a merger under Cournot competition with differentiated products. They study the case of plant specific suppliers (i.e. suppliers delivering their input to only one plant). In that case, if two firms merge, that does not change the number of input suppliers, but changes the rivalry between them. The two merged firms' suppliers will compete more fiercely on input prices to serve the merged firm, and thus the merger is profitable. These authors also show that in the case of firm specific suppliers, the results are reversed: the merger results in higher input prices. Finally, let us stress the interesting paper of Mullin *et al.*(1995) that applies and extends the event-study methodology of Eckbo (1983) and Stillman (1983) to investigate the competitive effects of the U.S. Steel consolidation. Specifically, they examine the stock market reactions of the U.S. Steel, major steel industry rivals and downstream customers (the railroads) to the unsuccessful dissolution suit initiated in 1911 and decided in 1920. They show that the reactions of downstream suppliers are

observable: for example, “the filling of the dissolution suit generates a pattern that also supports the conclusion that U.S. Steel’s dissolution would have lowered steel prices.[...] The railroads experience a statistically significant positive excess return of 1.26%.” They conclude that the methodology of Eckbo (1983) and Stillman (1983) is “strengthened when one examines the stock market reactions of downstream firms in addition to the reaction of product market rivals”.

II. 2. Hypotheses emerging from the literature

Working within the framework of this literature, we will study horizontal mergers in the automobile sector. We will first study horizontal mergers among the constructors and look for the effects for their horizontal rivals, i.e. the other constructors. We will compare our results with the findings of Eckbo and Wier (1985). Then, we will study what are the effects of a merger between constructors on their suppliers (“upstream perspective”), pinpointing if our results are consistent with the theory developed by Lommerud, Straume and Sogard (2002). Finally, going a step further, we will try to assess the effects of these mergers on the customers (“downstream perspective”)

What are the expected results under the different hypotheses developed in the literature (see Table I for the hypotheses of Eckbo and Wier (1985))? In order to take into account our 3 levels of analysis (horizontal, downstream and upstream) we propose the table hereunder which gives an outline of the hypotheses to be tested. Our contribution is particularly illustrated in the last two columns.

Table II

Abnormal Returns to the merging firms, their rivals, their suppliers and their customers

Theory predicting the source of the merger gains.	Abnormal Returns to merging firms	AR to the rival firms	AR to the customers	AR to the suppliers
MPH: Collusion	Positive	Positive	Negative	(Zero or) Negative
MPH: Predatory pricing	Positive	Negative	(Zero or) Positive	Zero or Negative
MPH: Market pressure	Positive	Negative	Negative	Negative
APH	Positive	Positive	Zero	Zero

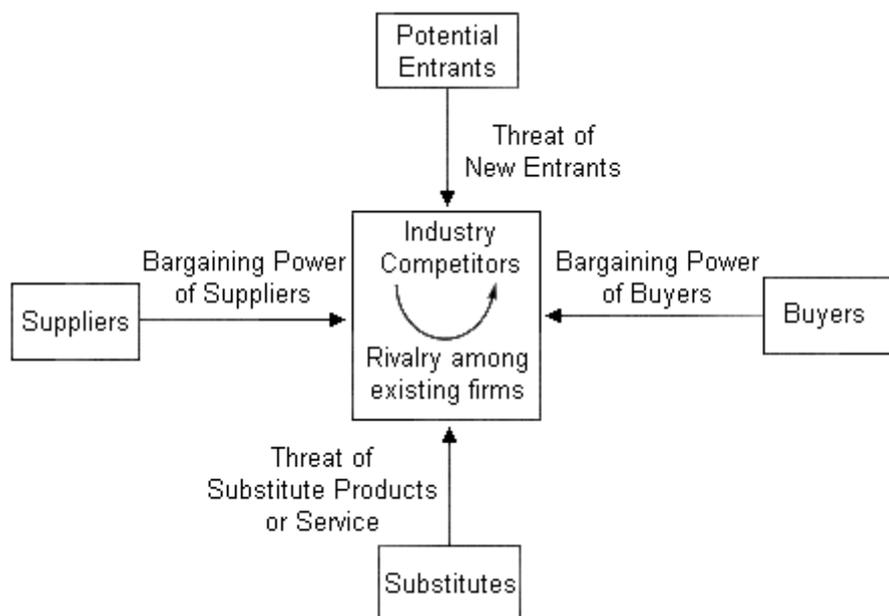
Table II shows the results to be expected according to the different hypotheses. The main point of this table is that now we can differentiate between each hypothesis (we can discriminate the Collusion hypothesis and the APH). For us the key hypothesis is the Market Power Hypothesis. In the *collusion* version, the merger would promote tacit or explicit cooperation among the members of the merger’s industry. So the abnormal returns should be positive for the merging firms and its rivals. These gains would occur to the detriment of the customers and the suppliers who should expect negative abnormal returns because of their weakened position. In the *predatory pricing* version, the new larger firm will engage in a price war. So this would have a negative impact on the rivals if they are not able to implement the same strategy. The suppliers would have to face a powerful customer (the new larger firm) who will negotiate lower input prices. So if the supplier is strong enough, the merger firm will have no impact on it, otherwise, the impact will be negative. On the contrary, the customers could expect a positive impact from this situation because they could benefit from this price war. We propose a third hypothesis consistent with the MPH, the “market pressure hypothesis”. According to this hypothesis, the mergers could lead the new larger firm to engage in “abuse of dominant position”. This consists in anti-competitive business practices used by a dominant firm in order to maintain or increase its position on the market. This includes improper exploitation of

customers and suppliers, and exclusion of the competitors. This will result in negative abnormal returns for all these actors. Finally, let us mention the Acquisition Probability Hypothesis (APH) developed by Song and Walking (2002) who explain that rival's stock prices react positively because the deal signals an increased probability that they too will become targets. We assume that such a situation would have no significant impact on suppliers and customers. This table offers thus a suggestive point of departure to organize the presentation of our results.

II. 3. Overview of the automobile sector

In this section, we will briefly describe the automobile sector and its components. The automobile sector seems particularly suited to our research's objectives. Indeed, the main actors in this sector are relatively important (the constructors) and the movements (the mergers between these constructors) within the sector can be identified. Moreover, the suppliers and the customers are important actors and their global identification via their SIC code seems relatively straightforward. So, in this paper, we will focus on the industry competitors, suppliers, and customers. This can be easily related to Porter's five forces model

Figure I : Porter's five forces model



Source : <http://www.brs-inc.com/porter.html>, adaptation of Porter (1980)

The terminology used in the automobile sector to refer to these three actors is the constructors, the equipment suppliers and the distributors or even the consumers. The main actors of our model are the constructors. As underlined in the introduction, a lot of mergers among the constructors has recently been recorded in this sector. A striking example of this trend is the growth of the Volkswagen group which holds Audi, Bentley, Bugatti, Lamborghini, Seat, Skoda and Volkswagen. In general, the main reason of mergers is that the constructors try to make costs savings. Indeed by the merger operations, they are able to benefit from economies of scale. An interesting example is the case of the platforms. If we look at the production activity of Volkswagen, we can realize that different models go through the same platform : The Audi A3, the Beattle, the Golf and the Skoda Fabia have the same chassis. This is one example of the strategies implemented by constructors in order to reach lower production costs. Moreover as consumers are increasingly looking for better equipped cars, considerable investments are requested in already expensive Research and Development programs. Norms to be respected in order to protect the Environment do also not lead to decreases in the production costs. Finally, we can stress that the intensity of rivalry among existing competitors is high. Based on structural factors developed by Porter (1980), we can add that exit barriers are high, industry concentration is not so high (even if the industry is more and more concentrated due to the mergers), there is a lack of differentiation among constructors (many constructors propose similar cars), and finally industry growth is rather slow.

Concerning the equipment suppliers, the situation is a little bit different. In fact based on a conversation with an expert of this sector (senior executive at the VAG group), the situation depends on the products delivered by the suppliers. For example, there are few suppliers who provide very complex products such as headlights with xenon, and so for these the rivalry is not so strong. But for tires or leather suppliers, for example, rivalry will be higher because there are a lot of suppliers delivering this kind of products. If we want to understand the relationship between suppliers and constructors, we have to know that, more and more often, the suppliers are bound to the constructors by long term contracts. Furthermore, the suppliers are involved earlier in the production process, i.e. the design of the models must be decided in agreement with the suppliers because they provide the most important components of the cars. So, if the designers imagine a model unrealizable from the point of view of the suppliers (for example, a too special dashboard), it will be a loss of money and of

time for everybody. It is the reason why suppliers intervene early in the production decisions.

Finally, the last actor is generally the distribution network. The cars are supplied to the consumers by the constructors through different ways:

- directly by agents or sub-companies;
- more often, indirectly by distributors;
- or by mix-systems (agents or sub-companies + distributors).

The profitability of cars distributors is relatively low. Since 1995, the constructors must authorize the distributors to sell other brands, generally in separated showrooms. Even if the “multi-brands” distributors are relatively frequent in the US, they are not the rule in Europe. More recently, in February 2002, the European Commission made public its project to open the cars’ distribution to a wilder competition. Immediately, Cardoen (a car seller) and Colruyt (a supermarket) announced their association in a selling operation with unusual discount. So, the cars’ distribution does not stop changing and it is not easy to predict today what it will be tomorrow.

III. Data

III.1. Data source and sample selection

Our sample is drawn from the SDC Platinum database. This database covers the merger and acquisition operations from 1985 until today. It also provides a lot of information about the operations such as the deal value, the announcement date, the deal attitude (friendly, neutral or hostile), the mode of payment, and information about bidders and targets. Our sample consists of operations between January 1, 1990 and December 31, 2000 and contains the 3 actors of Porter’s model: the suppliers, the constructors and the distributors. This represents a sample of 4,171 operations.

To get our final sample, specific selection criteria were used. First, at least one of the two firms must be listed on a European or North American or Japanese market. Second, the operation must entirely be related to the automobile sector: the automobile industry includes the production of particular and light commercial vehicles. Our criterion of selection being that both parties have to be clearly in the automobile sector, we have rejected operations involving sectors completely different from the automobile sector, such as the banks, the holding companies, the food sector.

Thirdly, the SDC database gives us the operation statute (pending, completed, intended...) and we have chosen to keep only the completed operations. Finally, we have recorded the deal value and selected the operations with a deal value greater than \$ 1 million. So after these filters, our sample consists of 595 operations.

Table III presents summary statistics about our sample operations. Entries in the last column give the total number of operations by considered SIC code. The column "Firm role" defines, using the SIC code, the role of the firms regarding the car industry.

Table III. Summary statistics about sample operations by SIC code

SIC	Sector name	Firm Role	Total
36	Electrical and electronic equipment	Supplier	6
3011	Tires and Inner Tubes	Supplier	18
3711	Motor Vehicles and Passenger Car Bodies	Car Industry	101
3714	Motor Vehicle Parts and Accessories	Supplier	241
5012	Automobiles and Other Motor Vehicles	Customer	49
5511	Motor Vehicle Dealers (New and Used)	Customer	180
Total			595

III. 2. Method used to form customers, suppliers and competitors portfolio per operations

The aim of our study is to assess the impact of m&a operations at the level of the car industry on the stock price of the actors of Porter's model (competitors, suppliers and customers). In this sub-section we describe the methodology used in order to identify the different actors. For each category, we have built one portfolio of firms per operation. The suppliers are listed companies drawn from the sample for which the SIC code is either 36, or 3011 or 3714. The customers are listed companies drawn from the sample for which the SIC code is 5012 or 5511. The competitors are listed companies drawn from the sample for which the SIC code is 3711. A last geographic filter was used : a specific firm is added into the corresponding portfolio if it is located within the same region as the one of the target of the operation. We have split our sample into 3 geographic areas: Europe, North America and, Japan and Asia. Each firm is weighted in the portfolio by its market value of the last day of the estimation window.

We count 101 operations among the constructors (see Table III) but only 66 operations can be studied. For the other 35 operations, the market data related to the firms are incomplete. The average number of competitors considered per operation is 64. The average number of customers and suppliers are respectively 24 and 117. So we can see that these portfolios seem to contain too many actors per operation. Therefore we conclude that portfolios' formation process is not optimal and that some improvements are possible. Finally, let us note that there are only 18 operations for which both the bidder and the target are listed.

We are thus aware of the limits of the formation of our suppliers' and customers' portfolios, and we will keep them in mind when analyzing the results.

IV. M&a operations within the car industry and associated horizontal and vertical effects

IV. 1. 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 use the simple market model, which is

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

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 index², α_j and β_j are, respectively, the estimated

² 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.

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 day zero. Hence, the regression sample period is -235 through day -36 relative to the announcement date.

Table IV presents regression summary statistics for the 88 different individual firms (bidders and targets) 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 is 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 26 %, somewhat higher than in the usual market model regression for an individual firm.

The cumulative average abnormal return (CAAR) is computed from the regression (1) residuals, 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

$$CAAR_T = \sum_{\tau=-5}^T \frac{1}{N} \sum_{j=1}^N \varepsilon_{j,t_j+\tau} \quad (2)$$

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 CAR³ 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 model⁴, the Boehmer et al. (1991) estimate the variance of the cumulative abnormal returns is

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

³ CAR refers to the cumulative abnormal return for a single stock as opposed to CAAR, the average CAR for the sample of stocks.

⁴ 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 $\text{Var}[c\varepsilon_T] = T\sigma^2 + X_T \left[\sigma^2 (X'X)^{-1} \right] X_T'$ where $c\varepsilon_T$ is the sum of forecast residuals between 0 and T, σ^2 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.

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

$$Var[CAR_T]^* = T\sigma^2 \left[1 + \frac{T}{U} + \frac{T \left[\frac{r_{m0}^T}{T} - \bar{r}_m \right]^2}{U Var(r_m)} \right] + 2(T-1)Cov[R_t, R_{t-1}] \quad (5)$$

where $Var[CAR_T]^*$ is the modified estimation of the CAR variance and $Cov[R_t, R_{t-1}]$ is the estimated first order autocovariance during the estimation window⁵. As in the standard Boehmer et al. (1991) method, $Var[CAR_T]^*$ is then used to standardize the observed CAR_T . Standardized CAR_T 's for the N stocks are then averaged cross-sectionally to obtain the $CAAR_T$, whose standard error will be $1/\sqrt{N}$ 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 standard errors of the standardized CAR_T .

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 original⁶. 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

⁵ 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).

⁶ Five hundred bootstrap samples is far above the number recommended by Efron et Tibshirani (1993).

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 method⁷.

V. Results

Table V displays the price reaction to the initial announcement of a business combination, i.e. the cumulative average abnormal returns (CAAR) for all firms in the sample. Before examining the results, let us mention the tests carried out in the study. For most of the actors, we report a one-tail test because the alternative hypotheses (see Table II) are clearly in one direction (the impact will be positive or the impact will be negative). But in the case of the customers, we must perform a two-tail test because the alternative hypothesis is just "different from zero".

As expected, we can see (see Figure 1, Panel A) that on average, the operations lead to the creation of value (1,27% and p-value = 0,14 after 5 days) and that the target captures most of this gain (3,63%; p-value = 0,12). The wealth creation for the bidder is of 0% after these 5 days.

Concerning the other actors of the operations (see Figure 1, Panel B), we can conclude that the competitors react to the merger announcement. They experience a loss of wealth of -1,04% (p-value = 0,14). This reaction is consistent with the "predatory pricing" and the "market pressure" hypotheses in which the rivals interpret the merger announcement as a bad signal for them. The impact on the suppliers and on the customers, even if negative, is smaller and less significant. The CAAR is

⁷ 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.

-0,19% for the suppliers with a p-value of 0,17 and -0,79% for the customers with a p-value of 0,25 at the end of the 5 days period, which, in both cases, is not significant.

Nevertheless let us acknowledge a limit concerning the method to form the portfolios. As mentioned, we have selected “global” portfolios of all suppliers and customers listed at the time of the operation, i.e. we have not taken into account the suppliers and the customers specifically related to the constructors involved in the operation. So the results obtained with this method could be diluted because they contain suppliers and customers who are not related to the constructors specifically involved in the operation and who will consequently not react to the operations. Concretely, it is possible that our results suffer from a bias towards accepting the null hypothesis of “No Effect”.

A significant improvement that could be brought to this study is to define more precisely the portfolios of suppliers and customers for each operation. But this task is not easy. For example, if we take one of the first operations of our sample (VW / Skoda (1990)) it is not obvious today to identify the suppliers of Skoda in 1990 because we can reasonably assume that the suppliers of Skoda today are essentially suppliers of VW. Another difficulty is to precisely assess the impact on the specific customers. In the automobile sector, there are different customers. On one hand, there are the distributors who often are affiliated with the car manufacturers or have exclusive rights with them. On the other hand, we have the consumers for which it is impossible to observe an impact.

So if we compare our results to the hypotheses of table II, it seems that they are consistent with the Predatory Pricing and the Market Pressure Hypotheses. Keeping in mind the comments made about the methodology used to form the portfolios of suppliers and customers, we must analyze these results cautiously. We intend to develop a more precise methodology, i.e. with specific identification of suppliers. This could improve the significance of some of our results strengthening what is only up to now a tendency (illustrated by border line results see Table V) of supporting the Market Pressure Hypothesis. The wealth creation of the merging firm would occur at the expense of the other actors of the sector. The new firm becomes so powerful that it exerts a pressure on the competitors, the suppliers and the customers.

VI. Conclusion

The aim of this paper, which is clearly achieved in a framework similar to the one of Mullin *et al.* (1995), was to test and extend the Market power Hypothesis of Eckbo and Wier (1985) and the Acquisition Probability Hypothesis of Song and Walking (2002). Working within the automobile sector and using an “event-study” methodology, we have underlined the impact of merger announcements at different levels and on different partners. At the horizontal level, the competitors seem to react negatively to a merger announcement. Extending our study, we focused on downstream and upstream effects of an announcement. Our first results are negative but not clearly statistically significant. Based on these results, the Predatory Pricing Hypothesis and the Market Pressure Hypothesis seem to be supported. But as already stressed, we must acknowledge that the formation of our portfolios needs to be improved in order to provide a more compelling and complete demonstration of the relevance of The Market Pressure Hypothesis.

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Table IV*Market Model Regression Summary Statistics and Specification Tests*

Panel A presents regression summary statistics for the 88 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 26%. 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 match well up to the spherical Gaussian specification

Panel A. Regression summary

	α ($\times 10^3$)	β	R^2
Mean	-0.549	0.883	0.258
Std. Dev.	1.759	0.774	0.195
Minimum	-5.407	-4.495	0.000
1st quartile	-1.313	0.655	0.085
Median	-0.443	0.881	0.240
3rd quartile	0.443	1.121	0.379
Maximum	3.326	3.179	0.761

Panel B. Hypothesis and Specification Tests

p-level	Hypothesis Rejected (%)			
	$\alpha=0$	$\beta=0$	JB	Q(1)
1%	1.13	86.36	72.73	22.73
5%	2.27	92.05	79.59	32.95
10%	7.95	92.05	84.09	37.50

Table V**Price Reaction to the Initial Merger Announcement**

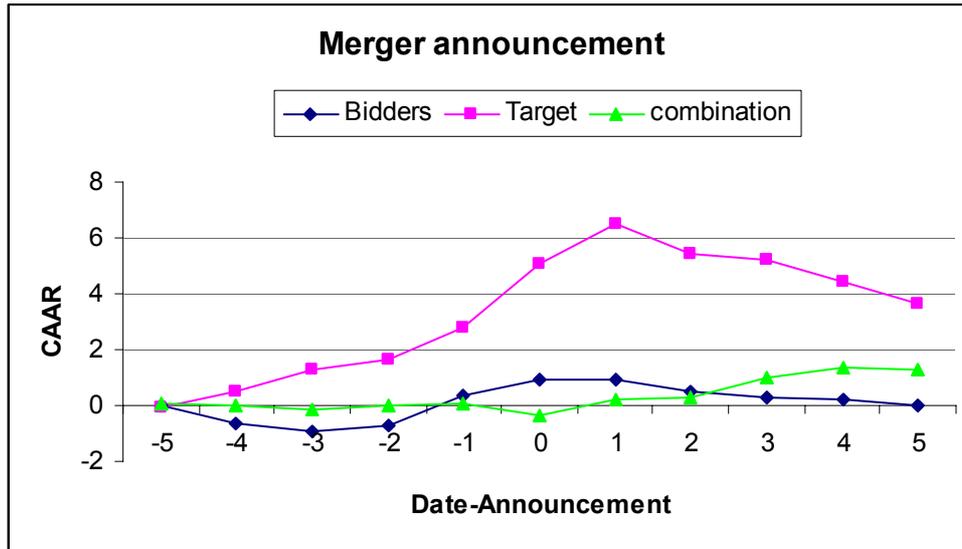
This table displays the CAARs around the initial announcement date (day 0) of proposed mergers for bidders, targets, combinations (bidders plus targets weighted by their respective market values on the last day of the estimation window prior to the announcement), competitors, suppliers and customers. Estimations are performed 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=64) 1-tail test											
CAAR (%)	0.03	-0.62	-0.92	-0.72	0.33	0.90	0.93	0.49	0.28	0.25	0.00
p-value	0.35	0.46	0.34	0.49	0.38	0.16	0.11	0.37	0.37	0.28	0.30
Targets (N=24) 1-tail test											
CAAR (%)	-0.05	0.49	1.28	1.66	2.78	5.07	6.53	5.42	5.19	4.41	3.63
p-value	0.44	0.44	0.36	0.17	0.12	0.03	0.01	0.07	0.07	0.09	0.12
Combinations (N=18) 1-tail test											
CAAR (%)	0.07	-0.02	-0.16	0.01	0.10	-0.34	0.25	0.27	0.99	1.35	1.27
p-value	0.36	0.49	0.43	0.30	0.28	0.49	0.33	0.31	0.22	0.11	0.14
Competitors (N=79) 2-tail test											
CAAR (%)	-0.03	-0.15	-0.33	-0.12	-0.28	-0.21	-0.16	-0.35	-0.86	-0.56	-1.04
p-value	0.36	0.36	0.43	0.89	0.54	0.61	0.56	0.33	0.17	0.23	0.14
Suppliers (N=78) 1-tail test											
CAAR (%)	-0.59	-0.67	-0.44	-0.41	-0.45	-0.38	-0.44	-0.31	-0.22	-0.20	-0.19
p-value	0.37	0.19	0.22	0.29	0.18	0.22	0.17	0.22	0.39	0.26	0.17
Customers (N=69) 1-tail test											
CAAR (%)	-0.29	-1.01	-0.56	-0.57	-0.32	-0.44	-0.52	-0.74	-0.85	-0.95	-0.79
p-value	0.17	0.02	0.22	0.22	0.40	0.31	0.24	0.19	0.17	0.18	0.25

Figure 1

Panel A illustrates the CAAR around the initial announcement date for the bidders, the targets and for the operations. Panel B shows the CAAR for the competitors, the suppliers and customers. CAAR are estimates using the market model with local indexes and all returns converted into US dollars.

Panel A



Panel B

