Assessing Coordinated Effects
in Merger Cases

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Abstract

Mergers can give rise to two types of anticompetitive effects: unilateral effects and coordinated effects. The latter arise if after a merger, firms can increase their market power by coordinating their actions. In this chapter we explain what coordinated effects are and how they can be identified. As building block for the analysis of coordinated effects in mergers, we review the economic meaning of collusion, and assess the factors that allow firms to reach and enforce collusive outcomes. We also review some approaches for quantifying coordinated effects, and provide an overview of the use of coordinated effects in European merger control.

1   Introduction

Merger control is one of the pillars of antitrust policy. It is necessary in order to ensure that anticompetitive mergers - that is, mergers which lead to a price increase, lower production, less variety, fewer innovations, etc. - do not take place. There are two mechanisms whereby mergers can give rise to anticompetitive effects: unilateral effects, and coordinated effects.

The concept of *unilateral effects* refers to a situation where the merger allows the merging firms to unilaterally - that is, independently of the reaction of the remaining competing firms - increase their market power: because of the lower competitive constraints (a merger reduces the number of independent competitors in the industry), firms which would not have increased their prices (or reduced production, etc.) after their merger may find it profitable to increase them, even if all other firms' prices remained unchanged.[1]

The concept of *coordinated effects* refers instead to the fact that after the merger it will become more likely that the merging firms *and* (at least an important subset of) their rivals will increase their market power by coordinating their actions. In other words, the

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[1]It is important to notice though, that *after* the merging firms increase their prices (or reduce their output), the rival firms will modify their decisions in turn. But the overall effect will generally be anticompetitive.

term "coordinated effects" indicates the higher probability that after the merger the main firms in the market will reach a (tacit or explicit) collusive outcome or - if collusion was already taking place - would strengthen such an outcome, for instance by managing to reach higher collusive prices, or by making collusion more stable.

This Chapter deals with coordinated effects of mergers, and its objective is to explain what they are and how they can be identified. Since a full understanding of collusion is fundamental to explain coordinated effects, in the first part of this Chapter we draw on the theoretical and empirical economic literature to answer two basic questions: 'what is collusion?' and 'what facilitates it?' The analysis of collusion and of the factors which facilitate it is the building block for the analysis of coordinated effects in mergers, and provides us with important hints on how to conduct such analysis in *practice*.

Whenever an agency is facing a merger, it will have to make an analysis of the market, to gather hints as to whether the merger may raise unilateral effects, or coordinated effects, or whether it raises no danger of increased market power.[2] When conducting such an analysis, some hints of whether coordinated effects may be relevant at all could be obtained by looking at very *simple indicators*. In our opinion, two will be especially important. The first concerns market structure: tacit collusion is unlikely to arise unless that post-merger there are only two or three firms in the market, with considerable symmetries among them. The second concerns past history of collusion: a motivated suspicion of a strengthening of coordinated effects should arise if the industry has a past history of collusion, with firms having developed a web of relationships (joint ventures, purchasing and/or distribution agreements, cross-directorates etc.), or a system of exchange of information (or other price schemes which allow to improve monitoring), or if suspiciously parallel price movements have taken place over time. In the second part of this Chapter we review these as well as other 'screens' and indexes one may want to look at in order to assess the likelihood of coordinated effects in practice.

Since we believe that the analysis of past merger policy is fundamental to better enforce competition policy, we devote the last par of the Chapter to the issue of how coordinated effects have been applied in European merger control. Originally, the EU Merger Regulation 4064/89 stated that mergers which would *create or strengthen a dominant position* (defined as the ability to behave to an appreciable extent independently of rivals and customers - and effectively amounting to the possession of very large market power) would be declared incompatible with the common market. However, the European Commission soon realized that there were mergers which appeared to be anticompetitive even if they did not give rise to a (single-firm) dominant position. To cope with such situations, the European Commission borrowed from the existing jurisprudence the concept of *collective dominant position* (or joint dominance), which was then applied to several cases (in an

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[2]In equilibrium, a merger might give rise to either unilateral effects or coordinated effects, not the two at the same time. However, an antitrust authority should assess both, because it may not be clear a priori which one would arise at equilibrium (finding that a collusive equilibrium is more likely to occur after the merger does not mean it will occur with a probability one). Note also that the unilateral effects analysis will generally give the lower bound to the potential price increase of the merger.

increasingly extensive manner), and which was arguably used as a way to address possible anticompetitive situations, perhaps also beyond the concept of coordinated effects. The review of the recent *AGF/GBI* merger case helps illustrate how the Commission applies the Guidelines to assess coordinated effects in merger cases.

The Chapter continues in the following way. Section 2 describes the potential anticompetitive effects of horizontal mergers: unilateral and coordinated effects. It also addresses the main questions that need to be explored in an assessment of coordinated effects: whether collusion in the ex-post merger market would be sustainable (enforcement problem), whether firms would be able to reach a mutual understanding or agreement (coordination problem), and whether the merger would relax both problems, thus facilitating collusion. Section 3 reviews some approaches which should help identify coordinated effects and "quantify" their relevance in practice. Section 4 describes the evolution of the policy on coordinated effects in European Merger control, and discusses the *AGF/GBI case*. Section 5 of the Chapter concludes.

2 Understanding Collusion to Bring a Coordinated Effects Case

A merger between competitors (known as a horizontal merger)[3] might give rise to an increase in prices and thus be anti-competitive. This might be due to two distinct effects: unilateral and coordinated effects.

To illustrate these effects, consider a set of single-product firms selling substitute products. An increase in the price of one product translates into an increase in the sales of another. However, this positive externality is not taken into account by firms when setting their prices given that the increase in sales benefits rival firms. A merger between two firms would allow them to internalize such externality and, absent any cost synergies,[4] would induce them to push prices up. This holds true regardless of the reaction of the outsiders. If such firms optimally react by also increasing their prices, the *unilateral effects* of the merger would be enhanced.[5] This leads to a new outcome in which all firms end

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[3]Unless explicitly mentioned, through the report we focus on horizontal mergers among producers. Similar principles also apply to horizontal mergers among buyers, who have an incentive to reduce demand and lower prices. However, mergers among buyers can lead to a distinctive feature, namely, buying power, whose impact on coordinated effects is discussed in Section 2.2. Coordinated effects in vertical merger cases are discussed in the Section 2.3.1.

[4]Horizontal mergers can also generate efficiency gains. If such gains are sufficiently strong, they might offset the anti-competitive effects of mergers. See Farrell and Shapiro (1990) for a formal analysis. In Section 2.2 we also discuss the effect of cost asymmetries on coordinated effects.

[5]This effect is shared by all models with "strategic complements", e.g., in which the marginal profit of increasing one's price is higher the higher the price charged by the other firms. This does not hold true in the presence of "strategic substitutes", e.g., when the marginal profit of increasing one's quantity is higher the lower the quantity produced by the other firms. In particular, when firms compete by choosing output, the outsiders react by expanding their output after the merger. However, the overall effect of the merger is an output contraction, given that the merging firms' output reduction is stronger than the outsiders'

up charging higher prices than before the merger, with the merger firm charging relatively higher prices than the non-merged firms.

Firms could also sustain higher prices after a merger by coordinating their actions. A merger leads to *coordinated effects* if it makes it more likely that the merging firms *and* (at least an important subset of) their rivals increase their market power through coordination. In other words, the term "coordinated effects" indicates the higher probability that after the merger the main firms in the market will reach or strengthen a (tacit or explicit) collusive outcome.

To assess whether a merger would create coordinated effects, one should address the following three questions:[6]

1. Would collusion post-merger be possible and sustainable? [*enforcement problem*]

2. Would firms be able to reach a collusive agreement and adapt it to the possibly changing market conditions? [*coordination problem*]

3. Would the merger enhance the likelihood of collusion? [*coordinated effects*]

The first question refers to the *enforcement problem*: for collusion to be sustainable, firms must find it in their own interest to respect the collusive agreement. The stability of collusion in the ex-post merger market is therefore a necessary condition for the merger to give rise to coordinated effects.

However, it is not sufficient: the fact that firms could sustain collusion does not mean that they actually succeed in doing so.[7] For the market outcome to be collusive, it is also necessary that firms solve a *coordination problem*, i.e., they have to agree on which strategy to follow, which price they want to set or which level of output they want to produce, how they will adapt it to changes in the market environment, among many other dimensions of the agreement. The coordination problem might be particularly acute when firms are asymmetric or when they sell differentiated products, as such features may give rise to a conflict of interests among them. Instead, communication among firms might allow firms to more effectively solve the coordination problem. These issues are addressed by the second question above.[8]

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output expansion.

[6]In line with this approach, the EU HMGs state that "[t]*he Commission examines whether it would be possible to reach terms of coordination and whether the coordination is likely to be sustainable. In this respect, the Commission considers the changes that the merger brings about.*" (para. 42).

[7]Even when collusion is sustainable, there are typically many outcomes that firms could end up reaching, which involve lower equilibrium profits, e.g. the equilibrium at the competitive benchmark. Firms might also have conflicting interests as to which equilibrium to play, or as to how to adapt it to changing market conditions.

[8]While policy discussions tend to put most emphasis on the coordination problem, the standard modelling approach focuses on the enforcement problem. Indeed, economic theory provides many insights on the nature of collusive equilibria, but says little on how firms coordinate (or not) on a particular collusive equilibrium, and on which one. There are some recent exceptions. See Harrington (2012b) and Lu and Wright (2010) for analyses on how firms reach a mutual understating through price leadership and price matching. See also discussion in Section 3.3.

There is often a positive link between the circumstances that make collusion more easily enforceable, and those that facilitate coordination on a collusive equilibrium.[9] For instance, as we discuss below, enforcing collusion and coordinating on a collusive equilibrium is the easier the smaller the number of firms. However, enforceability does not imply coordination, or viceversa, i.e., there might be contexts in which coordination is possible and yet collusion is not enforceable, or viceversa.

Answering the first two questions allows to assess whether the merger would give rise to coordinated effects. On the one hand, one could argue that the sustainability of collusion and firms' ability to coordinate on a collusive equilibrium are not sufficient to prohibit a merger on the basis of coordinated effects. For instance, if firms already collude in the pre-merger market structure, one could be tempted to conclude that the merger does not have any incremental effect on collusion. However, whereas this might be a possibility in economic models under particular assumptions,[10] it is unlikely to hold in practice. If collusion took place before the merger, most likely the merger will enhance it, by making it more stable (there would be a lower risk that a shock might result in a breakdown of collusion) or permitting firms to reach higher prices among the sustainable collusive ones. Therefore, if the first two questions indicate evidence of collusion before the merger takes place, then the merger should not be allowed on the basis of coordinated effects.[11]

In the next sections we first define the term "collusion" and describe the mechanisms by which firms can make it sustainable over time. We then examine the factors that facilitate collusion by relaxing the enforcement and the coordination problems. Last, we turn to the issues that need to be examined when evaluating the coordinated effects of horizontal mergers.

2.1   What is collusion?

Tacit versus explicit collusion   For economists, collusion arises when firms are able to sustain prices above some competitive benchmark,[12] under the fear that deviations from the agreed behavior would trigger periods of intense rivalry. Thus, economists put the emphasis on the market outcome and the incentive structure supporting it, regardless of whether firms achieve such an outcome through either *tacit* or *explicit* collusion. Instead,

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[9] As Harrington (2012a) notes: "*conditions for a firm to optimally initiate collusion are, to some degree, dual to the conditions for a firm to optimally sustain collusion.*"

[10] For instance, if the discount factor is very close to one (see Box 1) and if coordination problems are assumed away, then collusion on the monopoly outcome will be possible regardless of the number of firms.

[11] Perhaps the only caveat in this respect is a *de minimis* argument. Indeed, one might argue that a merger between two small competitors is unlikely to further enhance coordination even in markets in which collusion were already sustainable. Even in this case, though, one may object that allowing a merger between small firms may lead to other such mergers which would eventually result in a much more concentrated industry.

[12] It is important to stress that the competitive price may already incorporate a mark-up over marginal costs. This is the case in all oligopolistic models, except for the Bertrand model of price competition and perfectly homogenous goods. Hence, prices above marginal costs do not necessarily reflect a collusive outcome.

lawyers, judges, and antitrust authorities are concerned about the means by which firms reach and sustain a collusive outcome. As Joseph Harrington puts it, *"there is a gap between antitrust practice – which distinguishes explicit and tacit collusion – and economic theory – which (generally) does not."*[13]

In most jurisdictions, only explicit agreements, for which there is hard evidence of communication, are considered illegal. In contrast, tacit collusion is generally not considered as a violation of antitrust law.[14] However, both explicit and tacit collusion are taken into account when assessing the coordinated effects of horizontal mergers. Indeed, a merger might potentially facilitate cartel formation as well as give rise to conditions that relax the enforcement problem faced by firms when colluding either explicitly or tacitly. Accordingly, the assessment of coordinated effects through merger control can constitute a powerful ex-ante tool to deter cartel formation as well to fight tacit collusion. The latter is particularly relevant given the difficulties in fighting *tacit* collusion ex-post.

How can firms sustain collusion? Both theory and experience suggest that frequent interaction among firms may have a dramatic effect on market performance: in a dynamic setting, firms may learn to coordinate their strategies, and hence compete less aggressively with each other over time, through either tacit or explicit agreements. However, colluding is not an easy task as each firm is tempted to cheat on the tacit agreement. This is true even when firms collude explicitly, given that if one firm does not comply with the agreement, such a firm can clearly not be taken to the Courts for breach of contract by the other cartel members.[15]

To illustrate the incentives faced by colluding firms, let us consider a simple set-up. Suppose that all firms in the market sell their products at a price above the competitive price as they understand that it is in their common interest to do so. Knowing that all other firms are setting a high price, any firm could profitably deviate by undercutting it, as the firm would increase its sales with only a slight price reduction. So, what discourages firms from undercutting each-other? It is the fear that the rivals will react by setting very low prices as soon as they detect a price-cut. In other words, the fear that the price deviation will trigger periods of intense rivalry is the disciplining device that makes firms overcome their short-run temptation to deviate, and allows them to sustain collusive outcomes.[16]

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[13]See Harrington (2005) 'The Collusion Chasm: Reducing the Gap Between Antitrust Practice and Industrial Organizational Theory', Slide 7, CSEF-IGER Symposium on Economics and Institutions. For a discussion on the distinction between the economic and legal approaches to collusion, see for instance Kaplow and Shapiro (2007).

[14]See Motta (2004) and Mezzanotte (2009) for a discussion.

[15]In the presence of leniency programs, the deviant would be the one to denounce the cartel to the antitrust authority. After the deviation the cartel would in any case destabilize, but thanks to the leniency application the deviant would benefit from a reduced fine or even amnesty. For this reason, leniency programs hinder collusion. See Motta and Polo (2002).

[16]This explains why collusion can only be reached in dynamic settings (i.e., when firms interact repeatedly): in static settings the reduction in future profits cannot be used as a credible threat to discourage deviations simply because the future does not exist. Nevertheless, repeated interaction is not sufficient:

In order to sustain collusion, it is necessary that firms are able to detect deviations, for which they need to monitor each other. Equally critical for the sustainability of collusion, is firms' ability to credibly retaliate when they detect a deviation. But the possibility of inflicting strong punishments has to be assessed relative to the gains from deviation. Indeed, colluding firms face a trade-off. On the one hand, if a firm respects the collusive agreement, it gets collusive profits in the current period as well as in all future periods. On the other hand, if it deviates, it gets a higher profit in the current period, but much lower profits in the future as the deviant will be punished. Collusion will thus be sustainable if the value of current and future collusive profits exceed the value of current deviation profits followed by the flow of future punishment profits. This trade-off involves current short-run gains versus future losses. Therefore, any factor that enhances the future losses from deviating or that mitigates the current short-run gains from deviation will tend to facilitate collusion. We expand on this in the next section.

2.2 Which factors facilitate collusion?

A factor facilitates collusion if it allows firms to sustain and to agree on a collusive strategy in markets where collusion would otherwise not be sustainable. A facilitating practice may also strengthen collusion, by allowing firms to raise the profitability of the collusive agreement in markets in which firms were already sustaining prices above the competitive benchmark.

A correct identification of the factors that facilitate collusion is particularly relevant in merger analysis as it is in those industries more vulnerable to collusion where the coordinated effects of mergers are more likely to arise. The section on coordinated effects of the EU HMGs starts by noting that "[i]*n some markets the structure may be such that firms would consider it possible, economically rational, and hence preferable, to adopt on a sustainable basis a course of action on the market aimed at selling at increased prices.*" (para. 39). The aim of this section is to identify the factors that make some markets particularly more prone to collusion than others.

A factor facilitates collusion if (i) it relaxes the conditions that guarantee that firms have no incentives to deviate from the collusive agreement (*enforcement problem*);[17] or if (ii) it facilitates coordination on a collusive equilibrium (*coordination problem*). The first condition is met if collusive profits increase, deviation profits are reduced, or if the punishment threat becomes more severe. An improvement in monitoring, so that deviations can be more quickly and more accurately detected, would also relax the enforcement problem and thus facilitate collusion. The second condition is met when firms' conflict of interests is mitigated, or when they can more effectively communicate to coordinate their actions.

For ease of exposition, we classify the factors that affect collusion under four broad

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interaction has to be infinite, or last for an undetermined number of periods. Otherwise, in the last period all firms would deviate knowing that future punishments are not feasible. In turn, this makes it impossible to threaten firms in previous periods, so that collusion unravels in all periods.

[17]In Economic Theory, these are referred to as incentive compatibility constraints, see Box 1.

categories: (i) supply factors, (ii) demand factors, (iii) transparency, communication and information exchange; and (iv) corporate governance structures.

2.2.1 Supply factors

Number of firms   The number of firms in the market plays a crucial role in determining the likelihood of collusion. As expressed in the 2004 EU HMGs, "*it is easier to coordinate among a few players than among many*". In other words, a small number of competitors find it easier to overcome the coordination problem.[18]   Furthermore, once firms have reached a consensus on the collusive agreement, it is the easier for them to sustain collusion the fewer they are. That is, a small number of competitors also find it easier to overcome the enforcement problem: first, the smaller the number of firms in the industry the easier it is to monitor each other; and second, the temptation to deviate from the collusive agreement is also weaker since collusive profits have to be shared among fewer firms.

Entry   The number of firms in an industry can increase through entry. As acknowledged by the 2004 EU HMGs, one of the conditions for the sustainability of collusion is that "*the reactions of outsiders, such as current and future competitors not participating in the coordination...should not be able to jeopardize the results expected from the coordination*" (para. 41). Indeed, in industries with low barriers of entry, firms will find it difficult to sustain collusive agreements.[19] This holds true regardless of how the entrant behaves and how the incumbents react to entry.[20]

Excess Capacity   The degree of firms' excess capacity is a key ingredient affecting collusion possibilities. When firms are capacity-constrained, capacity constraints affect the size of the market that a firm can capture for itself when it deviates. Hence, the larger the firm's unused capacity, the greater its incentives to deviate. However, capacity constraints also affect the scope of other firms to flood the market in order to reduce profits following a deviation. Hence, the larger the degree of excess capacity in the industry, the more effective is such disciplining device. Since these two forces move in opposite directions, it is a priori not possible to conclude whether larger capacities at the industry level facilitate or hinder collusion.

Size Asymmetries   Let us start by considering a market made of symmetric firms, in the sense that they all sell homogenous products which they can produce at equal costs. Any move away from symmetric market shares (which would raise concentration) would

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[18]The idea that coordination is easier the smaller the number of firms is intuitive, but there is little economic literature on this result. See Compte and Jehiel (2010). Huck et al. (2004) and Engel (2007) provide experimental evidence in the lab supporting this result.

[19]Very often entry occurs in industries in which future demand is growing, and these two facts might affect collusion in opposite directions. See below for a discussion of collusion under demand fluctuations.

[20]The lysine cartel provides an example of how incumbent firms react to entry. See Connor (2001) for details.

also hinder collusion. This is so since the firm with the small market share has more to gain by deviating and less to lose from being punished.

Differences among firms - such as differences in their productive capacities, in the features of their products, in the size and content of their product portfolios, or in their production costs - typically explain why market shares are asymmetric. The question is then: how do such fundamental asymmetries, which often translate into asymmetric market shares, affect collusion?

While asymmetries might have a different impact on the mechanisms affecting the incentives to collude, there is a robust result that says that firms' asymmetries hinder collusion. Indeed, as we describe below, firm symmetry facilitates both the enforcement as well as the coordination problem.

Firm symmetry relaxes the enforcement problem, for one key reason: the scope of collusion is determined by the firm facing the greatest difficulties to collude (be it the large, or the small firm);[21] as firms become more symmetric, there is a transfer in the ability to collude from those that find it easier to collude to those that face the greatest difficulties in colluding. This re-balancing in the incentives to collude unambiguously facilitates collusion.

To fix ideas, consider a context in which market share asymmetries derive from differences in firms' product lines (Kühn (2004) and Motta (2004)). If the size of a firm is a function of the number of product varieties it holds, then it is the small firm the one that faces the greatest difficulties in colluding.[22] For a large firm, a reduction in the price of one of its varieties has a negative effect on the profits it makes through its other varieties. Hence, a large firm has a weaker incentive to deviate as compared to a single-product firm, since the latter does not internalize the negative impact of a price cut on other varieties. Similarly, low prices after a deviation hurt the large firms relatively more than the small firm, and so the large firms' ability to hurt the small one is limited.

When market share asymmetries derive from capacity asymmetries, the mechanisms sustaining collusion differ from the one just described. Let us consider a model in which firms sell homogenous products but are subject to asymmetric capacity constraints (Compte, Jenny and Rey (2002)). The large firm, and not the small one, is now the one that would benefit most from deviating, given that it could capture a greater fraction of the market were it to undercut the collusive price. Furthermore, the small firms cannot inflict strong punishments on the large firm given that, even when operating at full capacity, the residual demand left for the large firm would still be significant. Hence, the bigger the large firm the more difficult it is to discourage such a firm from deviating. A more equal distribution of firms' capacities would realign their incentives to collude and their capacity to punish deviators, thus facilitating collusion. In general, this implies that capacity asymmetries hinder collusion. Still, differences in concentration due to differences in the size of the small competitors should have no impact on the sustainability of collusion, as long as the

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[21]Technically speaking, this is the firm whose incentive compatibility constraint is binding.

[22]A similar result also arises in models with asymmetric capacities, which give rise to cost asymmetries (Vasconcelos (2005)).

size of the large firm remains unchanged.

When assessing the role of firms' asymmetries, it is also equally important to understand how they affect the coordination problem. According to the 2004 EU HMGs, "[c]*oordinating firms should have similar views regarding which actions would be considered to be in accordance with the aligned behavior and which actions would not.*" (para. 44) and "[f]*irms may find it easier to reach a common understanding on the terms of coordination if they are relatively symmetric, especially in terms of cost structures, market shares, capacity levels and levels of vertical integration.*" (para. 48). In other words, symmetry is generally assumed to relax the coordination problem.

When firms are engaged in tacit collusion, identifying a "focal point" in terms of prices or market shares, may become the less obvious the more asymmetric firms are. When firms sell homogenous products and face equal costs of production, there is a single monopoly price which all firms should be able to compute, as they all share equal information. However, when their costs or the features of their products differ, agreeing on a common collusive price might not be an easy task, and firms might face conflicting interests as to which price to select. For instance, under cost asymmetries, low cost firms may prefer to collude on lower prices than high cost firms, and successful collusion might be preceded by periods of trial-and-error through prices until firms achieve a tacit agreement on a given price.[23]

When firms are engaged in explicit collusion, bargaining can lead to efficient outcomes even among asymmetric firms.[24] However, inefficiencies might arise whenever firms' asymmetries are private information (e.g., firms do not know each others' costs, the features of their rivals' products, etc.). Therefore, to the extent that firms' asymmetries go hand in hand with asymmetric information, it is reasonable to expect that such asymmetries might hinder coordination on a efficient outcome.

Cost Asymmetries   Cost asymmetries also hinder collusion. In this case, the low cost firm, which is typically also the large firm, finds it more tempting to deviate from the collusive agreement: it has more to gain by deviating as at any price its markup is higher, and it fears less the punishment that can be inflicted by its high-cost rivals.[25]

Matters are more complex when firms do not know each others' costs. Athey and Bagwell (2001)[26] analyze a model of collusion with private cost information in which firms might face independent cost realizations in every period. They show that successful collusion among firms with asymmetric costs might sometimes entail productive inefficiencies: a high cost firm must be given incentives to report its true cost, and such incentives may

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[23]Mason, Phillips and Nowell (1992) provide experimental evidence showing that cooperation is more likely among firms with symmetric costs.

[24]Indeed, in bargaining models with sequential offers (Rubinstein, 1982), agreement is efficient as otherwise firms would continue bargaining until all efficiency improvements get exhausted.

[25]In contrast to this result, Miklos-Thal (2009) finds that, if side-payments are allowed, cost asymmetries facilitate collusion.

[26]See also Athey, Bagwell and Sanchirico (2004), who assume persistence in cost shocks instead of assuming that cost shocks are independent across periods.

require that the high cost firm serves an inefficiently large share of the market.[27] Such productive inefficiencies hinder collusion as they reduce collusive profits. Incentives for the high cost firm to truthfully report its cost might also come through side-payments by the low cost firm, but these would leave traces of explicit collusion and cartel firms would thus risk being detected and fined.

Multi-market contact   The possibility to sustain collusion might also depend on the number of markets in which the same set of firms interact; this is referred to as multi-market contact.[28,29] Building on the intuition described above on the effects of asymmetries, pooling the incentives to sustain collusion across asymmetric markets can help mitigate asymmetries within markets. Furthermore, multi-market contact facilitates collusion through increases in the frequency of interaction.

2.2.2   Demand factors

Demand movements   The sustainability of collusion is affected by demand movements over time. Consider first the case of a market whose demand is known to steadily grow over time. Collusion in this market is more easily sustainable than if the demand is decreasing for a simple reason: future demand affects the losses from deviating, which are the greater the higher future demand.[30]

The same logic extends to contexts in which demand moves cyclically over time, across booms when demand is rising and across recessions when it is declining. If one compares the sustainability of collusion across two periods of the cycle with equal demand, one in a boom and the other one in a recession, the incentives to deviate are the same but the losses from deviating are greater at the former. Hence, the scope for collusion is greater during booms than during recessions (see Haltiwanger and Harrington (1992)).[31]

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[27]Athey and Bagwell (2001) also show that if firms are sufficiently patient, perfect collusion can be achieved without sacrificing productive efficiency. This can be achieved by promising a high cost firm today with a higher market share in a future period in which both firms have equal costs. Market transfers so achieved are sufficient to ensure truth-telling as long as the discount factor is sufficiently high.

[28]For example, Bernheim and Whinston (1990) show theoretically that, in some cases, multi-market contact can improve firms' abilities to sustain high prices by pooling the incentive constraints that limit tacit collusion.

[29]See Phillips and Mason (1992) and Evans and Kessides (1994) for evidence of multimarket contact and collusion.

[30]This logic might nevertheless be reversed if future punishment profits also depend on the value of future demand and the impact of future demand movements is greater on punishment profits than on collusive profits. Fabra (2005) shows that collusion is more easily sustainable when demand declines if firms are subject to severe capacity constraints.

[31]Nevertheless, the above discussion assumes that the market structure remains unchanged despite demand movements. However, in markets where entry barriers are not too high, this need not be an adequate assumption. Indeed, entry is more likely during booms, just as exit is more likely during busts. The question is thus whether the impact of such changes in market structure prevail over the impact of demand movements on collusion. See Lepore and Knittle (2010) for an extension of Fabra (2005) with endogenous capacity choices.

In contrast to our previous discussion, both the European Commission and the Court of First Instance view demand growth as a factor hindering collusion.[32] We can think of two plausible explanations for this divergence: first, competition authorities and courts emphasize the role of demand growth on promoting entry (Vasconcelos (2008)); and second, they view demand growth as a source of demand instability, which - as discussed below - might jeopardize collusion sustainability.

Unexpected demand shocks When expected future demand is the same across all periods, so that the expected losses from deviating are also constant, unexpected positive shocks in demand can disrupt collusion by enhancing firms' current incentives to deviate (Rotemberg and Saloner (1986)). For this reason, even when demand shocks can be observed ex post, demand volatility hinders collusion.

Buying power Demand volatility can be exogenous, e.g. as in electricity markets, or endogenous, e.g. when it is driven by the demand of a big buyer that can decide how to schedule orders. Following the same logic as above, a big buyer is able to disrupt collusion by concentrating its purchases rather than scheduling frequent and regular orders (Snyder (1996)).[33] In this sense, buying power, which gives the buyer the ability to reduce the frequency of the interaction, hinders collusion. In line with this reasoning, the 2004 EU HMGs state that "*if a market is characterized by infrequent, large volume orders, it may be difficult to establish a sufficiently severe deterrent mechanism*" (para. 53). The 2010 US HMGs contain a similar statement: "*A firm is more likely to be deterred from making competitive initiatives by whatever responses occur if sales are small and frequent rather than via occasional large and long-term contracts*"" (Section 7.2).

Demand uncertainty Demand volatility very often comes hand in hand with demand uncertainty.[34] If demand changes over time and if such movements cannot be publicly observed, then firms might find it more difficult to monitor each other as a reduction in demand - which depresses all firms' sales - can be wrongly confounded with a rival's price cut. In contrast, when market demand is stable, inferring deviations from publicly available data is easier than when the demand is volatile. We postpone the discussion of collusion when there is imperfect monitoring to Section 2.2.3, where we discuss the role of market transparency in facilitating collusion.

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[32] The decision of the Airtours/First Choice merger case illustrates this view, as the CFI argued that evidence of "strong growth" in demand would undermine attempts to collude. See Section **??** for a discussion.

[33] The practice of concentrating large volume orders at infrequent times was for instance followed by the US government when it bought vaccines in bulk in order to undo collusion (Scherer (1980)). By buying in bulk, the government both increases the stakes of each procurement auction and reduces the frequency of such auctions, thus increasing the bidders' incentives to deviate and constraining their ability to punish each other in the near future.

[34] However, this is not necessarily always the case. For instance, demand can be perfectly observable and perfectly predictable, and yet it can change and be volatile over time.

2.2.3 Transparency, communication and information exchange

In this Section, we first discuss the importance of market transparency, which by increasing the observability of prices and quantities, improves monitoring. We then turn to the importance of communication in facilitating coordination among firms on a particular outcome. We emphasize the role and effects of different types of communication (whether it refers to future conduct or current and past data, whether it is public or private, and whether it includes detailed or aggregate data) on both the risk of collusion and the potential efficiency losses of banning communication.

Transparency In order to sustain collusion, it is necessary that firms are able to detect deviations, for which they need to monitor each other. Monitoring is thus a key ingredient of any collusive agreement. One can distinguish two features that characterize the effectiveness of monitoring: how long it takes firms to detect any potential deviation, and how precise is the information that firms receive on whether a deviation has indeed taken place. Monitoring is clearly the more effective the quicker it allows to detect deviations and the more accurate it is in reporting whether a deviation has taken place. Transparency improves monitoring in these two dimensions.[35]

In order to understand the role of transparency, let us consider the case in which market demand is uncertain and transaction prices cannot be publicly observed. Firms only see their own sales, but do not observe demand shocks. Firms cannot infer deviations from the data they observe, given that low sales can be due either to a low demand realization or to undercutting by the rival firm. If periods of low sales were not followed by a number of periods of intense rivalry or price wars, then firms would deviate knowing that they would go unpunished. Hence, in opaque markets, price wars are a disciplining device needed to avoid deviations, even when such deviations do not take place. Given that during price war periods firms make low profits, the profitability of collusion is lower in opaque than in transparent markets, as in the latter price wars are not used in equilibrium.

Practices aimed at increasing transparency Given the importance of monitoring, competition policy should pay special attention to practices that help firms monitor each other's behavior. One example of such a practice is given by communication on past conduct, that is discussed shortly. Other commercial and pricing practices also increase observability of firms' actions. For instance, collusion is more difficult when firms produce scores of *heterogenous products*, both because they would have to keep track of prices of too many products (which makes sustainability more difficult) and because different products' prices are likely to be affected in a different way when shocks occur, which makes coordination more difficult. But if firms organize prices in very few and well defined *price*

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[35]This is acknowledged in the HMGs both in Europe as well as in the US. For instance, the US HMGs state that *"[a] market typically is more vulnerable to coordinated conduct if each competitively important firm's significant competitive initiatives can be promptly and confidently observed by that firm's rivals. This is more likely to be the case if the terms offered to customers are relatively transparent."* (Section 7.2)

categories, then both coordination and monitoring become much easier.

In the same vein, *resale price maintenance* (RPM)[36] helps collusion among suppliers. Indeed, as shown in Jullien and Rey (2007), RPM can facilitate collusion by making it easier for firms to monitor each other. To see why this is the case, consider a context in which downstream markets are subject to shocks on demand or retail costs that producers cannot observe. In the absence of RPM, downstream prices would reflect these shocks; for instance, if retailers' costs decrease, part of the cost reduction would optimally be passed-through to retail prices. On the one hand, this allows firms to make higher collusive profits, thus discouraging deviations; on the other hand, it also makes it harder for firms to distinguish price cuts due to cost shocks, from price cuts due to deviations. RPM removes retail price flexibility, and thus has the opposite effects: lower collusive profits but more effective detection. The overall effect might seem ambiguous. However, in those cases in which RPM has no efficiency effects, we can be confident that if firms decide to adopt RPM it is because the pro-collusive effect dominates.

Communication In order to assess the role of communication and information exchange, it is first important to understand whether it makes any difference if firms communicate or not. In other words, does it makes any difference whether firms collude tacitly or explicitly? On the one hand, through explicit collusion, firms might be able to reach and sustain outcomes they would not otherwise achieve. This is so since explicit communication facilitates agreement among the collusive firms, allows to tailoring the pricing and sales policies to the specificities of each cartel member, makes it possible to adapt the collusive policies to changing market conditions, and allows firms to more effectively monitor each others' behavior. On the other hand, communication among cartel firms is costly, as it leaves trails that can then be used to detect the cartel.

Given the importance of communication, a powerful tool to fight collusion would be to prohibit communication among firms whenever such prohibition entails no efficiency losses, or rather, whenever the potential gains of deterring collusion exceed the potential efficiency losses of banning communication. For this reason, it is important to distinguish two types of communication. First, firms might communicate about their future intended conduct, e.g., planned production, prices, new product releases, capacity decisions, etc. This information is "soft" as it conveys intentions only, and cannot be verified by rival firms. Second, firms might communicate about current and past conduct, e.g. current and past sales, prices, product features, input prices, information about customers, etc. This information is "hard" as it can be verified, e.g. through invoices, customers' declarations, etc.

Communication about future conduct is important for sustaining collusion. On theory grounds, it is not straightforward to demonstrate that communication about future intentions helps sustaining collusion, as such communication has no commitment value.[37]

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[36]Under RPM, retail prices are set by producers rather than by distributors.

[37]In the jargon of economic theory, this is referred to as "cheap talk".

Still, it can be a powerful tool for collusive purposes since it might facilitate coordination on a specific outcome, as explained below.

In many contexts, firms can sustain collusion on several prices but first need to coordinate on which price they will all choose. For instance, suppose that collusion at the monopoly price is sustainable and that products are perfect substitutes. Then, prices sufficiently close to the monopoly price should be equally sustainable too, as profits from deviating or colluding at such prices are roughly similar as when the monopoly price is chosen. However, not knowing whether rival firms plan to collude at the monopoly price or at prices arbitrarily close to it, firms face "strategic uncertainty": if a firm sets the monopoly price but its rivals set a slightly lower price, the former will make zero profits and collusion could collapse. In light of this, firms may prefer to collude on prices below the highest sustainable price.[38] Communication about the price that firms plan to set mitigates strategic uncertainty, and thus facilitates collusion on higher prices.[39]

However, not all announcements about future prices are harmful. When firms announce their sale prices to consumers, and they commit to serve consumers at those prices, transparency increases on the demand side and it favors 'shopping around': prospective customers are better informed on the possible deals, and they will tend - other things being equal - to buy from firms which offer lower prices. In turn, this will make the market more competitive.

It is true that when price announcements are public, prices would become transparent not only on the demand side but also on the sellers' side. The latter effect would in principle favour collusion, but empirical evidence shows that it is the former effect which prevails.[40] It is important to stress, though, that for such a pro-competitive effect to take place, announcements should not only be public but also carry a commitment value towards consumers.[41]

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[38]In games with multiple equilibria, one can apply the concept of *risk dominance* in order to select a plausible equilibrium (Harsanyi and Selten (1988)). In symmetric games (e.g. if symmetric firms charge the same price, they all get equal profits) this criterion allows for a simple interpretation: if firms are unsure about which price the rival will choose and assign equal probability to the rival choosing either a low or a high price, then the low price equilibrium risk dominates the high price equilibrium if the expected payoff from choosing the low price exceeds the expected payoff from choosing the high price. For instance, if firms consider choosing the monopoly price or one slightly below, choosing the latter is the risk dominant equilibrium.

[39]The role of communication in eliminating strategic uncertainty has been explored in experimental settings. It has been shown that in the presence of strategic uncertainty, firms collude on prices below the monopoly level even when pricing at the monopoly level is also an equilibrium. See Cooper et al. (1989) and Van Huyck et al. (1990).

[40]See Motta (2004: 152-156) for a discussion.

[41]A famous case of communication of future intentions involved the Airline Tariff Publishing Company (ATP), which used to collect and store data on airline fares quoted on computer reservation systems. Price announcements through ATP were public but had no commitment value towards consumers: airlines could enter future prices into the ATP system but could also change those prices before they could be effectively available for customers. Therefore, ATP constituted a pure vehicle for price coordination with no real price effects, very much as when firms are sitting around a table discussing future prices (US Department of Justice (1994)). In this case, whether potential buyers see the discussion or not, it makes little difference...

Communication about firms' future *production* plans is also unlikely to increase efficiency as it implies no commitment (plans can be changed), and it is unlikely to be informative to consumers. Instead, this type of information exchange may allow firms to reduce strategic uncertainty and thus to more effectively collude too. This example illustrates the practice followed by the US automobile industry, that used to exchange production plans via the trade press (see Doyle and Snyder (1999)).

Communication about past conduct is also very important for sustaining collusion, though for different reasons. As argued above, the ability to monitor each other is crucial for the sustainability of collusion. Therefore, in markets in which firms cannot directly observe each other's price or output choices, communication about past conduct allows firms to overcome the lack of transparency. The more disaggregated the data (e.g. individual price choices and individual sales rather than average market price or aggregate sales) the more effective will communication be in allowing firms to detect deviations and to tailor punishments to the deviant.

2.2.4 Corporate and governance structure

Partial ownership arrangements (also referred to as cross-ownership) constitute passive investments as the acquiring firm gains no control over the decision taken by the firm whose stock it has acquired. Still, partial ownership arrangements may impact firms' conduct both in static as well as in dynamic games. In oligopolistic markets, when a firm increases its output it does not internalize the externality it imposes on others as the market price goes down. Hence, firms tends to over-produce above the level that maximizes industry profits. However, when holding shares of competitors, firms are able to at least partially internalize this negative externality, so that the market outcomes approach the monopoly outcome even in a static setting.[42] In the limiting (though probably unrealistic case) in which firms retain control but exchange their stock across them, the monopoly outcome can be achieved with no need to collude.

Partial ownership arrangements also change firms' incentives to sustain collusive outcomes.[43] Authorities typically view cross ownership as a factor facilitating collusion. For instance, the EU HMGs note that "[s]*tructural links such as cross-shareholding or participation in joint ventures may also help in aligning incentives among the coordinating firms*" (para. 48). Indeed, under cross-ownership deviation incentives are mitigated, given that a deviation by one firm imposes losses on others. Hence, cross ownership facilitates collusion. Like *cross-ownership, cross-directorships* and *joint ventures* may also offer opportunities for competitors to talk to each other, thereby making coordination easier. Similarly, purchasing and/or distribution agreements can also serve the same purpose.

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[42] For instance, in January 2011, the OFT opened an investigation into Ryanair's minority stake in Aer Lingus because it believed that it potentially raised competition concerns. The OFT press release can be found at http://www.oft.gov.uk/news-and-updates/press/2011/01-11.

[43] See Gilo et al. (2006) for an analysis of the effects of partial cross ownership on the sustainability of tacit collusion. See also Buccirossi and Spagnolo (2007) for a discussion.

2.3   Is there a coordinated effect?

Putting together the above insights, when would the merger make collusion easier, more stable, more effective, and when would the mechanisms to sustain it be more easily agreed upon after the merger? If, in the light of the analysis developed in the previous section, collusion was already sustainable before the merger, it is highly likely that the merger would further strengthen firms' coordination. Hence, the analysis of whether the merger would create coordinated effects need not go much further. However, in those markets in which collusion was not likely to be sustainable before the merger, one should conduct a careful analysis on the impacts of the merger on collusion.

The most straightforward effect of a merger is the reduction in the number of firms in the market. This alone has a direct effect on the incentives to collude: collusive profits have to be shared with fewer firms, so that the temptation to deviate from the collusive agreement is weaker. The reduction in the number of firms also creates unilateral effects, i.e., even in the absence of collusion, competition tends to be the weaker the smaller the number of firms in the market.[44] While this might weaken the punishment threat, the deviation effect is of a higher order magnitude than the punishment effect, implying that a reduction in the number of firms facilitates collusion despite the unilateral effects of the merger. The above, coupled with the fact that the reduction in the number of firms also relaxes the coordination problem (Section 2.2), unambiguously indicates that horizontal mergers facilitate collusion. However, this should not misinterpreted to conclude that all mergers make collusion sustainable, as other factors also have to assessed.

Among other relevant factors, it is particularly important to assess the effect of mergers on market structure; in particular, whether market structure becomes more or less symmetric after the merger.[45] As discussed in Section 2.2 above, mergers that make the large firm smaller or the small firm larger (i.e., symmetry increasing mergers) tend to facilitate collusion by relaxing the enforcement problem. Intuition also suggests that symmetry facilitates coordination on a collusive outcome. Hence, even if a merger involves a reduction in the number of firms, it might hinder collusion if it increases asymmetries among firms.

If there are any concerns that a merger would lead to coordinated effects, remedies should involve divestments that increase asymmetries among existing firms. A highly illustrative merger case in this respect is the *Nestlé/Perrier* case.

While horizontal mergers may weaken competition, they can also induce important **efficiency gains**. Indeed, if efficiency gains are sufficiently large, they may offset the otherwise negative effects of mergers on overall welfare. This question is well understood when it comes to assessing the trade off between efficiency gains and unilateral effects,[46] but much less attention has been devoted to the analysis of the interaction between efficiency gains and coordinated effects. Still, the discussion of cost asymmetries in Section 2.2 can

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[44]For instance, this is true in a Cournot model, when firms compete by choosing quantities.

[45]See Fonseca and Normann (2008) for experimental evidence of the effects of asymmetric mergers on collusion.

[46]See Whinston (2006), Motta (2004) and Motta and Tarantino (2016).

shed some light on this issue: efficiency gains by the merging firms enhance cost asymmetries, which in turn hinders collusion. Furthermore, even if collusion is still sustainable after the merger, efficiency gains may imply an output transfer from the less efficient to the more efficient firms, as well as a reduction in the collusive price. Assessing the trade-off between efficiency gains and coordinated effects is nevertheless a difficult task: not only prospective efficiency gains have to be estimated (as in a unilateral effects case), but also the impact of such gains on the likelihood of collusion.

Mergers can also affect the sustainability of collusion through its effects on multi-market contact among firms.[47] The idea is that collusion in all markets can be facilitated if mergers make more symmetric the market position of firms across such markets. To illustrate this, let us go back to the example used before: consider two markets, A and B; firm 1 is present in both markets, while firms 2 and 3 are only present in market A and B respectively. In market A firm 1's market share is s and firm 2's is $1 - s$; while in market A firm 1's market share is $1 - s$ and firm 3's is s. A merger between firms 2 and 3 creates multi-market contact between firm 1 and the new merged entity, and this implies that firms become symmetric across markets. Whereas before the merger within market share asymmetries would make collusion difficult, the merger facilitates collusion by making firms symmetric. While this example illustrates a concentration among two firms in unrelated markets, i.e., a conglomerate merger, the intuition extends to horizontal mergers with conglomerate aspects.

The structure of cross-ownerships among merging firms also has to be carefully assessed in a coordinated effects analysis. Consider again a simple example. Suppose that firm 1 owns a certain amount of shares of firm 2, while firm 2 owns the same amount of shares of firm 3. The latter is the one that finds it more difficult to collude, given that the other two firms' incentives to deviate are tempered by the fact that a deviation hurts them indirectly through their partial ownership of rival firms. A merger between firms 2 and 3 would imply that all firms in the market have fully symmetric cross-ownership on one another, thus facilitating collusion.

2.3.1 Coordinated effects of vertical mergers

Just as horizontal mergers have the potential to facilitate collusion, so do vertical mergers. This can be due to some of the effects highlighted before when assessing the coordinated effects of horizontal mergers. For instance, a vertical merger might make active firms more symmetric if after the merger all firms are vertically integrated and therefore share the same type of production (and distribution) costs. In turn, this would facilitate collusion.

In this section we focus on the coordinated effects which arise only because of the

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[47]Issues of multimarket contact have recently been raised in European merger cases. In 2007, Elopak and SIG, which were the main competitors of Tetrapak in the aseptic and fresh carton markets respectively, planned to merge. The Commission opened an in-depth investigation, but it was closed because the merger bid itself failed in face of an alternative bidder. See Kühn (2008) for a discussion. See also See also Montero and Johnson (2012) for a recent theoretical analysis.

vertical relationship. As shown by Nocke and White (2007),[48] vertical mergers might facilitate collusion among producers. On the one hand, when two firms vertically integrate, the size of the downstream market that a deviant can capture is smaller, given that the integrated retailer is loyal to its upstream subsidiary. This effect, which is referred to as the *outlets effect*, reduces deviation profits and thus facilitates collusion. On the other hand, it is also more difficult to discipline a vertically integrated firm given that it benefits, in any event, from the profits made by its downstream subsidiary. This effect, which is referred to as the *punishment effect*, reduces the severity of the punishment threat and thus hinders collusion. However, the outlets effect dominates, implying that vertical mergers facilitate upstream firms' ability to collude.

We believe that this conclusion would be strengthened in markets with imperfect observability, e.g. because upstream producers cannot observe each others' prices and these cannot be inferred from retailers' price or output choices. Indeed, if the downstream market is subject to random shocks, producers cannot distinguish whether a price cut by a retailer is due to an adverse demand shock or to a deviation by an upstream rival (just as described in Jullien and Rey (2004); see Section 2.2.3 above). In this context, vertical integration would allow the upstream producer to better monitor the behavior of its upstream rivals, given that its downstream subsidiary would have information on retail conditions. This concern is also contained in the 2008 EU NHMGs, which state that "[v]*ertical integration may give upstream producers control over final prices and thus monitor deviations more effectively.*" (paragraph 86). This effect, if combined with the *outlets effect* of vertical integration, would again point to the same conclusion: vertical mergers have the potential to facilitate upstream collusion.

This theory was to the best of our knowledge first adopted by the UK Competition Commission in the *Anglo/Lafarge* case. The merger (involving cement and concrete producers) did not create vertical integration, but increased it. According to the Competition Commission, it would have allowed Lafarge better access to information. Integration with Anglo would in particular provide Lafarge with a better understanding (in terms of overall information and its geo-graphic distribution) of the ready-to-mix (RMX) market. The ownership of the RMX plants would increase the knowledge of the local market conditions and allow better monitoring of deviations, whereas absent the merger, Lafarge would find it difficult - in areas where it does not have RMX plants - to understand whether lower sales would be due to an overall decline in demand or a deviation by competitor.[49]

The above conclusion is also reflected both the US and EU Non-Horizontal Merger Guidelines (NHMGs); however, their reasoning is somewhat different. In particular, the NHMGs highlight the role of vertical integration in facilitating collusion through the elimination of "disruptive buyers". For instance, the 1984 US NHMGs state that: "*The elimination by vertical merger of a particularly disruptive buyer in a downstream market may facilitate collusion in the upstream market.*" (Section 4.222)[50] This concern rests on

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[48]See also Normann (2009), which considers linear prices, and allows for the raising rivals' costs effect.

[49]See also Crocioni (2012), work in progress.

[50]The 2008 EU NHMGs include similar concerns. See paragraph 90.

the following intuition: if sales to a disruptive buyer are relatively important, then upstream firms might have more incentives to deviate in order to secure business with such relevant buyer. A merger with such a buyer reduces rivalry, and thus facilitates collusion.

Still, this result can also be accommodated within our previous reasoning. Note that if "*sales to a particular buyer are sufficiently important*", such a buyer is necessarily a big one. Vertical integration with a big buyer enhances the outlets effects: the larger the integrated buyer, the smaller the fraction of the downstream market that the potential unintegrated upstream producers can capture if they deviate. Hence, a vertical merger with a big buyer facilitates collusion more than a vertical merger involving a relatively smaller retailer (Nocke and White (2010)).

3 Quantifying Coordinated Effects Case in Practice

3.1 Preliminary considerations: HHI, symmetry, and past collusion

The analysis of collusion and of the factors which facilitate it is the building block for the analysis of coordinated effects in mergers, and provides us with important hints on how to conduct such analysis in *practice*. Whenever an agency is facing a merger, it will have to make an analysis of the market, to gather hints as to whether the merger may raise unilateral effects, or coordinated effects, or whether it raises no danger of increased market power. When conducting such an analysis, some hints of whether coordinated effects may be relevant at all could be obtained by looking at very *simple indicators*.

In our opinion, the following will be especially important. First, in general tacit collusion is unlikely to arise unless after the merger there will be two or three firms with a very important share of the market (say, more than 70%), and there will be considerable symmetry among them. This consideration is only partially aligned with what is probably considered the main indicator for anticompetitive mergers, that is, the Herfinshal-Hirschman Index (HHI) of industrial concentration.[51] Given that the HHI is the sum of the squared market shares, the index is the higher - other things being equal - the fewer the firms in the industry. However, the HHI decreases with symmetry. Therefore, we suggest that an agency should not only look at whether the industry is concentrated, but also - for the purpose of deciding whether to look into coordinated effects - if market shares (and capacities) are sufficiently symmetric across the main players.

Second, a motivated suspicion of strengthening of coordinated effects should arise whenever one discovers that the industry has a past history of collusion (for instance, cartels have been investigated following suspicious conduct, or successfully prosecuted, perhaps also in similar or adjacent markets), when firms have developed a web of relationships (joint ventures, purchasing and/or distribution agreements, cross-directorates etc.), when they have established a system of exchange of information (or other price schemes

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[51]See Coate (2005) for an empirical investigation of what are the main factors behind the FTC decisions to challenge a merger. HHI levels and changes are definitely one of the variables with most explanatory power.

which allow to improve monitoring), or when suspiciously parallel price movements have taken place over time (in this respect, we shall explain in Section 3.2 that there are a number of relative simple collusive 'markers' or 'screens' one may want to look at).

3.2   Screening for coordinated effects

The EU HMGs state that evidence of past coordination is particularly important when assessing the coordinated effects of mergers, particularly so if the characteristics of the relevant market have not changed significantly or are unlikely to change in the near future. Evidence of coordination in similar markets is equally relevant (paragraph 43). In line with this, the 2010 US HMGs state that "*conditions are conducive to coordinated interaction if firms representing a substantial share in the relevant market appear to have previously engaged in express collusion affecting the relevant market....Failed previous attempts at collusion in the relevant market suggest that successful collusion was difficult pre-merger but not so difficult as to deter attempts, and a merger may tend to make success more likely.*" The view that firms that colluded in the past will try to do so again is supported by empirical evidence showing that cartel break down tends to be followed by attempts to reestablish cartels (Levenstein and Suslow (2002)).

Economic analysis can play a major role in screening, i.e., identifying those industries in which cartel formation and tacit collusion are more likely. Screening is the first step in the process of detecting cartels, and it may or may not end up in prosecution. Indeed, it is a useful tool in that it picks those industries where antitrust authorities should devote more efforts in looking for collusive evidence (be it hard evidence, or competing explanations for observed behavior). Similar tools and indicators as the ones used for screening can also be useful for identifying those industries in which a merger would facilitate cartel formation or tacit collusion.

There are two main approaches for screening: the structural and the behavioral approach. The structural approach checks whether those factors that facilitate collusion, as reviewed in the previous section, are present in a given market; hence, it answers the question: how likely is it that collusion *will form*? In contrast, the behavioral approach answers the question: how likely is it that collusion *has formed*? In other words, it checks whether observed behavior is consistent with collusive behavior and whether there are competing theories that could also explain the observed patterns.

An industry for which there is past evidence of collusion, or even attempts to sustain collusion, should be more vulnerable to collusion in the future too. In this case, a merger would tend to facilitate collusion even more.

In order to check whether this is the case, behavioral collusive markers could prove useful.[52]   Collusive markers involve looking at data of certain variables, mainly prices and market shares to see whether their pattern is consistent with either tacit or explicit collusion.

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[52]On collusive markers (or screens) see Harrington (2006b) and for a less informal discussion Abrantes-Metz and Bajari (2009).

Since the ultimate aim of colluding firms is to raise prices, unusually high prices might provide some hint of collusion. The problem is that it is not always possible to construct the correct contra-factual, i.e., the price that would have prevailed in a competitive environment. For this reason, one should compare industry prices with those of a control group with similar costs and characteristics. For instance, as reported in Abrantes-Metz and Bajari (2009), organized crime in New York created during the 80's a "concrete club" which led to prices which were 70% higher than in other large cities: even taking into account the higher New York prices, the comparison suggested suspiciously high prices.

The fact that prices do not reflect costs might also be very informative. Indeed, theory suggests that in competitive environments prices tend to track costs of production. Bayari and Ye (1993) show that in a first-price sealed-bid auction with private values, the equilibrium bids are a function of costs when firms behave competitively. Instead, in an efficient cartel, firms would share their cost estimates, and then the lowest-cost firm would submit a serious bid whereas all the other cartel members would either refrain from bidding or submit high "phony" bids.

Athey et al. (2004) analyse a model where firms' costs are *i.i.d.* over time and are private information. Colluding firms would exchange messages over their costs before setting prices. They would then face a trade-off between efficiency (optimally, it is the lowest cost firm which would sell) and the price level: if the price is high, a high cost would declare a low cost; hence, truthful revelation would require choosing a low enough collusive price, but this mechanism might be too costly in terms of foregone profits. The authors show that at the best collusive equilibrium, provided that firms are patient enough, collusion entails stable prices and market shares over time.[53]

These theoretical works suggest therefore that if prices do not track costs, there might be collusion in the industry. This explains why, for instance, an antitrust authority might want to look at the evolution of prices and costs over time. For instance, in the DS Smith/Linpac Containers merger case, the UK Competition Commission looked at the time series of DsSmith's unit prices and costs - and since changes in prices followed quite closely changes in costs, it concluded that it did not offer evidence of collusion (buyers claimed that there was collusion in the industry).

Related to the abovementioned theoretical results that collusion would involve a higher price stability, Abrantes-Metz et al. (2005) have developed a **variance screen** of collusion. The analysis of a cartel in procurement auctions for food supply to military agencies in the US, revealed that prices in frozen perch were much less volatile (and less responsive to costs) during the life of the cartel than when the cartel broke down.

At the other extreme, abrupt increases in prices which are not justified by cost or demand shocks may indicate that the industry is colluding. However, as Harrington (2006b) warns, cartels are aware that unusual price changes would attract unwanted attention, and accordingly often adopt progressive price increase policies.

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[53] At a more geenral and intuitive level, one could say that price rigidity can also reflect that fact that agreeing to adapt to changing market conditions is difficult and costly (e.g. communication leaves traces that authorities can use to detect cartels).

Similarly, abrupt price decreases might also denounce the presence of a cartel. The occurrence of price wars (i.e., periods of intense rivalry followed by the return to a stable path of higher prices) as explained in Section 2.2.3, is a necessary component of collusion in markets in which transparency is low: price wars are used as a disciplining device to avoid deviations.[54] Price wars could also be indicative of failed attempts to collude. In contrast, the absence of price wars should not be considered as conclusive evidence of competitive behavior, given that price wars are costly and the most successful cartels are characterized by price stability.

Collusive price patterns also translate into distinctive **output patterns**. Indeed, quantity markers shed light on whether collusion took place or not by looking at the evolution of market shares. Under collusion, firms' market shares tend to be stable.[55] Also, the birth and the death of a cartel might give rise to abrupt changes in market shares and thus be indicative of a change in behavior from competition to collusion or viceversa.

It is important to notice that evidence consistent with collusion does not *prove* that collusion indeed took place, and the analysis should be careful enough to exclude any alternative plausible explanation of the observed behavior. Indeed, a sudden price reduction may not be due to the triggering of a price war in a Green and Porter-like cartel, but may be due to a demand or cost shock. For instance, in the *Woodpulp* case, it turned out that the alternating phases or high and low prices were caused by exogenous events such as shocks in the North American market which affected imports to Europe, and Swedish changes in the policy of subsiding stocks (see Motta (2004)).

In any case, we should bear in mind that in a coordinated effects case, the purpose is not to prove that a cartel was in place, but rather that there is a sufficiently high probability that the merger is creating or strengthening collusion. Therefore, price and market share data which are consistent with collusive behavior should be taken as very serious evidence that collusion is likely to already exist in the industry.

3.3 Other approaches

Unfortunately, there have been few attempts to develop practical tools to measure the magnitude of coordinated effects.[56] The state of economic analysis in this area is still limited, and there is no consensus yet on how this issue should be approached from a

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[54]See Porter (1983) and Ellison (1994) for seminal empirical analysis of price wars and collusion in the Joint Executive Committee that operated in the US at the end of the XIXth century. Fabra and Toro (2006) empirically analyze price wars in the Spanish electricity market and show that they are consistent with collusion among electricity producers.

[55]If the market under scrutiny is a procurement auction, bid rotation might appear at first sight as resulting in negative correlation in firms' output levels. However, bid rotation would typically be constructed so as to guarantee stable market shares overall.

[56]This is in contrast with the analysis of unilateral effects, for which a number of simple tests now exist to assess the effect of a merger on the pricing behavior of the merging firms. See Oxera (2011) for a review of such tools.

quantitative perspective. However, for completeness, we report here three attempts to contribute to the measurement of coordinated effects.

3.3.1   Coordinated Price Pressure Index

Price leadership is one way through which firms can achieve coordination without explicit communication. In other words, as it has been reported in some cases, one firm takes the lead in raising prices and the other firms match the price increase; failure to do so implies reversion to competitive pricing. Still, firms have to solve a coordination problem: namely, who will be the leader (Lu and Wright (2010) and Harrington (2012)).

Accordingly, it might be useful to quantify the incentives for a firm to take the lead in initiating collusion and how a merger impacts on such incentives. This is the approach followed by Moresi et al. (2011), who develop an index - referred to as the *Coordinated Price Pressure Index* (CPPI) - which is the largest price increase that a firm would be willing to initiate and its rival would be willing to match. A high CPPI indicates high chances that firms achieve collusive outcomes through price leadership.

In merger analysis, one would need to compute the Delta CPPI, which is the increase in the CPPI that results from a merger. If the CPPI significantly increases from the pre- to the post-merger market structure, the merger can be expected to lead to coordinated effects.

For the sake of simplicity, the construction of the CPPI rests on strong assumptions. For instance, it does not look at the incentives to initiate a price increase in a fully dynamic model among all the firms in the industry, but instead focuses on two firms' incentives to raise and match the price increase in a single round. If firms are asymmetric, the CPPI can differ depending on the identity of the leader, and caution calls to take the lowest value of the resulting CPPI.

The data needed to compute the CPPI include sales volumes, own price elasticities, diversion ratios,[57] profit margins and the discount factor.[58] Moresi et al. (2011) provide the exact formula to compute the CPPI, as well as several examples that illustrate how it can be computed.[59] For instance, consider two firms which compete by choosing prices; they have equal sales, and charge a margin of 40%. Their products are such that the diversion ratio between them is 25%, and the discount factor is 80%. The maximum price increase that each firm is willing to undertake is 10%, while the highest price increase that each firm is willing to match is 10.7%. Hence, the CPPI is 10%. Suppose that one of these two firms proposes to merge with another one. If the CPPI increases to 15%, then the Delta CPPI would be 5%; in other words, the merger would facilitate collusion through price-leadership by increasing in 5% the maximum price increase that firms are willing to lead and to match.

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[57] The diversion ratio measures how much of the displaced demand for product A switches to product B when the price of A goes up.

[58] These ingredients are also used to compute indexes for the assessment of unilateral effects in merger cases, e.g. the gross upward pricing pressure index (GUPPI).

[59] They also apply to the merger between AT&T and T-Mobile Merger.

It is not fully clear whether the CPPI measures the likelihood of coordinated effects, or their magnitude conditional on such effects being likely. As for the likelihood, one would like to know the effects on profitability, which need not coincide with the magnitude of the price increases.[60]

3.3.2 Incremental payoffs from collusion

Kovacic et al. (2006) advocate for an alternative analysis. They argue that quantifying the incremental payoffs from post-merger collusion among subsets of firms in the post-merger market would provide valuable information as to whether coordinated effects are more or less likely. This is grounded in the assumption that the probability of coordination will be greater the higher the payoff from doing so; but otherwise, their analysis does not require a direct quantification of the likelihood of post-merger coordination. Their approach requires to select a model of competition, and to calibrate it using pre-merger data.

They provide an example of a market in which two out of four firms decide to merge. Under the assumption of differentiated products price competition, they compute equilibrium profits pre-merger, post-merger under no collusion, and post-merger under collusion among different subsets of firms. They find, under a specific parametrization, that collusion after the merger would be more than three times more profitable than collusion before the merger. Evidence showing that the payoffs from incremental collusion increase substantially after the merger, would indicate a strong likelihood of coordinated effects.

3.3.3 Diversion Ratios and Cross-Price Elasticities

Ivaldi and Lagos (2016a) rely on numerical simulations to obtain predictions regarding the assessment of coordinated effects in merger cases. In particular, the authors simulate 50,000 markets, with 10,000 consumers and 5 single-brand firms in each, under the assumption that consumer preferences behave according to a model of discrete choice demand with random coefficients. On the basis of these simulations, the authors identify the factors enhancing the coordinated effects and the metrics that would allow for a better screening of mergers.

Their focus is on the effects of mergers on the critical discount factor above which a firm would find it optimal not to deviate from a trigger strategy sustaining perfect collusion. The paper proposes to decompose the impact as the sum of two effects: the Change in Profits (CP) and the Asymmetry in Payoffs (AP) effects. The former captures the change in the critical discount factor due to merging firms' internalization of the price effects on

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[60]In line with this, Ivaldi and Lagos (2016b) argue that the CPPI does a poor job in predicting coordinated effects. They show that it is important to incorporate information about the diversion ratios among the products of the merging firms, as they affect the costs of initiating the price increase after the merger. In particular, a merger between firms with high diversion ratios is more likely to make a price increase profitable. Because the CPPI does not incorporate this information, they claim that it fails in predicting coordinated effects.

the merging brands; the latter captures firms' asymmetries as reflected in their different critical discount factors prior to the merger. Which of the two effects dominates depends on the symmetries/asymmetries among the merging firms. For symmetric mergers, the change in the critical discount factor post merger is given by the CP effect alone, given that the AP effect is zero (pre merger, all firms have the same discount factor). In contrast, when the merging firms are fairly asymmetric, the AP is the dominant effect because the internalization effect if weaker. The paper confirms that mergers involving symmetric firms, with high diversion ratios among their products, are likely to be worrisome. It also raises concerns about mergers between asymmetric firms with high cross price elasticities, particularly so when one of the merging firms is a maverick (i.e. a small who would otherwise have disrupted collusion).

These differences across symmetric versus asymmetric mergers have implications for the types of indexes that are better at capturing the likelihood of coordinated effects. The authors show that, in the case of mergers among symmetric firms, the diversion ratios pre merger are a good proxy as they capture the internalization effect across the merging brands. In contrast, in the case of asymmetric mergers, the cross own elasticities are a good predictor of coordinated effects, and it is superior to using the merging firms market shares.

4   Coordinated Effects in European Merger Policy

In this Section, we briefly report on the use of coordinated effects in European merger control, a conclude with a description of the ABF/GBI merger case.

The European Merger Regulation of 1989: the dominance test   When merger control was finally introduced in the late Eighties, the criterion to authorize or prohibit mergers in Europe was based on the concept of *dominance*, that is, "the power to behave to an appreciable extent independently of its competitors, its customers and ultimately of the consumers."[61] (In practice, for a finding of dominance a firm must enjoy a very high degree of market power, and it is widely accepted that it is unlikely that a firm with less than 40% of the relevant market would be found dominant.)

The Merger Regulation used to state that "a concentration which creates or strengthens a dominant position as a result of which effective competition would be significantly impeded in the Common Market or in a substantial part of it shall be declared incompati-

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[61]See *Hoffmann-La Roche*, where the European Court of Justice first defined this concept thus: "The dominant position [...] relates to a position of economic strength enjoyed by an undertaking which enables it to prevent effective competition being maintained on the relevant market by affording it the power to behave to an appreciable extent independently of its competitors, its customers and ultimately of the consumers. Such a position does not preclude some competition, which it does where there is a monopoly or quasi-monopoly but enables the undertaking which profits by it, if not to determine, at least to have an appreciable influence on the conditions under which that competition will develop, and in any case to act largely in disregard of it so long as such conduct does not operate to its detriment."

ble with the Common Market."[62] In other words, only mergers which created or reinforced a dominant position could be prohibited by the European Commission. This introduced a test which is different from the "substantial lessening of competition" test used in US law and more aligned with economic analysis.

To see why the two tests may well lead to different outcomes when applied to the same merger, consider a situation where two or more firms with sizeable market shares would coexist in an industry after a merger, but none of them has enough market power to be considered dominant, and suppose it is also very unlikely that they would collude. For instance, imagine that a firm has 50%, the two merging firms would have a share of 45% after the merger, while the remaining market is fragmented among smaller firms. In such a situation, economic theory clearly indicates that the merger might well be detrimental because of unilateral effects (suppose for instance that the enhanced market power is not outweighed by efficiency gains), but it would be very hard to argue that the merger would create or reinforce a dominant position, since the merging firms would face a stronger competitor. Hence, the Commission could not prohibit such a merger, as under the Merger Regulation 4064/89 the finding of a dominant position was a necessary condition for prohibiting a merger.

Joint dominance   Soon, the European Commission realized that there were mergers which did not appear to be "good" (because they reduced competition, and were likely to raise prices) but which could not be prohibited because they did not create or reinforce a *single-firm*'s dominant position. However, the Commission could still prohibit such a merger if it could argue that it created or reinforced a *joint* dominant position. Loosely speaking, joint dominance refers to a situation where a (presumably small) group of firms in the market are able to coordinate their actions and set prices above the competitive level. However, what exactly joint dominance was, and how it could be proved to exist (or to likely occur after a merger), became the object of a series of merger cases in the EU.

The first case where the Commission challenged a merger on joint dominance grounds was *Nestlé/Perrier*, a merger in the French mineral water industry (see Section **??**). This was a case where all the elements pointed to high likelihood of coordination (probably pre-existing the merger) among the main firms, but the Commission eventually allowed the merger under some remedies, probably with a view to establish a precedent that would not be challenged in court.

After Nestlé/Perrier it was uncertain for a while whether the Community Courts would uphold the Commission's argument that a merger may be prohibited because of *joint* dominance.

In *France v. Commission* - a 1998 judgment - the European Court of Justice accepted the concept of joint dominance, but then quashed the decision that the Commission had taken in *Kali+Salz/MdK/Treuhand* on the merit, and seemed to indicate that some sort of structural links ("correlative factors") among firms was needed to prove joint dominance.

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[62]Merger Regulation 4064/89, article 2(3). Note that the legal term "concentration" stands for merger (or takeover).

Although it was unclear what exactly and how strong such structural links should be, this judgment seemed to set a very high standard to prove joint dominance.

However, in *Gencor v. Commission* the Court of First Instance (CFI) reaffirmed the principle that the European Commission can block mergers if they create joint dominance but seemed to accept a broader (and more economics-aligned) interpretation of the concept, and argued that there is no need for oligopolists to have some structural links in order to prove that collective dominance exists.

The Court stated that "*the concentration would have had the direct and immediate effect of creating the condition in which abuses where not only possible but economically rational, given that the concentration would have significantly impeded effective competition in the market by giving rise to a lasting alteration to the structure of the markets concerned.*" (para. 94 of Judgment). The judgment seemed to pay less attention to structural links between the firms and more attention to the structure of the market, referring in particular to the fact that the merger would have rendered the position between the two main producers extremely symmetric, both in terms of reserves of world platinum production and in terms of costs of production.

The Commission was then ready to use the higher degree of freedom left by the CFI judgment, and started to increasingly rely on the concept of joint dominance, applying it to cases where it was not straightforward that the merger would have created or reinforced collusion. Arguably, though, joint dominance was the only tool available to the Commission to prohibit anticompetitive mergers which it could have not otherwise stopped.

Airtours, and the new Regulation   The *Airtours* judgment of the Court of First Instance (followed immediately by other two judgments, *Schneider/Legrand* and *Tetralaval/Sidel,* in which the CFI also annulled merger prohibition decisions of the Commission) is very important because it led to a change in EU merger policy.

In *Airtours*, the Commission had extended the concept of joint dominance to an industry whose features were not unambiguously conducive to collusion. The CFI went very carefully through the economic analysis of the Commission, and annulled the Decision. Its judgment contains a number of remarkable points.

First, the CFI clarifies the standards of proof required by a merger prohibition: it is not enough for the Commission to argue that after the merger it is *possible* that firms will collude, it should motivate and explain that the collusive outcome will be very *likely* to arise. (Similarly, in Tetralaval/Sidel - where however the issue was whether the merger would have led to anticompetitive tying - the Court stressed that the standard of proof cannot consist in showing the *mere possibility* that a certain outcome can occur, but requires strong arguments and evidence that such an outcome would be *plausible*.)

Second, this judgement makes it clear that joint dominance is not a multi-purpose concept, but has to do with the pro-collusive effects of a merger, as economic analysis would have done it. In particular, the Court spells out three conditions for tacit coordination to be sustainable: (i) sufficient market transparency (for firms to monitor each other and see whether there are deviations); (ii) the existence of an incentive not to depart from the

common policy, i.e., the existence of a credible mechanism of retaliation if deviations occur; (iii) current and prospective rivals, as well as consumers, must not jeopardize coordination (in other words, neither entry is easy nor buyer power is very high). These are the same conditions that any economic textbook would indicate as those which allow for a collusive outcome to arise. Therefore, the judgement clarifies once and for all that the concept of joint dominance used by the European judges is the same as the one used in economic analysis.

Finally, in this and the following judgements the CFI heavily criticizes the economic analysis carried out by the Commission, persuading Commissioner Mario Monti that the use of economics and economists at DG-Competition should be enhanced, and to create the Chief Economist's Office.

After *Airtours*, it was clear that the Commission could not rely too much on the joint dominance concept to prohibit mergers that it regarded to raise anticompetitive concerns but which did not create or strengthen a single-firm dominant position. This pushed it to adopt a new Merger Regulation (entered into effects in May 2004) with a new test for the assessment of merger control: the Commission will prohibit mergers that "*would* significantly impede effective competition*, in the common market or in a substantial part of it, in particular as a result of the creation or strengthening of a dominant position*".

In part not to lose the case-law, in part to accommodate the objections of some member states (the dominance test still applies in some national laws), a reference to 'dominance' is kept, but the 'test' de facto is modified from a dominance test to a 'substantial lessening of competition' test.

The Horizontal Merger Guidelines   The Horizontal Merger Guidelines (HMGs) issued in 2004 by the Commission follow the conditions for coordinated effects as set out by the CFI in *Airtours* and subsequently confirmed by the Court of Justice in *Impala*, and which are to a large extent consistent with what economic analysis suggests (see our own Section 2.1 above).

> "*Coordination is more likely to emerge in markets where it is relatively simple to reach a common understanding on the terms of coordination. In addition, three conditions are necessary for coordination to be sustainable. First, the coordinating firms must be able to monitor to a sufficient degree whether the terms of coordination are being adhered to. Second, discipline requires that there is some form of credible deterrent mechanism that can be activated if deviation is detected. Third, the reactions of outsiders, such as current and future competitors not participating in the coordination, as well as customers, should not be able to jeopardise the results expected from the coordination.*" (para. 41)

In other words, the Commission identifies the ability to reach some sort of common understanding (on prices, on capacities, on terms of sales, on how to divide markets, and so

on) as a precondition for coordinated effects, followed by the three (cumulative) conditions for the sustainability of the collusion, namely (i) a mechanism or circumstances that allow monitoring of each other's actions, (ii) the ability and credibility of a mechanism which allows to punish deviations, and (iii) the inability of customers to command lower prices and of existing or prospective rivals to react, thus making it unlikely to reach the collusive outcome.[63]

The HMGs also clarify that the merger may raise coordinated effects concerns in two ways: (i) by increasing the likelihood that firms will (tacitly or explicitly) coordinate their behavior *after* the merger (e.g., because the merger reduces the number of existing competitors, increases the symmetry of the main firms aligning their incentives to collude, or removing a maverick firm which in the past had prevented or threatened collusion); or (ii) by making coordination which already existed before the mergers easier, more stable or more effective.

Finally, the HMGs also point out that efficiency gains could well have a procompetitive effect not only in unilateral effects but also in coordinated effects cases: "*In the context of coordinated effects, efficiencies may increase the merged entity's incentive to increase production and reduce prices, and thereby reduce its incentive to coordinate its market behavior with other firms in the market. Efficiencies may therefore lead to a lower risk of coordinated effects in the relevant market.*" (para. 82)

To the extent that the Commission follows the HMGs, and it applies the analysis not in a mechanical way (prior to Airtours, one could get the impression that most of the analysis had consisted in a listing of the main facilitating factors without really trying to uncover the real working of the market and the degree to which collusive outcomes may be plausible and sustainable), coordinated effects in EU competition policy will be aligned to the teachings of economic analysis. An indication that the Commission is starting to do a good job in this direction comes from the recent ABF/GBI case (2008), as described next.

4.1 *ABF/GBI*: application of the European Guidelines

The ABF/GBI merger (2008) was the first merger challenged (but eventually approved subject to sizeable remedies) by the European Commission on the basis of coordinated effects since Airtours. In this case, the Commission had the chance to apply its own Merger Guidelines, which in turn were modeled after the Airtours judgment (later affirmed by the European Court of Justice).

It is interesting not only because it is illustrative of the way in which EU merger control is enforced, but also because it shows the importance of a careful analysis of the industry and how differences in some features of the market may lead to very different outcomes

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[63]In general, economic theory suggests that there are two important aspects of collusion, namely enforcement and coordination. In merger analysis, though, it is enforcement that should be the focus of the analysis, whereas in anticompetitive agreements and cartels (or conspiracies, in US law), the focus is on coordination.

of the investigation (notably, differences in the distribution sector in Spain and Portugal relative to France led to an assessment of coordinated effects in the former but not in the latter).

The case consisted in the acquisition of GBI's yeast[64] operations in Continental Europe[65] by Associated British Foods (ABF), and the Commission's investigated the merger upon referral from the Spanish, Portuguese and French authorities. Accordingly, the relevant markets were defined as those for compressed, dry and liquid yeast in each of these three countries. (We shall focus on compressed yeast, which is the most important.)

The Commission's assessment, following the case law and the HMGs, hinges on three steps. First, it analyses the basic features of the market, to see whether they are conducive to coordination. Second, it studies whether any coordinated outcome would be sustainable. This step itself requires - in the light of Airtours - to show that (i) the market is sufficiently transparent to allow monitoring of deviations, (ii) there exists a credible mechanism to punish them, and (iii) it is unlikely that outsiders (be they customers or entrants) may prevent tacit or explicit collusion. Third, it must show that the merger either strengthens coordination (if it already exists) or makes it more likely. We discuss these three steps in the following subsections.

4.1.1 Market features make coordination likely

The decision mentions a number of features of the market which are likely to be conducive to coordinated behavior. There is a high degree of concentration, with ABF and GBI combined market share being around 70-80% in Portugal, 40-50% in Spain and 30-40% in France, while Lesaffre's shares were respectively 20-30%, 40-50%, and 60-70%. The market is also characterized by frequent interaction (in Spain and Portugal, buyers are mostly small artisanal bakers who cannot afford refrigerated storage and order yeast with a weekly or bi-weekly frequency); products are homogenous (although in France Lesaffre seems to enjoy a higher quality status); demand is stable or declining; it is unlikely that new technologies may break the market equilibrium; in Spain and Portugal (but not in France, where bakery is no longer artisanal, and distribution is in the hands of centralized groups), there is small buyer power; there exist barriers to entry and expansion (production has becoming increasingly concentrated in fewer plants, witnessing economies of scale); and multi-market contacts across Europe exist among all the main players.

The analysis of past price and output data also revealed significant market share stability and price parallelism even when production was hit by input cost increases. As the Commission puts it: "*Such supply shocks can, in some circumstances, disrupt any efforts to tacitly coordinate conduct, particularly to the extent that they may affect some players more than others. However,* [...], *given common technology and climatic conditions of the*

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[64]Yeast is an essential ingredient in the production of bread and bakery products. It is perishable and even when refrigerated it lasts only for three-four weeks.

[65]GBI's yeast business in the UK and South America were sold to Lesaffre, and approved (subject to remedies) in a prior merger investigation.

plants of ABF, GBI and Lesaffre serving the Spanish market, increased input costs can be expected to affect all three players in a similar manner." (para. 224). Interestingly, but not surprisingly, internal documents revealed that firms were fully aware of their symmetry in this respect, and that therefore their interests in price increases were perfectly aligned.

4.1.2 Sustainability of coordination

Although the 'checklist' of the factors which may facilitate collusion is a useful step in the investigation, the crucial step is then to understand how likely it would be that deviations may be monitored and punished.

(i) In this case, the distribution sector plays a fundamental role in determining the degree of *transparency* of the market. The Commission found that the Spanish and Portuguese markets were characterized by very strong and stable relationships both between distributors and their clients (in many cases, very strong personal relationships developed over time, due also to the frequent visits of the distributors) and between producers and distributors (which were *de facto* or *de jure* exclusive dealers and which enjoyed exclusive territorial protection), the latter also reporting information on market developments to the former (often, reporting information back to the suppliers was part of the distribution agreement or was incentivized in contracts).[66]

On the contrary, distribution in France was in the hands of concentrated and centralized groups which bought from several suppliers and served industrial buyers.

The Commission stressed how the simple organization of the distribution sector in Spain and Portugal allowed suppliers to efficiently monitor the market,[67] whereas in France such transparency could not be achieved.

(ii) As for the capacity to deter deviations through *credible punishments*, the Commission found that "*all three players- GBI, ABF and Lesaffre - currently hold excess capacity in their plants serving Spain, sufficient to initiate a long-lasting price war in the event of any of them deviating from coordinated interaction.*" (para. 242). If necessary, they could have also used capacity in plants located elsewhere.[68] Furthermore, retaliation would have been timely given that the high frequency of market transactions, and its threat would

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[66]Although bakers had a primary distributor/supplier, they also developed some relations, and minor purchases, from a secondary source. Yeast being indispensable, this was a way for bakers to ensure themselves against possible shortages or failures in primary sourcing. In turn, this link with another distributor/supplier allowed bakers to switch supplier in case the primary increased prices. But in turn, this would mean that the primary distributor/supplier may be informed of possible 'deviations' by rivals.

[67]The role of a stable demand in increasing transparency of the market is clearly explained in the following excerpt from the Decision: "*In the context of frequent deliveries,* [monitoring deviations] *is simply verified by observing significant decrease in volumes with respect to the previous year for a given territory. Indeed when market demand is relatively stable, as is the case in Spain, inferring deviations from collusive conduct is easier and requires less market data than when the market demand fluctuates significantly and unpredictably.*" (para 232)

[68]"*Shifting volumes from one geographic market to the other, though likely uneconomical on a permanent basis given the opportunity cost of lost sales, allows the three producers to reinforce the threat of significantly expanding sales without necessarily holding excessive idle capacity.*" (para. 242).

have been enhanced by the existence of multi-market contacts.

(iii) As for the *reactions of outsiders*, the third of the conditions stressed by Airtours, the Commission found that the (fragmented) competitors as well as importers were facing high barriers to entry and expansion; that there was limited countervailing buyer power of distributors (that as we have seen were linked by exclusive deals to producers) and bakers (who were mostly small artisans).

4.1.3 Coordinated effects of the merger

Lastly, "*the Commission must further show, on the basis of a prospective analysis, the extent to which the "alteration in the* [relevant market] *structure that the transaction would entail"* [*Airtours, para. 61*] *significantly impedes effective competition by making coordination easier, more stable or more effective for the three firms concerned either by making the coordination more robust or by permitting firms to coordinate on even higher prices.*" (para. 273). In this respect, it found the following:

(i) The merger increased transparency by reducing the number of players, facilitating the detection of deviations and retaliations (when only two firms exists, there is no risk of free-riding in the punishment efforts, nor possibility to make mistakes on the identity of the deviators).

(ii) GBI exhibited differences relative to ABF and Lesaffre. First, GBI served Spain and Portugal from its Italian plant, which also served other markets. This means that demand and supply shocks affecting other markets may have repercuted on the Iberian markets. After the merger, ABF/GBI would reorganize production relying on local plants, thereby removing this possible source of misalignments facing shocks.

Second, it had made a number of improvements in production and packaging. However, under the terms of the merger agreements, GBI's patents would be shared by ABF and Lesaffre, which by doing so "*(a) eliminate GBI as a source of potentially destabilizing innovation and (b) ensure neither of the two coordinating firms inherits the competitive advantage that may eventually derive from IP rights.*" (para. 301).

Third, it was not present in the market for liquid yeast, mostly used to supply industrial bakers. In case of growth of this market relative to compressed yeast, this may have been a further source of misalignment of incentives.

In general, after the merger ABF/GBI and Lesaffre would be highly symmetric in terms of production costs, capacities,[69] and market shares (both of them would have 40-50%), thereby facilitating tacit collusive outcomes.[70]

4.1.4 The remedies

On the basis of the abovementioned analysis, the Commission concluded that the merger would have been created or strengthened coordinated effects in Spain and Portugal (but

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[69] After the merger "*both Lesaffre and ABF would have almost identical spare capacities [...] in the Iberian Peninsula.*" (para. 297)

[70] Symmetry would instead be absent post-merger from the French market, largely dominated by Lesaffre.

not, as we saw, in France). Still, the transaction was cleared subject to the remedies proposed by the parties. An initial remedy consisted in the divestment of GBI's sales and distribution activities in Spain and Portugal, but did not include a production plant (it only included an agreement to supply the buyer for three years with yeast produced at GBI's Italian plant), but it was not accepted because the lack of a production plant would have not made the buyer a serious competitor. Ultimately, the accepted remedy consisted in offering, on top of sales and distribution assets, either a UK plant or the plant located in Portugal.[71]

5 Conclusions

Mergers lead to coordinated effects when they increase the likelihood that firms will reach (tacit or explicit) collusive outcomes in the post-merger market. Therefore, a careful assessment of coordinated effects is necessary in order to prevent anti-competitive mergers from taking place.

We have reviewed the main factors that, from an economic point of view, should be analyzed in a coordinated effects analysis. The main questions to be addressed is whether collusion would be sustainable after the merger, and how the merger contributes to the sustainability of collusion. Certain supply factors - such as a small number of symmetric firms, barriers to entry, or multi-market contact - and demand factors - such as demand stability and the existence of regular and frequent orders - contribute to facilitating collusion. Also, price transparency on the sellers' side and communication about past and future conduct make it easier for firms to reach and respect a collusive agreement. A merger that takes place in a market already conducive to collusion, is likely to enhance collusion and thus raise concerns over coordinated effects. The incidence of some mergers on the likelihood of collusion might be stronger than others: particularly worrisome are those that increase symmetry in markets in which there are already few competitors. The assessment of coordinated effects in vertical merger cases points out that vertical integration should raise more concerns when it involves relatively large buyers in markets in which producers have little information regarding retail markets. From an applied perspective, the quantification of coordinated effects in merger cases is an area in economics that is not yet fully developed, and while some simple indexes now exist, there is no unanimity about their usefulness.

The description of the European merger policy provides useful hints that can guide the assessment of coordinated effects in future mergers cases. The experience highlights the importance of identifying those mechanisms available to firms for monitoring compliance and to credibly punishing deviators in order to make collusion sustainable. It also stresses that the assessment of coordinated effects requires detailed knowledge of the industry, as well as a careful analysis of the past performance and interaction among firms in the

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[71]The latter turned out to be implemented: Lallemand, a German competitor with limited presence in Spain and Portugal, bought GBI's sales and distribution business as well as the Portuguese plant (see Neven and de la Mano (2009)).

market. To be sure, because the analysis is often very delicate and complex, reliance on economic theory should help us in correctly assessing the likelihood of coordinated effects in merger cases.

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