# Tjalling C. Koopmans Research Institute

**How to reach the authors**

*Please direct all correspondence to the first author.*

Petar Angelov
Stephanie Rosenkranz
Hans Schenk
Utrecht University
Utrecht School of Economics
Kriekenpitplein 21-22
3584 TC Utrecht
The Netherlands.
Tel: +31 (0)30 253 87 41
Fax: +31 (0)30 253 73 73
E-mail:  P.Angelov@uu.nl

# Competitive Effects of Merger Remedies in Europe's High-Tech Industry

Petar Angelov
Stephanie Rosenkranz
Hans Schenk

Utrecht School of Economics
Utrecht University

**Abstract**

Using an event study methodology, this paper assesses the competitive effects of remedies implemented by the European Commission in 11 horizontal mergers in the ICT industry between 1990 and 2010. The estimates of merger announcement effects for both merging parties and competitors have predominantly insignificant residuals, suggesting that collusion and anti-competitive effects are *not* implied by the market reactions to merger announcements. Remedies, both behavioural and structural, appear to be largely ineffective in negating the competition concerns of the Commission, even if properly applied to anti-competitive mergers. Moreover, behavioural remedies appear to transfer rents from merging parties to competitors. These findings suggest that static economic models are ineffective in analysing dynamic markets, possibly as a result of inadequate market definitions.

**Keywords**: Merger remedies; competition policy; industrial competitiveness; ICT; M&A; event study

**JEL classification**: G34, L41, L43

## 1. Introduction

The objective of this paper is to assess the competitive effects of remedies that have been implemented by the European Commission (EC) in horizontal mergers in the Information and Communication Technologies (ICT) industry. Remedies are measures meant to diminish the negative effects a proposed merger may have on competition conditions so that a merger is allowed to pass while it may have been blocked without such measures. Such remedies may be structural or behavioural. A structural remedy aims to restore—to a certain extent—the pre-merger market structure, e.g. by spinning off parts of the merging firms soon after the merger is consumed. A behavioural remedy aims to control the effect of any change in market structure, e.g. by regulating access to intellectual property (Davies & Lyons, 2007). The European Commission's Directorate-General for Competition (further to be referred to as DG COMP), following Baer (1999), put merger remedies in four broad categories: commitment to transfer a market position (the full spectrum between full divestment and exclusive license); commitment to exit a joint venture; commitment to grant access (whether to technology, infrastructure, or termination of exclusive agreements); and other commitments.[1] Remedies may be proposed ex ante by the merging parties, in which case they may fulfil a strategic role in the negotiation processes that develop in certain merger cases (Joskow, 2002).

Various authors have questioned the effectiveness of the EC's merger control. For example, Aktas et al. (2004, 2007) and Duso et al. (2006, 2007) suggest that EC regulatory activities may have limited or reduced rather than sustained or increased competition, for reasons which we shall explore later. Since remedies are one of the most powerful tools of merger control, and are applied ex ante with uncertain ex post effects, studying the competitive effects of such remedies in more detail would be helpful to learn more about the effectiveness of the Commission's merger control approach.

The ICT industry is a particularly interesting one for conducting such a study. It is among the most innovative and dynamic, and consequently susceptible to profound changes in competition. Moreover, the ICT industry is vital for economic growth and technological progress. It has been estimated that via spill-over effects, up to 20 per cent of all economic growth is attributable to the ICT sector (Fransman, 2009). Because of its high innovation

---

[1] "Other" remedies included severing the influence of the merging parties in a competitor, separating two collectively dominant competitors, and withdrawing a brand from a particular market (DG COMP, 2005).

incidence, competitive processes in the industry tend to revolve around R&D and innovation rather than around capacity, output, or price, which are more typical of mature industries (Fransman, 2009). The market structure of the ICT sector can be classified as continuously evolving in a dynamic environment. One the one hand, demand-driven technological trends lower the switching costs to consumers, increasing the level of substitutability between interchangeable services and thus making price discrimination by data-transfer related companies less sustainable. Together with technological convergence, they enhance the possibilities for growing competition between different kinds of network providers, as they increasingly can substitute for one another (Mueller, 1999; EC, 1997). On the other hand, the positive feedback from network effects could result in a single network dominating the market, giving advantage to a first mover in a network market, but nevertheless resulting in suboptimal economic solutions.[2] All these have direct implications on the definition of relevant markets as boundaries become ever more blurred. The literature on the competitive effects of regulatory decisions by the EC in the ICT sector, however, is scarce.

We track the effect of merger specific events on the stock returns of merging firms and rivals using an event study methodology, thus assuming that competitive effects can be judged by the significance and direction of abnormal returns. Two main hypotheses underlie this approach: significant positive abnormal returns to rivals indicate an anti-competitive merger; while significant negative abnormal returns to rivals indicate an efficiency enhancing pro-competitive concentration. The quantitative estimations are supported by qualitative analysis, extracted from EC decision reports on the merger under investigation.

This paper contributes to the literature on the effectiveness of merger remedies by making use of a unique dataset of horizontal merger cases in the ICT industry, spanning from 1990 to 2010. Second, unlike previous works, the results are analysed not only on an aggregate level but also on a case-by-case basis, allowing for a more detailed analysis. Moreover, focusing on ICT allows for the incorporation of industry idiosyncrasies. Finally, this study incorporates quantitative as well as qualitative data, which facilitates a thorough competition policy assessment.

---

[2] See the speech Competition and Information Technologies given by the Competition Commissioner M. Monti on 18 September 2000: 'Competition rules are all the more necessary in the area of the Internet. […] The rapid growth of Internet may unduly reward first movers onto these markets, closing down subsequent competition, and it is this that we should be concerned about'.

The paper is set up as follows. In Section 2, we briefly rehearse the potential effects of mergers. This is followed by a discussion of the existing evidence on market reactions to the European Commission's merger decisions. Following that, are the research design and the underlying methodological considerations, and a derivation of empirically testable hypotheses. Section 7 presents the data used for the empirical analysis in Section 8. The paper concludes with a discussion of the results, the implications of the findings and suggests directions for further research.

## 2. Potential effects of oligopolistic mergers

We will be adopting the standard oligopoly approach that was introduced by Fudenberg and Tirole (1984) and Farrel and Shapiro (1990), which neatly fits the framework used to construct the ECMR[3]. Farrel and Shapiro (1990) constructed an oligopolistic model in a homogeneous Cournot setting, where a subset of firms in the market merges and jointly maximizes profits. The authors proved that the optimal strategy for the merging firms in such a setting is to reduce the level of production. Rivals in the market find it profitable to subsequently raise production, however by less than the quantity reduction of the merging firms. As a result, aggregate production in the post-merger market decreases. To internalize the negative externality from the lower post-merger quantity produced, conditional on the efficiency gains from the merger, the merging companies have an incentive to raise their prices, the so called "unilateral" effect in the jargon of the European Community Merger Regulation (ECMR) guidelines. Due to the decreased number of market participants post-merger, the likelihood of collusive behaviour increases and the competitive pressure decreases. These conditions give incentives to rivals to increase their prices as well, the so-called "coordinated" effect. In this setting, the post-merger consumer surplus unambiguously decreases. Deneckere and Davidson (1985) show that a similar pattern of events emerges in a Bertrand price setting with differentiated goods.

Thus, a horizontal merger under certain conditions may generate price increases and quantity reductions for merging and rival firms due to market power and reduced competition effects.

However, horizontal mergers are sometimes also motivated by, and result in merger-specific

---

[3] For a discussion on the economic models and assumptions used by the DG COMP, see Motta, M. & Vasconcelos, H. (2005).

efficiencies. In a model constructed by Fudenberg and Tirole (1984), due to the lower marginal costs of production and economies of scale post-merger, the merging firms achieve a competitive advantage and hence have an incentive to capitalize on it by lowering prices and increasing production, hence improving their profitability. If such efficiencies are realized, the overall product market competition intensifies and due to the lower prices and increased level of supply, rivals are expected to generate lower profits post-merger. Hence, the authors conclude that with increasing efficiencies for the merging firms, the market prices and competitor's profits decrease, resulting in a positive effect on consumer surplus.

Despite the fact that the propositions which we derive below from these standard oligopolistic models hold in general, there are some theoretically complicating factors that might affect our analysis and that should be mentioned. These models are static, and as such hardly apply to endogenous mergers in a dynamic environment where the sequence of the mergers and the corresponding policy responses condition whether they hold (Nocke & Whinston, 2008). It might also be the case that due to the existence of antitrust policy, anti-competitive mergers are deterred and thus are not included in our sample.[4] Diversification of rivals' revenues might also make the market reaction on a certain merger insignificant (McAfee & Williams, 1988). Moreover, it might be the case that the merging firms are motivated by uneconomic reasons.[5] We propose several methods to deal with some of these complications.[6] Others remain beyond the scope of this paper.

### 3. Event study methodology

Recall that we try to assess the competitive effects of merger remedies in the ICT sector from the market reactions on certain events of interest. In order to do so, certain assumptions have to be made regarding the rationality of investors, efficiency of financial markets, and the probability to capture an unbiased and significant effect of a certain event on the return of companies' stock. The following paragraphs justify the use of returns on stock prices and suggest that this is a reliable competitive assessment approach.

---

[4] See Sorgard (2009), who claims that an optimal merger policy entails deterrence, i.e. the effect a decision has on firms' future merger behaviour.
[5] See Schenk (2005) for a comprehensive summary of the motives behind uneconomic mergers and a theory that formally explains "the merger paradox".
[6] See robustness of results, section 6.1.

The theory of financial markets is the backbone of the methodology applied in this paper. The Efficient Market Hypothesis (EMH) is attributed to the works of Fama (1965) and Fama et al. (1969), basically postulating that the price of a stock reflects the discounted present value of all expected future cash flows. This requires the assumption that investors are rational utility maximizers who constantly update their stock trading strategies upon arrival of news. Indeed, Schwert (1996) and the authors of several other studies[7] find strong evidence that stock prices of merging companies are unbiased estimates of the direction of the change in profits. Duso et al. (2006) find the same pattern for rivals. One can thus conclude that there is enough evidence to assume relative accuracy of the market in predicting actual outcomes of mergers, at least regarding the direction of change.

Following these postulates, investors are assumed to react to competition policy decisions of the EC that affect the future profitability of firms. Significant effects of EC decisions should be detected only if a substantial portion of the market reacts to those decisions. In turn, this can be the case only if the Commission bases its policies on rational grounds. The literature on the topic concludes that the EC verdicts in merger cases indeed follow sound economic reasoning and are independent of political influence (Lindsay, 2003; Bergman et al., 2005).

The assumptions on the functioning of the financial markets made above call for a method that can detect stock price fluctuations on a specific date in time. An approach with long history in the finance field, the event study methodology has the advantage of providing an independent method to isolate the effect of an event of interest on the stock prices and thus is useful to judge the competitive effect of mergers and subsequent decisions by the significance of the 'abnormal' stock price effect associated with the unanticipated event.[8] The model variations most commonly used today have been developed by Ball and Brown (1968), Fama et al. (1969), and Brown and Warner (1985).[9] It has been at the same time subject to criticisms[10] and it is true that it relies on certain rather strong simplifying assumptions. In response to the criticisms, techniques employed here attempt to overcome some of those shortcomings.

---

[7] See Ravenscraft and Pascoe (1989), Healy et al. (1992), Kaplan and Weisbach (1992), and Sirower and O' Byrne (1998).
[8] As reported by Kothari and Warner (2007), by the end of 2006, there were more than 500 published papers utilizing the event study methodology in different areas of economics.
[9] See McKinlay (1997) for a thorough overview of the methodology and appropriateness of use of event studies.
[10] See McAfee (1988) and Fridolfsson and Stennek (2010).

Assuming that the market has built an understanding of the functioning of the DG COMP in merger cases, and provided the detailed knowledge of investors on the markets under consideration, it is possible that the market can react to an event prior to the official announcement of that event or decision.[11] This in turn would reflect on the significance of the stock price movement at the day of announcement, making it likely less significant. Thus, in order to secure the robustness of the estimates, we incorporate this market anticipation effect into the research design and use extended event windows to control for it.

## 4. Literature review

In a pioneering study in the field of competitive effects of merger remedies, Elzinga (1969) applies an evaluation method and discovers that the remedies assigned in anti-merger cases in the U.S., following the Celler-Kefauver amendment of the Clayton Act, cannot be branded anything but a failure. In a closely related study, but slightly improving on Elzinga's (1969) method, Rogowsky (1986) investigates the welfare gains offered by merger remedies in a sample of 104 cases brought by the Federal Trade Commission (FTC) or the Justice Department (DoJ) since 1968 in which a remedy had been accomplished by 1981. Around 60% of the cases were found to be either deficient or unsuccessful. From the other one third, 70% was found to present no likelihood of substantial lessening of competition. Both authors found that even where substantial divestiture had been achieved, little had been added to consumer welfare.

In a study that greatly influenced the FTC remedies guidelines, Baer (1999) examines divestitures ordered between 1990 and 1994.[12] The author used surveys and interviews of parties directly involved in the mergers, conducted in a case-study format. Baer (1999) came to three general conclusions: i) most divestitures appear to have been successful in creating a viable competitor in the market of concern to the FTC; ii) respondents tend to look for marginally acceptable buyers and may engage in strategic conduct to impede the success of the buyer; iii) existence of information asymmetries between divestures and most buyers resulted in mistakes in the course of the divested assets acquisitions.

---

[11] Haw et al. (1990) indeed prove that there is significant market reaction to non-public information in merger cases.

[12] The Baer (1999) study is greatly influential for the European Commission merger remedies guidelines as well, since the European merger policy closely follows developments in the U.S (EC Commissioner for Competition Mario Monti, 2003).

Building on the methodologies of the three aforementioned articles, the authors of a study by DG COMP (2005) conducted an evaluation of the design and implementation of commitments offered and accepted by the Commission in previous cases. The study analysed a representative sample of 40 decisions adopted by the Commission in the five-year period 1996 - 2000. The authors report that 57% of the total of 85 remedies were considered to have achieved their stated competition objective (49 "effective" remedies); 24% raised design or implementation issues that were not resolved during implementation and most likely reduced the competitiveness of the divested business (20 "partially effective" remedies); and 7% were "ineffective".

The first implementation of event study methodology to studying effects of merger remedies was carried out by Ellert (1976). Using a two-factor CAPM specification of the market model, the author examined the risk-return characteristics of 205 large corporations whose M&A activities were challenged by the DoJ or the FTC between 1950 and 1972, comparing the results against a set of companies whose merger activities were not scrutinized by the competition authorities. He found that firms that were challenged by the government earned abnormal returns of 23% in the eight years preceding the merger challenge. These same firms experienced a subsequent 2.0% drop in value in the month of announcement of a competition litigation. Given that during the remaining litigation period and following court decisions, stockholders in merging companies earned rates of return not statistically different from those obtained by stockholders in the control group, the author concludes that the divestiture program did not have a differential impact. Moreover, Ellert concludes that the evidence is consistent with the hypothesis that mergers are useful in reallocating assets to more efficient users.

Both Eckbo (1983) and Stillman (1983) introduced a methodology that attempts to test the effect of merger control enforcement upon *rival* firms in the merged firm's industry. Using the market model approach, the authors test the unilateral market power and coordinated effects hypotheses. Eckbo (1983) examines 65 horizontal mergers between 1963 and 1978 that were challenged by either the FTC or the DoJ. The author found that rival firms experienced positive significant abnormal returns around the merger announcement, but statistically insignificant abnormal returns around the announcement of a government antitrust complaint. In a similar fashion, Stillman (1983) examines the returns to rival firms of 11 horizontal mergers that were challenged by the FTC or DOJ under Section 7 of the Clayton

Act. Thus both Stillman and Eckbo argue that their estimates provide evidence that collusion effects are *not* implied by the market reactions to regulatory announcements and consequently, antitrust litigation and imposed remedies were ineffective in negating the initial competitive concerns.

In the only event study example found in the literature on merger remedies effects examined in the context of the ICT industry, Bittlingmayer and Hazlett (2000) examined the impact of pro- and anti-enforcement actions against Microsoft by U.S. competition authorities between 1991 and 1997. Using abnormal returns over 1-day and 3-day windows around an announcement of a significant character, they found evidence that pro-enforcement announcements were accompanied by decreases in the value of a control sample of 159 rival computer industry firms. Hence, the authors collect significant evidence to reject joint hypothesis of (i) Microsoft conduct being anti-competitive and (ii) antitrust policy enforcement producing net efficiency gains.[13]

In a series of papers Duso, Gugler and Yurtoglu (2006), Duso, Neven and Röller (2006) and Duso, Gugler, and Szuecs (2010) use an event study methodology to assess the effectiveness and the impact of the EU competition policies on affected companies. They find that only prohibitions achieve a full reversal of the anti-competitive rents generated at the announcement of a merger. Remedies are found to be only partially effective in achieving rent reversion. Furthermore, remedies seem to be most efficient after the first investigation phase, while their impact is diminished after an in-depth investigation. Duso, Gugler, and Szuecs (2010) also assess whether the introduction of the new merger regulation of 2004 has influenced the frequency and determinants of systematic mistakes in assigning remedies.[14] The authors observe that the overall frequency of errors did not significantly change after the reform overall, yet an absolute increase in numbers of remedying pro-competitive mergers is observed.

## 5. Hypotheses

Since horizontal mergers may exhibit both market power effects and efficiency gains the net welfare effect would be dependent on the relative level of each. Measuring this net effect therefore is an indicator of the competitive nature of a merger. An improvement in merging

---

[13] Carstensen (1999) offers a less favorable conclusion on the Microsoft case. See also Comanor (2001), who discusses remedy problems in the Microsoft case.

[14] Remedying mergers, which the market regarded as pro-competitive (type I errors) as well as instances in which the EC failed to remedy mergers that were regarded as anti-competitive (type II errors).

firms' performance could be attributed to both market power and efficiency gains. Profit enhancement for rivals, however, can only stem from market power effects. Hence if the positive externalities for competitors (higher prices and lower quantity produced) exceed the negative externalities (lower prices and, thus, lower profits due to efficiencies for the merging firms), a horizontal merger is characterized as anti-competitive (decreasing consumer welfare). From this, we derive the following hypotheses:

H1.   A post-merger increase in competitors' profits indicates an anti-competitive merger.

H1(a). Any event that lessens the price increase potential and/or negates the market power effect of a merger results in a reverse (negative) effect on competitors' profits.

Evidence confirming sub-hypothesis H1(a) suggests that merger control is effective. Conversely, when the post-merger efficiency gains are enough to overcome the positive externalities stemming from reduced competition, rivals suffer from lower profits and thus a merger can be characterized as pro-competitive (increasing consumer welfare).

H2.   A post-merger decrease in competitors' profits indicates a pro-competitive merger.

H2(a). Any event that lessens the efficiency potential of a merger results in a reverse (positive) effect on competitors' profits.

Evidence confirming hypothesis H2(a) indicates ineffective merger control, assigning remedies to pro-competitive mergers and thus harming consumer surplus.

## 6. Research design
### 6.1 The model

To observe the market reaction to the merger announcement event (the announcement date is indexed as date 0), we adopt the market model as developed by Brown and Warner (1985) in order to calculate the abnormal returns around the announcement dates, either of the merger or of procedural decisions. In order to calculate the normal returns, i.e. to get a grasp on what would have happened had the event not occurred, an estimation window of a hundred trading

days prior to the event is used, from t = -130 to t = -30. This should help in avoiding any serious contamination of the estimates due to information leakage and speculative trading closer than 30 days prior to the event (Ravenscraft and Scherer, 1987). The abnormal return (AR) parameters are estimated over eight trading days, from t=-5 to t=2. As mentioned above, anticipation is likely, given that investors have some knowledge of both the market and EU competition policy so that market reactions prior to the actual event can be expected. We allow for 2 post-event trading days so that the market has time to absorb the information. Tests are performed both on a case-by-case basis and on aggregate level, grouping merging firms and competitors and testing for joint significance. When aggregated, the sample includes only one of the merging firms per case to avoid violations of independence assumptions (Wooldridge, 2003). The small sample size also requires the use of non-linear non-parametric tests (Yaffee, n.d.).

Abnormal returns are calculated as follows:

$$A_{i,t} = R_{i,t} - R_{m,t} \qquad (1)$$

where $A_{i,t}$ is the excess return of stock $i$ at time $t$, $R_{i,t}$ is the return on the stocks of either the merging firms or competitors separately, $R_{m,t}$ is the return of an appropriate index, chosen in accordance with the stock exchange of listing.

Since we assume that there is a certain level of market anticipation, which influences firm $i$'s return before (or after) the merger announcement or remedies decision, the total valuation effect of the event is defined as the sum of the daily abnormal returns within the event window of eight days around the event. The cumulative abnormal return (CAR) is therefore calculated as:

$$CAR_{T1,T2} = \sum_{t=T1}^{T2} AR_t \qquad (2)$$

The corresponding specification of the OLS Market Model takes the following form

$$R_{it} = \alpha_i + \beta_i R_{mt} + \sum_{k=1}^{l} \gamma_k D_{kt} + \varepsilon_{it} \quad (3)$$

where $R_{it}$ is the change in the stock price of firm $i$ on day $t$, $\alpha_i$ is the intercept coefficient for firm $i$, $R_{mt}$ is the change in the market index[15], for day $t$, $\beta_i$ is the market risk coefficient for

---

[15] The market index of choice includes the firm under investigation. However, the impact of the firm on the index is assumed to be insignificant, and thus avoiding concerns of autocorrelation, since only the main market indexes of the exchange of listing were chosen in all cases and those tend to diversify the effect of individual firms.

firm $i$, $D_{kt}$ is a binary variable that equals 1 if day $t$ is within the eight-day event window $k$, and $\gamma_k$ captures average abnormal returns associated with the event window $k$. This regression is run separately on all companies in a system of equations.

In order to avoid contamination of the effect due to other factors that are linked with the normal operations of a company, we calculate the total return of a stock, controlling for stock splits and dividends:

$$RI_t = RI_{t-1} \frac{P_t}{P_{t-1}} \qquad (4a)$$

When $t =$ day before a dividend payment $D_t$, then the total return index equals:

$$RI_t^d = RI_{t-1} \frac{P_t + D_t}{P_{t-1}} \qquad (4b)$$

where $P_t$ is the price since dividend payment, $P_{t-1}$ is the price on previous date, and $D_t$ is dividend payment associated with time $t$.

The significance test statistics for the *CAR* are calculated as follows:

$$T - test = \frac{(\sum AR/N)}{(AR\_SD/N^2)} \qquad (5)$$

where *AR* is the abnormal return and *AR_SD* is the abnormal return standard deviation. *N* is the number of trading days in the event window, eight in our case.

In what follows, we construct specific measurements to test the hypotheses derived in Section 5. The sequence of market reactions and appropriateness of merger decisions follows a timeline from the merger announcement to the final decision.

### 6.2 Merger announcement effects on CAR

From the standard models it follows that the market expects an increase in profits of the merging firms at the time of the merger announcement, either due to post-merger increased market power or merger specific efficiency gains. Hence the combined merging companies' cumulative abnormal returns should be significantly positive ($CAR_m>0$). The expected profitability of rivals is conditional on the prevailing effect of the horizontal merger. If the efficiency effect prevails over the market power effect (a pro-competitive merger), profits, and thus CAR of rivals should be significantly negative ($CAR_r<0$). In the case of market

power being the leading effect of the merger, rivals' profits and thus CAR should be significantly positive $(CAR_r > 0)$.

The complicating factors mentioned above add more options. It would also be possible that at announcement, the merging parties suffer a combined decrease in shareholder value $(CAR_m < 0)$ as a merger can also decrease efficiencies and result in net economic loss. If the rivals experience a decrease as well, the result is ambiguous but not anti-competitive.[16] If the rivals' shareholder value increases significantly upon announcement of an uneconomic merger $(CAR_r > 0)$, the resulting market structure may be anti-competitive due to a loss of competitive advantage of the merged companies lowering the competitive pressure in the post-merger market. In such cases the EC, however, has no mechanisms to remedy the outcome.

### 6.3 The effects of remedies on CAR

The expected effect of remedies on the merging firms and competitors is dependent on the competitive nature of the merger and the effectiveness of the assigned remedies. Let us assume that remedies are correctly applied to an anti-competitive merger and are effective in restoring the pre-merger market structure without harming merger-specific efficiencies. In this case, at the time of the remedy decision date, the merged firms' expected profits and thus $CAR_m$ is expected to be significantly negative $(CAR_m < 0)$. However, the reversal of the positive effect of the announcement should not be complete since merger-specific efficiencies should still be viewed as profit enhancing by investors. Rivals' profit potential, on the other hand, should be completely reversed and thus significantly negative $CAR_r$ should be expected $(CAR_r < 0)$.

Let us now assume a second scenario, where remedies are assigned wrongly to a pro-competitive (efficiency generating) merger. In this case, the merging firms' additional profits expected at the time of announcement by the market should be negated and thus should result in significantly negative $CAR_m$ $(CAR_m < 0)$ for the merging firms. Competitors' profits, on the other hand, should be expected to rise in comparison to the time of the merger announcement

---

[16] In actual fact, such a scenario might even be pro-competitive in the sense that it might result in lower prices and higher consumer welfare (see Cox and Portes, 1998).

due to the decreased chance of being at a post-merger competitive disadvantage. Hence rivals' $CAR_r$ should be significantly positive ($CAR_r > 0$).

A third scenario is a mixture of the previous two. In this case, remedies are assigned correctly to an anti-competitive merger but are ineffective in addressing the competitive concerns at merger announcement. Hence, there should be no adjustment of market expectations and thus one should not expect significant results for both merging firms and rivals.

**Table 1**
**Possible reactions on events of interest by the market\***

| Value of Merging Companies | Value of Competing Companies | Possible Explanations |
|---|---|---|
| Increase | Increase | Reduced competition, higher prices, lower consumer welfare, market re-evaluation |
| Increase | Decrease | Increased efficiency of merged firms, lower prices, increased consumer welfare |
| Decrease | Increase | Decreased efficiency of merged firm, higher prices, reduced competition and welfare |
| Decrease | Decrease | Increased competition, lower prices, higher consumer welfare, market re-evaluation |

\*Based on Eckbo and Wier (1985) and Cox and Portes (1998).

### 7. Data and case selection

The approach applied in this paper requires some selection during sample construction, which affects the statistical assumptions related to the randomness and the probability distribution of the observations. It follows from the objectives of this paper that the cases of interest are mergers in the ICT industry, reviewed by the European Commission and accepted with commitments. Out of the total of 437 such mergers and concentrations between 1990 and 2011, 25 were accepted only after remedies, from which 16 in Phase I and 9 in Phase II (see Appendix 2). The event study methodology requires that the companies and their competitors under investigation are publicly traded prior to the time of merger announcement. Moreover, the competitive assessment focuses exclusively on horizontal mergers.[17] These conditions

---

[17] The companies from the mergers often had overlapping markets both horizontally and vertically. Rather than following standard definitions of either vertical or horizontal, we follow the analysis of DG COMP and characterize a merger according to the product market overlap where competitive constraints emerge.

limit the size of the sample under investigation to 11 cases.

Some companies are involved in more than one case either as merging firm or competitor. In certain cases, the merging company is a fully owned subsidiary of a publicly listed firm, which is in turn taken to represent this subsidiary as a proxy. In the majority of cases, data was available only for the bidder or for the target, which limits the accuracy and reliability of estimates to a certain extent. However, it seems plausible to assume that since only one of the merging companies was traded, investors incorporate all their expectations for value creation to the publicly traded firm. Thus, this assumption secures the reliability of the estimates.

In two cases (Telia/Sonera, and Thomson/Reuters), the stocks of the merged companies are merged in the available financial databases as well, following some adjustments and corrections, thus appearing as one company. In this sense, our sample consists of 15 unique merging companies and 11 unique competitors (see Appendix 3 for a full list and details), bringing the total number of companies in the sample to 26. Appropriate indexes were collected according to the stock exchange of listing. Daily stock price returns, adjusted for dividends and splits, were collected from Thomson One Banker Database and Yahoo Finance.[18] Dates of merger announcement were collected from Reuters' merger section, the Financial Times, companies' press releases, and domestic news agencies.

For qualitative data, we predominantly used the publicly available reports of the Commission's decisions. The advantage of this is that we can rely on the Commission's analysis for market definition and thus for the determination of the competitors that are directly affected by the merger. Furthermore, the reports of DG Comp provide further in-depth information about the specific characteristics of the merger and the decision, the types of remedies, the market delineation and sector information, all of which prove to be useful in the estimation, classification, and interpretation of the results.

---

[18] For some companies, publicly available information was no longer available. We thank Professor Tomaso Duso for support with the data collection for those companies.

## 8. Results[19]

As mentioned in the previous section, we conduct an event study on a case-by-case as well as aggregate level. Tables 2 and 3 report the results. Apparent on first glance is the predominance of Phase I clearances. Looking at the market reactions, one can see that the CAR estimates vary in significance among the cases and the companies.

---

[19] The analysis below is conducted with regards to statistically significant results only. In case one gives more weight to the actual magnitude of the fluctuations, the conclusions may change substantially, as we will discuss further below.

**Table 2**
**Merging and Rival Firms CAR% Regression Output**

| Merger Case | CAR% Ann. | CAR% 6.1(b) | CAR% 6.1(c) | CAR% 8.2 | Merger Type | Remedy Type |
|---|---|---|---|---|---|---|
| M. 1551 | | | | | Horizontal | Divesture of a controlling |
| AT&T (ac) | -3.698 | 4.272 | | | | stake |
| Vodafone (r) | -4.868 | 1.901 | | | | |
| | | | | | | |
| M. 1795 | | | | | Horizontal | Divesture of a controlling |
| Vodafone (ac) | 4.967 | -13.632 | | | | stake; Granting access to |
| British Telecom (r) | -3.977 | -5.697 | | | | technical protocol |
| | | | | | | |
| M. 2574 | | | | | Horizontal | Divesture of a controlling |
| Pirelli (ac) | 5.613 | -22.95 | | | | stake |
| Benetton (p)(ac) | -1.104 | -6.733 | | | | |
| Alcatel-Lucent(r) | 5.003 | -0.33 | | | | |
| | | | | | | |
| M.2803 | | | | | Horizontal | Divesture of a business |
| Telia-Sonera (f) | 1.316 | 7.457 | | | | unit; Granting access to |
| Telenor Group (r) | -0.318 | -1.234 | | | | technical protocol |
| | | | | | | |
| M. 3817 | | | | | Horizontal | Termination of exclusive |
| Wegener (ac) | 0.942 | 2.452 | | | Joint Venture | vertical agreements |
| Telegraaf Group (r) | -2.007 | **4.632*** | | | | |
| | | | | | | |
| M. 3916 | | | | | Horizontal | Granting access to |
| D-sche Tel. (ac)(p) | -2.672 | 6.169 | | | | technology via licensing |
| Telecom Aus. (r) | -2.132 | **5.044*** | | | | or other IPRs |
| | | | | | | |
| M. 4035 | | | | | Horizontal | Commitment to exit from |
| Telefonica (ac) | **-8.525**** | 0.401 | | | | an alliance |
| O2 (t) | 25.145 | **-2.911**** | | | | |
| KPN (r) | 5.763 | -2.855 | | | | |
| Cosmote (r) | **4.493*** | 2.765 | | | | |
| | | | | | | |
| M. 4504 | | | | | Horizontal | Granting of access to |
| TELE 2 (t) | 5.101 | | 3.984 | **5.059**** | | technology via license or |
| France Telecom (r) | **4.758**** | | -2.168 | -1.326 | | other IPRs |
| | | | | | | |
| M. 4726 | | | | | Horizontal/ | Divesture of a business |
| Thomson/Reuters(f) | 0.582 | | **6.157**** | 3.203 | Vertical | unit; Granting of access |
| Morningstar (r) | **-9.126**** | | 4.467 | -6.138 | | to technology via license |
| FDS (r) | -4.814 | | -4.08 | -2.462 | | or other IPRs |
| | | | | | | |
| M. 5650 | | | | | Horizontal | Divesture of a package of |
| D-sche Tel. (p)(ac) | 2.415 | -2.679 | | | Joint Venture | assets; "Mix and Match" |
| France Tel. (p)(t) | 6.37 | **4.139*** | | | | |
| Vodafone (r) | 5.162 | 2.795 | | | | |
| | | | | | | |
| M. 5669 | | | | | Horizontal | Granting of access to |
| Cisco (ac) | **-4.943*** | 0.914 | | | | technology via license or |
| Tanberg (t) | -0.408 | -1.511 | | | | other IPRs; Granting of |
| Polycom (r) | -21.8 | -0.247 | | | | access to infrastructure |

**Significant at 5%;          (f) – the merging companies' stocks were fused;  (r) – rival company
*Significant at 10%;         (p) – the listed company is owner of the merging firm and used as proxy;
(ac) – acquiring company;   Ann – reaction of the market at merger announcement;
(t) – target company;        Articles 6.2(b), Art. 6.2(c), Art. 8.2 – procedural decisions;

**Table 3**
**Aggregate CAR % Regression Output**

|  | Merger Announcement CAR% | | | Remedies Decision CAR% | | |
|---|---|---|---|---|---|---|
|  | OLS | Quantile | Robust | OLS | Quantile | Robust |
| **Merging Firms** | -0.332 | -0.04 | -0.351 | -0.619 | **2.33*** | **3.23**** |
|  | (1.328)† | (1.952) | (1.455) | (2.263) | (1.285) | (0.739) |
| **Rivals** | 0.77 | -0.32 | 1.06 | -0.255 | -0.33 | 0.035 |
|  | (2.232) | (2.474) | (1.995) | (1.237) | (1.451) | (1.254) |

† Standard Errors provided in parenthesis
** Significant at 5% confidence level
*Significant at 10% confidence level

Looking at the case-by-case output, largely insignificant results for both merging firms and rivals are obtained in four of the cases: AT&T/Mediaone, Vodafone/Mannesmann, Pirelli/Edizione, and Telia/Sonera. Interestingly, all four of those were decided prior to the 2004 ECMR reform. Merger announcements have significant effects on merging firms' returns in two occasions (Telefonica/O2 and Cisco/Tanberg), both negative. Merging firms are significantly affected at the time of announcement of a clearance with commitments by DG COMP in three observations (SFR/Tele2, T-mobile/Orange, and Telefonica/O2) while no reaction of rivals is observed. In Telefonica/O2, the coefficient is negative upon clearance with commitments as it was on announcement. In two cases, the abnormal effect of merging firms is significantly positive. The Thomson/Reuters case exhibits insignificant results upon clearance decision that might be affected by the prior Phase II initiation announcement, which has a significantly positive CAR coefficient.

Of greater importance and interest to this study are the stock price reactions of direct rivals, as identified by DG COMP. Competitors' CARs around the time of merger announcement appear significantly higher than the market return in only two of the cases but not for all competitors identified (Telefonica/O2; SFR/Tele 2). Interestingly, the significant positive effects of remedies on rivals' returns are not observed in the same anti-competitive cases identified at the time of merger announcement (Wegener/PSM, and T-Mobile Austria/Tele.Ring).

On an aggregate level, despite the fact that we use several estimation procedures correcting for the small sample, rivals as a group exhibit largely insignificant CAR coefficients around any of the events of interest. Returns around the time of merger announcement appear

insignificant as well. Nevertheless, EC decisions to assign remedies result in significantly positive CAR for merging firms, at least on average.

## 8.1 Robustness of results

Our sample has the advantage of an accurate identification of rivals that are directly affected by potential competitive effects by a merger, relying on the assessment and analysis of DG COMP. With regards to the merger announcement date, a thorough analysis of the press and the history of the merger is performed, identifying the first rumours and leakages of the potential for a concentration between two firms. By allowing for a longer event window prior to the event of interest, we also include any market anticipation and hence reaction to private information. In such a way, other market shocks that may have contaminated the effect of the merger announcement are minimized. Moreover, exact decision dates by the EC are controlled for by cross-checking the official date of the final decision with the official EC press release, which in some cases are at different dates.

Finally, we perform a series of statistical tests. Most of the financial time series exhibited correlation of the residuals and thus we run robust regressions, correcting for heteroskedasticity. In regressing the CAR of the merging firms and competitors combined, due to the small sample, we use non-parametric estimations, which do not rely on the same sample distributional assumptions, like independence of firms and asymptotic normality, as the standard parametric linear estimation procedures. Therefore, the results can be believed to be largely unbiased and reliable estimates of the market reactions to merger events of interests.

## 8.2. Discussion

Following our theoretical assumptions, only two cases, namely SFR/Tele2 and Telefonica/O2, should have raised anti-competitive concerns resulting in remedies by the Commission.

Judging by the market expectations of the competitive effects of mergers, the largely insignificant CAR for both merging and rival firms suggests that the market power effect did not dominate those concentrations. Hence, those cases should not have resulted in remedies assigned by the Commission. In three of those occasions (AT&T/Mediaone,

Vodafone/Mannesmann, and Pirelli/Edizione/Olivetti/Telecom Italia), both merging firms and competitors are global players with diversified revenue streams, pointing at a potential diversification effect. Overall, the evidence of those three cases, all related to the telecommunications sector, suggests that market definitions in the telecom industry were either too narrow, the dynamics of the sector was not taken into consideration (performing market competitive analysis only in the short-term), and/or that the ability of the market to counter any competitive effects of the merger was underestimated.

Negative returns to merging firms upon merger announcement might be partly due to the fact that most of the identified merging firms are acquirers and, as is well known[20], acquirer's stock price reaction tends to be less significant than target's and often negative. Nevertheless, under the assumption regarding the incorporation of information about a merger by investors, the merging parties announced a shareholder value-destroying merger. The fact that in Telefonica/O2, the rival significantly gained share value reinforces the conclusion that this merger created a significant competitive disadvantage for the merging firms and a potentially anti-competitive post-merger market structure. However, the EC can theoretically do little in order to remedy effectively such an unfortunate outcome.

Interestingly, the significant positive effects of remedies on rivals are not observed in the same anti-competitive cases identified at the time of merger announcement, speaking of the ineffectiveness of the remedies assigned in anti-competitive mergers. Additionally, since there are significant positive coefficients on the CAR of rivals as a result of acceptance only after commitments, one may conclude that the remedies in those two cases were actually efficiency destroying and reinforced the anti-competitive post-merger market structure.

The largely insignificant CAR for rivals on an aggregate level reinforces the analysis from the case studies that the market rarely sees potential for sustainable price increases in the ICT sector due to a specific merger. The situation is somehow different for merging firms. The evidence of positive aggregate CAR for merging firms upon assignment of remedies suggests that, on average, remedies negotiation between the merging parties and the EC resulted in a favourable outcome for the merging parties. Although the market does not seem to perceive those concentrations as anti-competitive at merger announcement, and thus the EC should

---

[20] See Sudarsanam (2010) Ch. 4 for a summary of stylized facts on mergers and acquisitions.

have refrained from direct intervention, at least the remedies were not value destroying for the merging firms and preserved at least some efficiency gain.

Regarding the conduct of the EC pre- and post-reform, the absolute number of ICT mergers under investigation (both vertical and horizontal) is greater pre-reform (249 cases pre-reform versus 190 post-2004; see App. 2). Imposition of remedies is proportionally more often phenomena before the 2004 reform, with 6.4% of cases being accepted only after commitments, compared to 4.7% post-reform. Additionally, there were five prohibitions pre-reform and none after. How do these figures compare with the sample of 11 horizontal ICT mergers used here? Only four of the cases in the sample were decided prior to 2004. However, all of those cases exhibit largely insignificant CARs for both merging and rival firms. The two cases that classify as anti-competitive, following the methodology adopted here, were both investigated right after the reform. The estimates suggest that before the reform of 2004, the EC was stricter with the narrow market definitions and the imposition of conditions on mergers. Based on the case-by-case estimates, the instances of remedying mergers, which the market did not regard as anti-competitive, are almost at par pre-and post reform. However, the two anti-competitive cases identified post-reform speak of the effectiveness of the newly introduced "more economic" competitive assessment introduced in 2004. This result holds at least with respect to the initial investigation phase, since the implementation of remedies did not improve overall.

Overall, the evidence is unambiguous that the European Commission far more often imposes remedies in ICT horizontal mergers, which, judging by the market reactions, are *not* anti-competitive in their nature. Remedies, both behavioural and structural, appear to be largely ineffective in negating the competition concerns expressed by the Commission in its analysis, even in the two cases where they are properly assigned to anti-competitive mergers.

Moreover, behavioural remedies appear to transfer rents from merging parties to competitors. Hence, the findings on the competitive effects of remedies in the ICT sector reported here are in accordance with much of the existing literature, which concludes that the EC has had little success with restoring competition in the market. Thus, the Commission's main contribution to the competitive nature of markets may stem only from the deterrent effect of its policies.

## 9. Conclusions and Policy Implications

In this paper we examined the competitive effects of remedies assigned by the European Commission to horizontal mergers in the ICT industry, on both a case-by-case and aggregate level. The study contributes to the existing literature by constructing a unique dataset of the industry and using updated theoretical and empirical frameworks. For the competitive assessment, we use the market as an objective and unbiased indicator of changes in the market structure, utilizing the event study approach. Key to this methodology is the assumption that a merger announcement and the accompanying EC decisions have significant impact on the stock returns of rivals, allowing one to judge the competitive effect of events of interest in a plethora of scenarios.

Using a sample of 11 horizontal mergers from the ICT sector in the period between 1990 and 2010, and estimating from the market's reactions, the evidence suggests that the European Commission imposes remedies in horizontal mergers in the ICT industry that are *not* anti-competitive. Remedies, both behavioural and structural, appear to be largely ineffective in negating the competition concerns expressed by the Commission in its analysis, even in the two cases where they are properly assigned to anti-competitive mergers. Moreover, behavioural remedies appear to transfer rents from merging parties to competitors.

The implications of the findings are several folds. First, directly related to the insignificant stock return effect of remedies assigned in most of the cases, especially related to rivals' returns, it appears that investors are aware of the dynamic structure of the ICT industry and thus know that artificial changes in the market share of companies through mergers or remedies will eventually be undone in the long-term by endogenous market processes. The implications are that markets act rationally and with a long-term horizon but more importantly that interventionist merger control practices rather delay natural competitive processes.

Second, the rapidly evolving and uncertain ICT sector, with new goods and services appearing constantly, is likely to be difficult to model using traditional static models. The EC should thus be cautious with defining markets too narrowly in sectors where products may become obsolete even in the short-term. This might have harmful effects on otherwise potentially dynamic efficiency enhancing mergers, which are remedied only in the name of protecting static competition. Moreover, a narrow focus only on competition ignores the

importance of innovation, which is essential not only for the competitiveness of the ICT sector but also for general economic development and consumer welfare. Consequently, competition should not be separated from performance and innovation. Therefore, if the EC would want to avoid the problems that are suggested in this research, a wider lens of looking at the ICT market in a dynamic setting might be more appropriate.[21]

Moreover, it may seem appropriate to leave the regulation of ICT markets to specific telecoms regulators and other designated national and supra-national regulators. The latter may have a closer feel for the developments of the ICT industry and its viable future, as well as apparent ability to promote competition forces in it, evident from the recent market structure developments in the sector.

Third, judging by the effect of structural remedies, the EC might consider applying the same SIEC double test for unilateral dominance and collusive behaviour to that type of remedies before assigning them.[22] Related to that, contradicting the general preference of structural over behavioural remedies, the dynamics of the ICT sector may be more prone to behavioural remedies even in horizontal mergers as those are reversible in the long-term and allow for more flexibility. On the other hand, behavioural remedies are related to higher enforcement and monitoring costs so more care should be invested in their design and implementation.

Merging parties have their role in the ineffective implementation of merger remedies as well, as these same parties often suggest the remedies to be applied. Since merging firms are more likely to act in their self-interest, it would not be surprising if remedies appear to be ineffective.

The results are subject to certain limitations, mainly related to the assumptions made in designing the research. Using event studies to generalize about the overarching impact of antitrust policies necessitates the use of strong assumptions regarding the efficiency of financial markets. Moreover, there might be biases because of the policy regime in which the data are generated, and because of unobserved deterrent effects[23]. The hypotheses used rely

---

[21] For an empirical analysis of dynamic efficiencies in mergers and acquisitions, see Meijaard, Schenk and Prince (2005).
[22] Motta et al. (2003) come to similar conclusion, however, using a completely different methodology.
[23] See Section 2.

on the significance of stock returns around certain events, which requires that the merger affects a substantial part of the revenue stream of a firm. This, however, might not always be the case. The small sample size used in this paper  is not  without problems, although we have endeavoured to address this issue as discussed Furthermore, there are several complicating factors in the interpretation of rivals' returns, which make the analysis difficult at times. Despite the use of extensive robustness checks, this paper does not exhaust by far all the statistical techniques for robust results estimation. Hence, the use of event study approach is indicative but it is best to be used complementary to structural analyses and various additional evaluation techniques, as we have illustrated in our cases discussion.

The current analysis focuses on horizontal mergers in the ICT sector only. Nevertheless, there are other examples of dynamic industries and it would be interesting to see how the results would compare. In addition, further research may look at vertical mergers as well. A full assessment of dynamic industries would require a reliable and appropriate economic model, which does not suffer from too many and too strong simplifying assumptions.

## Bibliography

Aktas, N., de Bodt, E., & Roll, R., (2004), Market Response to European Regulation of Business Combinations. Journal of Financial and Quantitative Analysis, 39, pp 731-757.

Aktas, N., de Bodt E., & Roll R., (2007), Is European M&A Regulation Protectionist?, The Economic Journal, 117(522), 1096–1121.

Baer, W. (1999), A Study of the Commission's Divestiture Process, Federal Trade Commission.

Ball , R. & Brown, P., (1968), An Empirical Evaluation of Accounting Income Numbers, Journal of Acc Res 6(2), 159-178.

Bergman, M. A., Jakobsson, M., & Razo, C., (2005), An Econometric Analysis of the European Commission's Merger Decisions, International Journal of Industrial Organization 23 (9-10), 717-737.

Bittlingmayer, G., & Hazlett, T., (2000), DOS Kapital: Has antitrust action against Microsoft created value in the computer industry?, Journal of Financial Economics, Elsevier, vol. 55(3), pages 329-359.

Brown, S. J., & Warner, J. B., (1985), Using Daily Stock Returns: The Case of Event Studies, Journal of Financial Economics 14, 03-31.

Carstensen, P. C., (1999), Remedying the Microsoft Monopoly: Monopoly Law, the Rights of Buyers, and the Enclosure Movement in Intellectual Property, The Antitrust Bulletin, Fall: 44, 3, 577-617.

Comanor, W. S., (2001), The Problem of Remedy in Monopolization Cases: the Microsoft Case as an Example, The Antitrust Bulletin, Spring: 46, 1, 115-133.

Cox, A., & Portes, J., (1998), Mergers in Regulated Industries: The Uses and Abuses of Event Studies, Journal of Regulatory Economics, 13, 281-304.

Davies, S.W., & Lyons, B., (2007), Mergers and Merger Remedies: Consequences for Competition, Edward Elgar.

Deneckere, R., & Davidson C., (1985), Incentives to form Coalitions with Bertrand Competition, The RAND Journal of Economics, 16(4), 473–486.

Duso, T, Neven, D. J., & Röller, L.H., (2006), The Political Economy of European Merger Control: Evidence using Stock Market Data, Wissenschaftszentrum Berlin Discussion Paper No. FS IV 02-34.

Duso, T., Gugler, K., & Yurtoglu, B., (2007), EU Merger Remedies: An Empirical Assessment, Humboldt University, Berlin, and Wissenschaftszentrum Berlin, Germany.

Duso, T., Gugler, K., & Yurtogly, B., (2008), How Effective is European Merger Control?, Wissenschaftszentrum Berlin, Markets and Politics Working Paper No. SP II 2006-12.

Duso, T., K. Gugler, & Yurtoglu, B., (2010), Is the Event Study Methodology useful for Merger Analysis? A Comparison of Stock Market and Accounting Data, International Review of Law and Economics, 30, 186–192.

Duso, T., Gugler, K., & Szücs, F., (2010), An Empirical Assessment of the 2004 EU Merger Policy Reform, Competition and Innovation Working Papers SP II 2010-16, Wissenschaftszentrum Berlin.

Eckbo, E. B., (1983), Horizontal Mergers, Collusion, and Stockholder Wealth, Journal of Financial Economics 11, 241-273.

Eckbo, B. E., & Wier, P., (1985), Antimerger Policy Under the Hart-Scott-Rodino Act: A Re-examination of the Market Power Hypothesis, Journal of Law and Economics 28, 119-149.

Ellert, J. C., (1976), Mergers, Antitrust Law Enforcement and Stockholder Returns, Journal of Finance 31 (2), 715-732.

Elzinga, K.J., (1969), The Antimerger Law: Pyrrhic Victories?, Journal of Law and Economics, Volume 12, No. 1, 43-78.

European Communities, (1989), Council Regulation (EEC) No 4064/89 of 21 December 1989 on the control of concentrations between undertakings. Official Journal L 395 of December 30th 1989 – corrected version Official Journal L 257 of September 21st 1990, 13.

European Commission, (1997), COM (97) 623: Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors, and the Implications for \ Regulation.

European Communities, (2004), Council Regulation (EC) No 139/2004 of 20 January 2004 on the control of concentrations between undertakings (EC Merger Regulation). Official Journal L24/1 of January 29th 2004.

European Commission, (2005), Merger Remedies Study: Public Version. Luxembourg: Office for Official Publications of the European Communities.

Fama, E., (1965), The Behavior of Stock-Market Prices. The Journal of Business, Vol. 38, No. 1, 34-105.

Fama, E., Fisher, L., Jensen, M. C., & Roll, R., (1969), The Adjustment of Stock Prices to New Information, International Economic Review 10(1), 01-21.

Farrell, J., & Shapiro C., (1990), Horizontal Mergers: An Equilibrium Analysis, American Economic Review, 80(1), 107–126.

Fridolfsson, S., & Stennek, J., (2010), Industry Concentration and Welfare: On the Use of Stock Market Evidence from Horizontal Mergers, Economica, 770(308), 743–750.

Fransman, M., (2009), How Innovation Happens and What Should be Done to Encourage It, paper prepared for the OECD Innovation Strategy. Paris: OECD.

Fudenberg, D., & Tirole, J., (1984), The Fat-Cat Effect, the Puppy-Dog Ploy, and the Lean and Hungry Look, American Economic Review, 74, 2, 361-366.

Healy, P., K. Palepu; & Ruback, R., (1992), Does corporate performance improve after mergers?, Journal of Financial Economics, 31, 135-175.

ICT Regulation Toolkit, (2011), Module 1: Regulating the Telecommunications/ICT sector: Overview; Module 6: Legal and Institutional Framework, available at http://www.ictregulationtoolkit.org/en/Sections.html (retrieved on 14.07.2011).

Joskow, P., (2002), Transaction cost economics, antitrust rules and remedies, Journal of Law, Economics and Organization, 18 (1), 95–116.

Kaplan, S., & Weisbach, M., (1992), The success of acquisitions: evidence from divestitures, Journal of Finance, March 1992, 47(1), 107-138.

Kothari, S., & Warner, J.B., (2007), Econometrics of Event Studies, in Handbook of Corporate Finance, Volume 1, ed. by B. E. Eckbo, pp. 3–35. Elsevier/North-Holland, Amsterdam.

Lindsay, A., (2003), The EC merger regulation: substantive issues, Sweet & Maxwell.

MacKinlay, A. C., (1997), Event Studies in Economics and Finance, Journal of Economic Literature 35, 13-39.

McAfee, P. R., (1988), Can Event Studies Detect Anticompetitive Mergers?, Economics Letters, 28(2), 199–203.

Meijaard, J., Schenk, H., & Prince, Y., (2005), Dynamic Efficiencies in Mergers and Acquisitions, Research Report commissioned by the European Commission, Brussels; EIM, Zoetermeer.

Monti, M., (2000), Competition and Information Technologies Conference "Barriers in Cyberspace" - Kangaroo Group Swissôtel, Brussels, 18 September 2000, http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/00/315&format=HTML&aged=0&language=EN&guiLanguage=en (retrieved on 25.07.2011).

Monti, M. (2003), The Commission's notice on merger remedies, in F. Lévêque and H. Shelanski (eds), Merger Remedies in American and European Union Competition Law, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, ch. 1.

Motta, M., Polo, M., & Vasconcelos, H., (2003), Merger remedies in the European union: an overview, in F. Lévêque and H. Shelanski (eds), Merger Remedies in American and European Union Competition Law, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Motta, M., & Vasconcelos, H., (2005), Efficiency Gains and Myopic Antitrust Authority in a Dynamic Merger Game, International Journal of Industrial Organization 23, 777-801.

Mueller, M., (1999), Digital Convergence and its Consequences, Javnost The Public 6(3), 11-27.

Nocke, V., & Whinston, M., (2008), Sequential Merger Review, Discussion paper, National Bureau of Economic Research Working paper 14526.

Ravenscraft, D., & Pascoe, G., (1989), Can the stock market predict merger success?, mimeo, University of North Carolina Centre for Economics Studies, Bureau of the Census.

Schenk, H., (2005), Organizational Economics in an Age of Restructuring, or: How Corporate Strategies can harm your Economy, Springer.

Schwert, W., (1996), Markup Pricing in Mergers and Acquisitions, Journal of Financial Economics 41, 153-192.

Sirower, M. & O'Byrne, S., (1998), The measurement of post-acquisition performance: towards a value-based benchmarking methodology, Journal of Applied Corporate Finance, 11(2), 107-121.

Sorgard, L., (2009), Optimal Merger Policy: Enforcement vs. Deterrence, Journal of Industrial Economics, 57(3), 438–456.

Stillman, R., (1983), Examining Antitrust Policy towards Horizontal Mergers, Journal of Financial Economics, 11(1-4), 225–240.

Sudarsanam, S. (2010), Creating Value from Mergers and Acquisitions. The Challenges, Prentice Hall.

Rogowsky, R. A., (1986), The Economic Effectiveness of Section 7 Relief, Antitrust Bulletin, Spring, 187-233.

Wooldridge, J. M., (2003), Introductory Econometrics: A Modern Approach, Thomson South-Western, Mason, Ohio, (2nd edition).

Yaffee, A., (n.d.), Robust Regression Modeling with STATA: lecture notes, New York University, available at http://www.nyu.edu/its/statistics/Docs/robust_reg3.pdf (retrieved on 15.07.2011).

# Appendixes

## Appendix 1 – ICT Trends and Structure

**Table A.1: Convergence/divergence and integration/disintegration**

|  | IT | Telecom | Broad-casting | Other media |
|---|---|---|---|---|
| Content / services | Software based content | Telecom based services and content | Broadcast programs | Film, music, newspapers, etc. |
| Transport / software | Software | Network services | Transmission | Cinemas, video rentals, etc. |
| Equipment / hardware | IT hardware | Telecom equipment | Broadcast equipment | Reproduction of films, printing, etc. |

Source: Anders Henten, Rohan Samarajiva and William Melody: 'Designing Next Generation Telecom Regulation: ICT Convergence or Multisector Utility?', WDR, Lyngby, 2003, page 9.

**Table A.2**

Horizontal Segments of a Converged Media Environment

| | |
|---|---|
| Content | Information products (Text, TV, Radio, Film, Financial info, Money, Graphic art, Web pages, Games, Music, Photography) |
| Packaging | Services; bundling and selection of content; addition of integrative and presentational functionality |
| Carriage | Physical infrastructures for transport (fixed telephone network, terrestrial and satellite wireless, cable TV systems, private LANs and WANs, etc.) |
| Software | Intelligence, including processing and storage hardware and software for network and individual terminals |
| Equipment | Local devices for input and output of signals and information (phone handsets, TVs, PCs, organizers, PDAs, etc.) |

Source: Bane, Bradley, and Collis, 1995

**Table A.3**

Privatisation of incumbents in developing countries
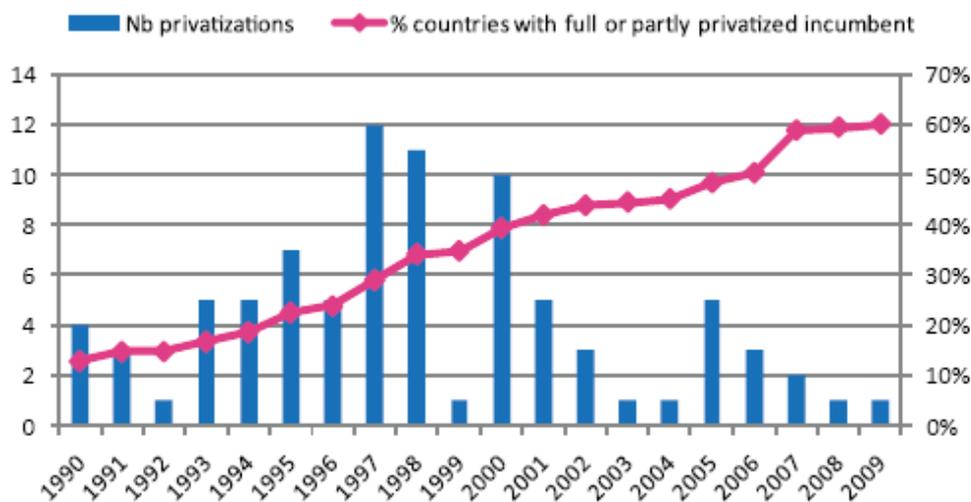


Source: ITU World Telecommunication/ICT Regulatory Database.

**Table A.4**

Growth in ICT diffusion and competition, world, 1995-2008
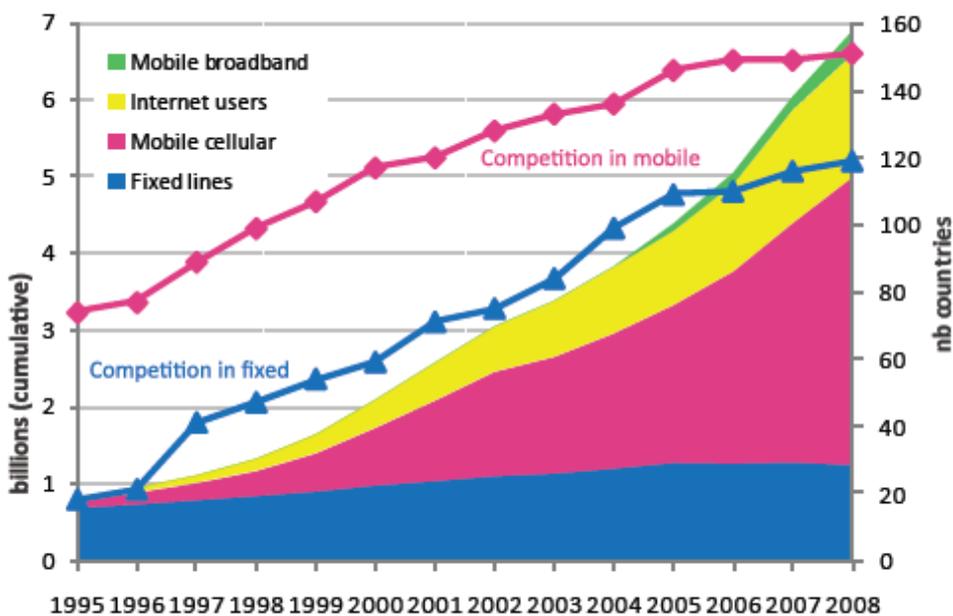


Source: ITU World Telecommunication/ICT Regulatory Database.

**Table A.5**



Growth in competition, world
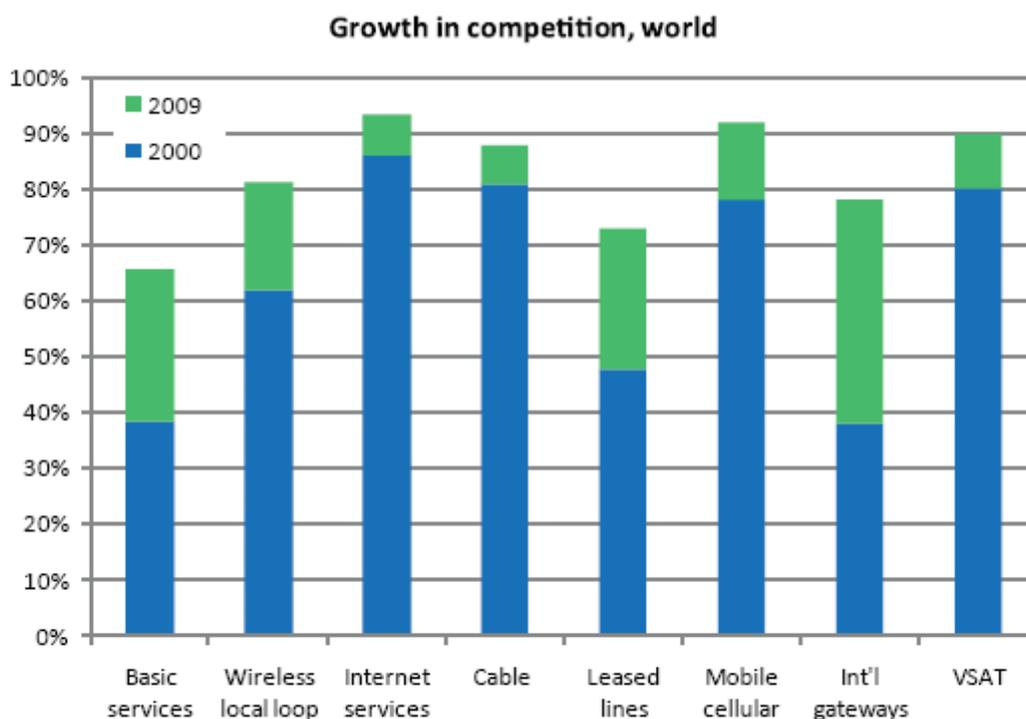
Note: In blue: level of competition in 2000; in green: percentage of countries having opened up for competition between 2000-2009.

Source: ITU World Telecommunication/ICT Regulatory Database.

**Appendix 2: Case statistics**

Table 2.1 – ICT case investigation

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total under investigation** | 0 | 6 | 4 | 6 | 6 | 17 | 17 | 17 | 20 | 25 | 50 | 48 | 19 | 14 | 19 | 38 | 27 | 31 | 29 | 12 | 24 | 8 | **437** |
| Art 6.1 (b) in conjunction with Art 6.2(compatible w. commitments) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 1 | **16** |
| Art. 6.1 © Intitation of Phase II | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 3 | 1 | 1 | 0 | 0 | 2 | 1 | 2 | 1 | 2 | 3 | 1 | 1 | 0 | **22** |
| Art 8.2 compatible with commitments | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | **9** |
| Art 8.3 prohibition | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **5** |

**Appendix 3: Final sample description**

| Case Code | Merging Firms | Pre-/Post-Reform | Merger Ann. Date | ECMR article | Phase II Date (Art. 6.1 c) | Competitor | EC decision date | NACE Code |
|---|---|---|---|---|---|---|---|---|
| M. 3817 | Wegener/ PCM | ECMR 2004 | 17.3.2005 | 6.1 (b) | | TMG Group | 07.7.2005 | J58.01.03 – Publishing of newspapers; M73.01 - Advertising |
| M. 4726 | Thomson Corp./ Reuters Group | ECMR 2004 | 15.5.2007 | 8.2 | 08.10.2007 | S&P; Morningstar | 19.2.2008 | J62 - Computer programming, consultancy and related activities |
| M. 2574 | Pirelli/Edizione/ Olivetti/ Telecom Italia | ECMR 1989 | 06.8.2001 | 6.1 (b) | | Alcatel-Lucent | 20.9.2001 | J61 - Telecommunications |
| M. 1551 | AT&T/ Mediaone | ECMR 1989 | 06.5.1999 | 6.1 (b) | | Comcast; Vodafone | 23.7.1999 | J61 - Telecommunications |
| M. 1795 | Vodafone/ Mannesmann | ECMR 1989 | 11.10.1999 | 6.1 (b) | | British Telecom | 12.4.2000 | J61 - Telecommunications |
| M. 5650 | T-Mobile/ Orange | ECMR 2004 | 08.9.2009 | 6.1 (b) | | Vodafone | 1.3.2010 | J61.02 – Wireless telecommunication J62.09 – Other information and computer services |
| M. 5669 | Cisco/ Tandberg | ECMR 2004 | 28.10.2009 | 6.1 (b) | | Polycom | 29.3.2010 | J61.02 – Wireless telecommunication J62.09 – Other information and computer services |
| M. 4504 | SFR/Tele 2 | ECMR 2004 | 03.10.2006 | 8.2 | 19.3.2007 | France Telecom | 18.7.2007 | J60.02 – Television programming and broadcasting |
| M. 3916 | T-Mobile Austria/ Tele Ring | ECMR 2004 | 10.08.2005 | 8.2 | 14.11.2005 | Telekom Austria | 26.4.2006 | J61 - Telecommunications |
| M. 4035 | Telefonica/ O2 | ECMR 2004 | 31.10.2005 | 6.1 (b) | | Cosmote; KPN | 10.1.2006 | J61 - Telecommunications |
| M. 2803 | Telia/ Sonera | ECMR 1989 | 26.3.2002 | 6.1 (b) | | Telenor | 10.7.2002 | J61 - Telecommunications |

**Appendix 4 – Aggregate Statistical Output**
**App. 4.1 Merging firms' output**

Table App. 4.1.1: Merging firms' announcement CAR; OLS.

```
Linear regression                              Number of obs =     11
                                               F(  0,   13) =   0.00
                                               Prob > F      =     .
                                               R-squared     = 0.0000
                                               Root MSE      = 4.9699


------------------------------------------------------------------------------
           |             Robust
cumulative~n |   Coef.    Std. Err.     t     P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
     _cons |  -.332337   1.328272   -0.25   0.806     -3.201895   2.537221
------------------------------------------------------------------------------
```

Table App. 4.1.2: Merging firms' announcement CAR; Robust Nonparametric estimations.

```
   Robust regression

   Huber iteration 1:  maximum difference in weights = .02984309
   Biweight iteration 2:  maximum difference in weights = .14511725
   Biweight iteration 3:  maximum difference in weights = .0000626

                                               Number of obs =     11
                                               F(  0,   13) =   0.00
                                               Prob > F      =     .


------------------------------------------------------------------------------
cumulative~n |   Coef.    Std. Err.     t     P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
     _cons |   -.3512351   1.455871   -0.24   0.813     -3.496453   2.793983
------------------------------------------------------------------------------
```

Table App. 4.1.3: Merging firms' announcement CAR; Quantile Nonparametric estimations.

```
Quantile Regression

Iteration  1:  WLS sum of weighted deviations =  57.572638
Iteration  1:  sum of abs. weighted deviations =  57.530369
Median regression                              Number of obs =     11
Raw sum of deviations 57.53037 (about -.04317825)
Min sum of deviations 57.53037                 Pseudo R2    =   0.0000


------------------------------------------------------------------------------
cumulative~n |   Coef.    Std. Err.     t     P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
     _cons |   -.0431782   1.952911   -0.02   0.983     -4.262186   4.175829
------------------------------------------------------------------------------
```

Table App. 4.1.4 Merging firms Remedies Decision; OLS estimations

```
Linear regression                                    Number of obs =     11
                                                     F( 0,   13) =   0.00
                                                     Prob > F    =     .
                                                     R-squared   = 0.0000
                                                     Root MSE    =  8.471
-------------------------------------------------------------------------------
            |          Robust
cumulative~n |   Coef.    Std. Err.      t    P>|t|      [95% Conf. Interval]
-------------------------------------------------------------------------------
      _cons |  -.6198945  2.263975   -0.27  0.789     -5.510915   4.271126
-------------------------------------------------------------------------------
```

Table App. 4.1.5 Merging firms remedies decision CAR; Robust Nonparametric test

```
Robust regression

Huber iteration 1:  maximum difference in weights = .7912771
Huber iteration 2:  maximum difference in weights = .3037693
Huber iteration 3:  maximum difference in weights = .01917442
Biweight iteration 4:  maximum difference in weights = .27106398
Biweight iteration 5:  maximum difference in weights = .06054097
Biweight iteration 6:  maximum difference in weights = .01052313
Biweight iteration 7:  maximum difference in weights = .00175004


Robust regression                                    Number of obs =  11
                                                     F( 0,   13) =   0.00
                                                     Prob > F    =     .


-------------------------------------------------------------------------------
cumulative~n |   Coef.    Std. Err.      t    P>|t|      [95% Conf. Interval]
-------------------------------------------------------------------------------
      _cons |  3.236048   .7397901    4.37  0.001      1.637828   4.834267
-------------------------------------------------------------------------------
```

Table App. 4.1.6: Merging firms' remedies decision CAR; Quantile Nonparametric estimations.

```
Quantile regression

Iteration  1: WLS sum of weighted deviations =  76.025498
Iteration  1: sum of abs. weighted deviations =  76.583642
Iteration  2: sum of abs. weighted deviations =  71.867823
Median regression                                    Number of obs =      11
Raw sum of deviations 71.86782 (about 2.3347595)
Min sum of deviations 71.86782                       Pseudo R2   = -0.0000
-------------------------------------------------------------------------------
cumulative~n |   Coef.    Std. Err.      t    P>|t|      [95% Conf. Interval]
-------------------------------------------------------------------------------
      _cons |  2.334759   1.285948    1.82  0.093     -.4433631   5.112882
-------------------------------------------------------------------------------
```

## App 4.2: Competitors' output

Table App. 4.2.1 Competitors merger announcement CAR, OLS

```
Linear regression
                                            Number of obs =     13
                                            F( 0,  16) =   0.00
                                            Prob > F    =      .
                                            R-squared   = 0.0000
                                            Root MSE    =  9.205

-------------------------------------------------------------------------------
            |        Robust
cumulative~n |   Coef.    Std. Err.     t    P>|t|     [95% Conf. Interval]
-------------------------------------------------------------------------------
       _cons |  .7765865  2.232533    0.35  0.732     -3.956172   5.509345
-------------------------------------------------------------------------------
```

Table App. 4.2.2 Competitors merger announcement CAR; Robust Nonparametric test

```
Robust regression

Huber iteration 1:  maximum difference in weights = .57393396
Huber iteration 2:  maximum difference in weights = .0016652
Biweight iteration 3:  maximum difference in weights = .13862337
Biweight iteration 4:  maximum difference in weights = .0099704

Robust regression                           Number of obs =     13
                                            F( 0,  16) =   0.00
                                            Prob > F    =      .
-------------------------------------------------------------------------------
cumulative~n |   Coef.    Std. Err.     t    P>|t|     [95% Conf. Interval]
-------------------------------------------------------------------------------
       _cons |  1.062814  1.995911    0.53  0.602     -3.168328   5.293955
-------------------------------------------------------------------------------
```

Table App. 4.2.3: Competitors merger announcement CAR; Quantile Nonparametric estimations.

```
Quantile regression

Iteration  1: WLS sum of weighted deviations =   113.6184
Iteration  1: sum of abs. weighted deviations = 112.74397
Median regression                           Number of obs =     13
Raw sum of deviations  112.744 (about -.31826079)
Min sum of deviations  112.744                Pseudo R2   =   0.0000
-------------------------------------------------------------------------------
cumulative~n |   Coef.    Std. Err.     t    P>|t|     [95% Conf. Interval]
-------------------------------------------------------------------------------
       _cons |  -.3182608  2.474972   -0.13  0.899     -5.564967   4.928445
-------------------------------------------------------------------------------
```

Table App. 4.2.4 Competitors remedy decision CAR. OLS estimations

```
Linear regression
                                              Number of obs =     13
                                              F(  0,    16) =   0.00
                                              Prob > F     =     .
                                              R-squared    = 0.0000
                                              Root MSE     = 5.1042
---------------------------------------------------------------------------------
              |          Robust
cumulative~n |   Coef.     Std. Err.     t    P>|t|      [95% Conf. Interval]
---------------------------------------------------------------------------------
       _cons |  -.2553045  1.237957   -0.21  0.839      -2.879656   2.369047
---------------------------------------------------------------------------------
```

Table App. 4.2.5 Competitors remedies decision CAR; Robust Nonparametric test

```
Robust regression

Huber iteration 1:  maximum difference in weights = .49624724
Huber iteration 2:  maximum difference in weights = .01785053
Biweight iteration 3:  maximum difference in weights = .1552578
Biweight iteration 4:  maximum difference in weights = .00344667

Robust regression                             Number of obs =     13
                                              F(  0,    16) =   0.00
                                              Prob > F     =     .
---------------------------------------------------------------------------------
cumulative~n |   Coef.     Std. Err.     t    P>|t|      [95% Conf. Interval]
---------------------------------------------------------------------------------
       _cons |  .0349912   1.254395    0.03  0.978      -2.624208   2.69419
---------------------------------------------------------------------------------
```

Table App. 4.2.6 Competitors remedies CAR; Quantile Nonparametric estimations.

```
Quantile regression

 Iteration  1:  WLS sum of weighted deviations =  65.502075
 Iteration  1: sum of abs. weighted deviations =  65.517554
 Iteration  2: sum of abs. weighted deviations =  65.433862
Median regression                             Number of obs =     13
Raw sum of deviations 65.43386 (about -.33069775)
Min sum of deviations 65.43386                Pseudo R2    =   0.0000
---------------------------------------------------------------------------------
cumulative~n |   Coef.     Std. Err.     t    P>|t|      [95% Conf. Interval]
---------------------------------------------------------------------------------
       _cons |  -.3306977  1.451353   -0.23  0.823      -3.407428   2.746032
---------------------------------------------------------------------------------
```