The cost of inappropriate interventions/non interventions under Article 82

Economic discussion paper

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A report prepared for the Office of Fair Trading
by Lear

FOREWORD

This report was commissioned by the Office of Fair Trading (OFT) from Lear – Laboratorio di economia, antitrust, regolamentazione.

Lear were asked to develop economic theory that can be applied within the existing legal framework to deepen the understanding of the underlying nature and relative magnitude of the costs arising from competition authorities condemning welfare-increasing business practices or condoning welfare-reducing ones, as well as to indicate any emerging implications and recommendations for improving rules and assessment frameworks.

Any views expressed in this report are those of Lear and do not necessarily reflect the views of the OFT nor the legal position under existing competition law which the OFT applies in the exercise of its competition law enforcement functions.

This report is part of the OFT's Economic Discussion Paper series, and is intended to inform current discussion within the competition policy community in the UK about the cost of inappropriate interventions and non-interventions under Article 82 or under section 18(1) of the Competition Act. If you would like to comment on the paper, please write to me, Amelia Fletcher, at the address below. The OFT welcomes suggestions for future research topics on all aspects of UK competition and consumer policy.

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EXECUTIVE SUMMARY

S.1   In competitive markets, firms fight to gain more customers. In order to outperform their competitors and increase their market share, they lower prices, offer discounts to selected customers, build infrastructures and facilities to meet new demand, invest in research and development activities to lower their production costs or improve their goods and services. All these behaviours increase the quality and the variety of products on offer and reduce the level of prices thereby making customers better off.

S.2   However, some of the behaviours just mentioned can be adopted by firms with a strong hold on the market to alter the competitive process in their favour so that the benefits customers derive from competition can be lost. For this reason Article 82 of the EC Treaty prohibits abusive behaviours adopted by firms with a dominant position.

S.3   This prohibition bestows on competition authorities the difficult task of inhibiting these abusive conducts, without preventing firms from competing. Since few, if any, behaviours can be considered abusive per se, the decision to stop or allow a potentially abusive behaviour depends on its actual effects on the other firms in the market and on consumers. Hence, a competition authority may commit an error when assessing these effects and reach an inappropriate decision.

S.4   This study has been commissioned by the OFT to broaden the current understanding of the costs of an inappropriate application by a competition authority of Article 82 of the EC Treaty (or of section 18(1) of the UK Competition Act and of other similar laws that prohibit abusive conducts by dominant firms).

S.5   Much current research on unilateral business practices is directed at developing criteria and indicators for identifying those conducts that harm competition and at assessing the likelihood of errors in applying these indicators and criteria. This study builds on this literature, but it focuses on the costs caused by these errors. Its aim is to understand the nature and magnitude of these costs and to develop a theoretical framework to assess them. An increased understanding of the costs of erroneous interventions, or non interventions, and of what determines their size and persistence will highlight areas for improvement in the enforcement strategy of Article 82 that will help the OFT to minimise these costs.

S.6   The approach taken in this study, which is discussed in Chapter 1 and Annex A, is based on the assumption that the objective of competition law is to maximise social welfare, defined as the sum of the profits of all the firms operating in the relevant market(s) and of total consumer

surplus. As a consequence, the errors derive from the possibility that the competition authority prohibits a conduct which is welfare enhancing (i.e. competitive), or allows a conduct that is welfare reducing (i.e. abusive). From the assumption that a competition authority seeks to guarantee the highest possible level of welfare it also follows that the costs of its errors are equal to the loss of social welfare derived from the change in the firm's behaviour from the intervention, or from the continuation of the abusive conduct arising from non intervention.

S.7 There are two elements to the costs of an erroneous decision: there is an *ex post* (or direct) element and an *ex ante* (or indirect) one. The *ex post* costs refer to a specific antitrust decision and they affect only the market(s) concerned with the behaviour judged by the competition authority. The *ex ante* costs, instead, affect all markets because they represent the welfare loss caused by the distortion that the expectation of the occurrence of errors imposes on the behaviour of all firms. The first part of this study (Chapters 2 to 4) focuses on the former kind of costs, while the second part (Chapters 5 and 6) discusses the determinants of the latter.

S.8 The assessment of the *ex post* costs requires a clear understanding of the effects of the conduct considered by the competition authority on the determinants of social welfare and of the relevant counterfactual. For this reason this study proposes a classification of potentially abusive conducts that abandons the traditional form-based approach, for an effect based one.

S.9 The standard taxonomy adopted in the antitrust literature and practice distinguishes between pricing and non pricing behaviours and therefore focuses on the form the conduct takes, rather than on its economic consequences in the relevant market(s). This distinction is not very helpful when what matters is how social welfare is affected. In addition, it is not very robust because defining behaviour as pricing or non-pricing can depend on how the behaviour is described. For instance, a refusal to supply is normally classified as a non-pricing strategy. However, a decision by the owner of an essential input to charge an extremely high price, such that its rivals are not willing\capable to pay it, is considered a pricing strategy, but it is not different in its effects from a refusal to supply.

S.10 Therefore, Chapter 2 proposes a classification that better supports an economic analysis of the welfare effects of allowing, or prohibiting, a potentially abusive conduct. This classification is based on the consequences that the potentially abusive behaviour has on the payoff functions of the rival firms and on the market equilibrium. Behaviours are split depending on whether they modify the demand or the cost curve of one, or more, of the dominant firm's competitors (structural strategies),

thus altering their payoff function, or they simply affect the equilibrium level of output (output strategies).

S.11   Structural strategies can be further partitioned depending on whether (*ceteris paribus*) competitors experience an increase in their costs or a reduction in their demand. Refusals to supply a more efficient input, exclusionary contracts with distributors, margin squeezes from above or multi-product discounts to key suppliers are the most likely to fall in the first category, while a refusal to supply a higher quality input or tying and bundling are the most likely to fall in the second. Examples of pure output strategies are: below cost prices, margin squeezes from below and discriminatory prices, which increase the level of output and the market share of the dominant firm without modifying the profit functions of the rivals. Chapter 2 explains in details how this taxonomy works and how it relates to the traditional one.

S.12   This effect-based classification can be used to derive some general conclusions on how specific characteristics of the affected market(s) determine the sign and magnitude of the welfare change caused by an antitrust decision on conducts belonging to the same category.

S.13   Chapter 3 develops the framework for assessing the welfare effects of potentially abusive strategies (classified as proposed in Chapter 2) and from these derives conclusions on the costs of erroneous antitrust decisions that stop, or allow, them. Given the complexity of the subject this Chapter only highlight the most relevant results, while a detailed description of these results is included in Annexes C, D and E. These annexes also contain some policy suggestions that could help a competition authority to minimise the costs of antitrust errors.

S.14   Depending on the number of final markets affected and on whether these are characterised by external effects, the assessment of the welfare effect of a potentially abusive conduct can be quite complicated. Hence, Chapter 3 starts by analysing the impact that a potentially abusive strategy can have on the determinants of social welfare in a single final market in which there are no spill-over effects. Chapter 3 shows how this depends on the mode of competition that prevails in the market, the degree of product differentiation and of cost asymmetry between the firms, and the strength of the barriers to entry. The analysis is then extended to more complex market conditions and considers how the results obtained in the basic setting change when there are economies of scale or network externalities and when the conduct under examination affects more than one final market.

S.15   Section 3 of this chapter shows that, in the short term, structural strategies tend to lower the equilibrium output, to increase the cost of production and decrease the consumers' willingness to pay. All these effects identify the short term costs the competition authority may

impose on society if it fails to intervene. However, the same strategies may create benefits if they produce cost or demand efficiencies for the dominant firm. Moreover, they can also lower the social cost of production if the dominant firm is more efficient than its rivals. In the short term, output strategies tend to increase welfare, unless the incremental cost of production is above the consumers' willingness to pay. The welfare gain generally brought about by such a strategy identifies the short term cost of an inappropriate intervention.

S.16   In the long term, both structural and output strategies may force the exit of actual competitors or impede the entry of potential ones. However, the same strategies may protect long run investments made by the dominant firm. The balance of these effects determines the net welfare change of the conduct under examination and the cost of an erroneous decision.

S.17   Section 4 considers how these results change if the market exhibits economies of scale and network externalities. Section 4 shows how these market characteristics affect the short run and the long run equilibrium. In a nutshell, spill-over effects may provide the main economic justification for the conduct of the dominant firm, which may wish to expand its output to exploit the economies generated on the supply side or on the demand side of the market. These efficiencies increase the welfare gain that could be produced by the dominant firm's conducts and add to the cost of an erroneous intervention. However, the same market characteristics make the exit of rivals a more likely event so that they could allow the dominant firm to gain a stronger hold on the market in the long run.

S.18   Section 5 extends the analysis to the case in which a decision can affect more than one final market. The reason it is important to assess these cases separately is discussed in Annex B. It shows that when we have to assess the cost of an antitrust decision concerning an alleged abusive conduct that affects two or more final markets, we cannot simply add the welfare that would result from the decision in the two markets (as we could do, for instance, for two vertically related markets) because these can be characterised by exogenous links, such as consumption complementarities, economies of scope and other types of cost savings. In addition, if the conduct consists in tying, bundling or multi-product discounts it can generate links between the demand curves of the affected markets (endogenous links).

S.19   Exogenous links are another form of spill-over effects and their analysis is akin to that developed in Section 4. Endogenous links can be welfare improving if they allow the dominant firm to introduce a more efficient pricing structure that induces a higher level of consumption in one of the affected markets or in both of them. This is especially true if the two final products are part of a system good or form the two sides of a two-

sided market. We also discuss how these endogenous links may be exploited by a dominant firm to protect its market power in the market where it is dominant or to extend its market power to the linked market.

S.20   In addition to these qualitative results, the study also attempts to gain some understanding of the relative quantitative importance of the effects that different types of conducts can have on the key determinants of social welfare, using a very simple game-theoretical model of duopolistic competition. The results of these simulations, which are presented in Chapter 4 and Appendix F, show that the changes in the demand curves are those that have the strongest impact on welfare. Hence, the costs of a type I error ("false conviction") are likely to be higher when a strategy increases consumers' willingness to pay, while the cost of a type II error ("false acquittal") are likely to be higher if the strategy negatively affects the demand curves. These results suggests that curbing the incentives to innovate can be costlier than preventing the exploitation of cost efficiencies and that cost and demand effects should not be treated on a par. Clearly these are just interesting working hypotheses that can alert competition authorities not to treat all effects equally. To reach any firm conclusions more research is needed, which goes beyond the scope of this study. The hypotheses generated by our numerical models are meant to provide a guide for further work in this field.

S.21   Chapter 5 and 6 complete the picture by considering the *ex ante* costs of erroneous decisions. Firms select their course of action on the basis of the profit they expect to earn from it, hence, not only do they include in their calculations the possibility of being fined for abusive behaviour, but they also consider that may not be caught or that they may be fined even when complying with the law.

S.22   In order to study the cost of errors from an *ex ante* perspective we need to examine the decision methods adopted by the competition authority, and the related sources of errors, as they will influence the firms' expectations. Chapter 5 describes the decision making approach of a competition authority either as rule-based or as standard based. In a rule-based approach the competition authority applies a legal test which relies on the presence of a set of triggering facts to decide whether a conduct violates the abuse of dominance prohibitions. In a standard-based approach it assesses whether a conduct is abusive on the basis of a case-by-case analysis of the consequences of the behaviour on social welfare.

S.23   With a standard-based approach the errors can only stem from the lack of complete and accurate information or from the choice of a flawed or inappropriate economic theory (i.e. from imperfect knowledge). Similarly, rule-based decisions can be affected by a lack of information. But rule-based decision also can be affected by the fact that the 'triggering facts' may also be present when the behaviour is not abusive, or may

not be there even if the behaviour is abusive (this is the so-called inclusion problem).

S.24   In Chapter 6 we analyse how the different sources of errors may influence firms' expectations about the application of competition law and how this may result in socially inefficient decisions; i.e. a decision to refrain from socially efficient conduct, or a decision to undertake a socially inefficient conduct.

S.25   We first find that both types of errors reduce the degree of compliance with competition law in a symmetric way. We then investigate whether there are reasons to believe that there are asymmetries in error costs such that a given type of error may have more impact than the other. We find that some claims from the literature that false convictions have a greater welfare-decreasing effect do not appear sufficiently grounded both when the competition authority follows a rule and when it adopts a standard. We conclude that the only difference in error costs stems from the higher probability that some conducts normally investigated by competition authorities are competitive rather that abusive.

S.26   Finally, we have looked at the way mistaken decisions impact the creation or strengthening of dominance. We have found that the relative *ex ante* cost of antitrust errors depends on the prevalent source of market power in the economy. False convictions are costlier in dynamic economies where firms can achieve a dominant position mainly through the adoption of innovative and efficient conducts. The same type of error is much less costly in those economies with heavy-handed regulations that make rent-seeking a suitable means to gain privileged positions and market power.

CONTENTS

1. PRELIMINARY ISSUES

Introduction

1.1 This study has been commissioned by the OFT to improve their understanding of the costs of an inappropriate application by a competition authority of Article 82 of the EC Treaty, or of section 18(1) of the UK Competition Act, collectively referred to as "abuse of dominance prohibitions".

1.2 Much current research on unilateral business practices is directed at developing criteria and indicators for identifying those conducts that harm competition and at assessing the likelihood of errors in applying these indicators and criteria. This study builds on this literature, but it focuses on the costs caused by these errors. Its aim is to understand the nature and magnitude of these costs and to develop a theoretical framework to assess them. An increased understanding of the costs of erroneous interventions, or non interventions, and of what determines their size and persistence will highlight areas for improvement in the enforcement strategy of Article 82 that will help the OFT to minimise these costs.

1.3 The next chapters will be dedicated to the development of this analytical framework. In this Chapter we define and discuss some key concepts on which the framework is going to be built:

> The whole analysis is based on the assumption that the objective of a competition authority is to maximise social welfare, as measured by the sum of the firms' profits and aggregated consumers' surplus.
>
> This study deals only with abusive conducts, which are all those practices adopted by a dominant firm that reduce social welfare and lower the competing firms' profits.
>
> An inappropriate application of the abuse of dominance prohibitions amounts to prohibiting a competitive conduct (false conviction) or to condoning an abusive conduct (false acquittal).
>
> The first part of this study assumes that the decision of the competition authority does not have any effect on the *ex ante* decision of dominant firms and considers the cost caused by an erroneous decision of the competition authority, given that the dominant firm has already chosen its behaviour. The second part considers the costs of errors from an *ex ante* perspective.

The costs of each type of erroneous decision are calculated with respect to the level of social welfare associated with the appropriate decision.

The assessment of this cost is equivalent to evaluating the welfare consequences of the conduct under investigation. The two exercises are symmetric.

The economic objective of competition law

1.4 Before discussing the costs of an erroneous application of the abuse of dominance prohibitions, it is essential to set out clearly what we consider to be the ultimate goal of competition law, and hence of a competition authority, because this will be the benchmark against which these costs will be assessed.

1.5 In this study we assume that a competition authority protects competition with the aim of maximising economic efficiency as measured by social welfare; and we use the standard definition of social welfare employed in most industrial organization literature:

Definition 1 Social welfare (W) is given by the sum of the profits of all the firms (π) and of aggregated consumers' surplus (CS) in the market(s) under consideration:

$$W = \pi + CS.$$

1.6 Definition 1 assumes that the welfare of individual economic agents can be measured, compared and, thus, aggregated in a single figure. It also limits the assessment to the sum of the individual welfare of two broad sets of agents, those that are mostly affected by any antitrust decision: the consumers and the firms operating in the relevant markets[1].

1.7 The individual welfare of firms and consumers is measured respectively by their profits and their surplus. A firm's profit is given by the difference between its revenues and its production costs. Consumer surplus is the difference between what a consumer is willing to pay for each unit of the products she acquires and what she actually pays.

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[1] Antitrust decisions can also affect other agents, such as the government that collect revenues through the tax system. However, these effects are minimal in general. Hence, to simplify the analysis we assume that they can be disregarded.

1.8   This definition is still incomplete as we must also consider that markets are inherently dynamic. Hence, a competition authority must take into account how its decisions affect, not just the current state of the market(s) concerned, but also its future states. This is important because there may be cases where a conduct can have a positive impact on social welfare in the short term, but a negative one in the longer term, so that its overall effect is a reduction in social welfare[2]. The complete definition of the objective function that we will employ then is:

Definition 2 The objective function of a competition authority is to maximise the present value of the flow of social welfare over the periods of time over which the decision has an effect on the relevant market, i.e.:

$$W = \sum_{t=0}^{T} \delta^t (\pi_t + CS_t)$$

1.9   Definition 2 uses the notion of social welfare discussed above (Definition 1) and it assumes that, since markets evolve and change over time, there will come a time ($T + 1$) when a decision made by a competition authority will no longer have any effect on the interested market. δ is the discount factor which represents the intertemporal preferences of the competition authority[3], i.e. the importance that it gives to social welfare at time $t + 1$ with respect to social welfare at time t.

1.10   Figure 1.1 below shows social welfare at one point in time. This is given by the sum of consumers' surplus and the firms' profits. The former is given by the difference between the consumers' willingness to pay and their actual expenditure and is represented by area A, i.e. the area below the demand curve up to the quantity consumed, less the rectangle representing the cost borne for purchasing that quantity. The latter are equal to the price times the quantity produced less the cost of producing it and are represented by area B.

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[2] Predation is a classic example of a behaviour that in the short term increases social welfare (through the price reduction). However, in the long term this strategy drives rivals out of the market creating the conditions for the dominant firm to be able to raise prices well above marginal cost. This reduces social welfare and off-sets the short term increase.

[3] We assume that $0 < \delta < 1$, as it is likely that a competition authority considers the impact of its decisions on the future states of the market, but that it would also give more weight to the present with respect to the future.

FIGURE 1.1: SOCIAL WELFARE AS THE SUM OF CONSUMERS' SURPLUS AND THE FIRMS' PROFITS
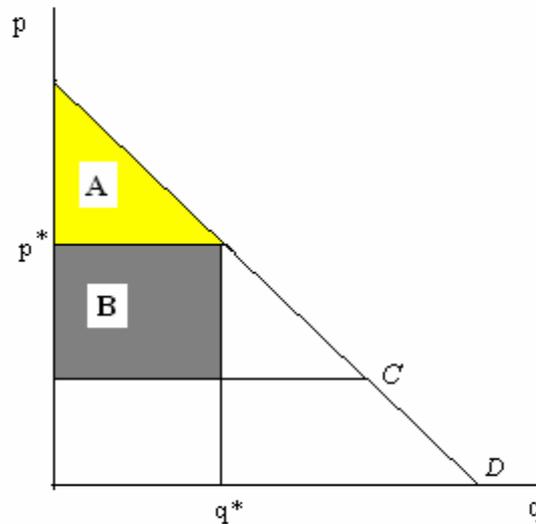
1.11   Two principles are embedded in this definition of social welfare:

the first is that social welfare increases when a firm sells one unit of the product whose cost is below what consumers are willing to pay to buy it (the *efficient production* principle); and

the second is that the way in which the benefits of the exchange are shared between the two sets of agents operating in the market does not affect the overall level of social welfare (the *irrelevance of distribution principle*)[4].

1.12   These two principles have important consequences when we start assessing the costs of erroneous applications of the abuse of dominance prohibitions against this definition of a competition authority's goal (see also the next section).

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[4] Profits are equal to revenues (R) less costs (C). Total consumers' surplus is equal to the aggregate consumers' willingness to pay (WP) less their total expenditure (E). Since by definition revenues and expenditure coincide, social welfare can be rewritten as: $W = WP - E + E - C = WP - C$. This formula shows that social welfare depends only on the consumers' willingness to pay and the cost of producing the relevant output, but that it does not matter how the gains from the exchange are shared between consumers and firms.

Social welfare

1.13   The objective function presented in Definition 2 is based on the notion, largely employed in the industrial organisation literature, that social welfare is given by the un-weighted sum of the profits of the all the firms and total consumers' surplus. However, this is not the only possible definition of social welfare and others have been proposed, where a lower weight is given to the welfare of firms with respect to that of consumers[5]. In some cases, the welfare of society is identified only with that of the consumers.

1.14   It is important to understand the implications of these different definitions of social welfare to understand why we have chosen to adopt one that gives the same weight to the welfare of the consumers and of the firms.

1.15   All these different definitions of social welfare can be captured by this more general formulation

$$W = \alpha \pi + CS \quad (1.1)$$

Where α is a policy parameter that expresses the relative weight a competition authority gives to the wellbeing of firms with respect to the wellbeing of consumers. This may take values ranging from 0 to 1. The lower is α, the lower is the weight given to firms' welfare with respect to consumers' welfare. If $\alpha = 1$ the formulation yields the social welfare function we are employing in this study, if $\alpha = 0$ we have a social welfare function that considers only the welfare of consumers.

1.16   The first important implication is that, while in a case in which $\alpha = 1$ the competition authority is not concerned about how the gains from trade are distributed between consumers and firms, with $\alpha < 1$ distributive

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[5] The EC Guidelines on the application of Article 81.3 of the EC say that "the objective of Article 81 is to protect competition on the market as a means of enhancing consumer welfare and of ensuring an efficient allocation of resources. Competition and market integration serve these ends since the creation and preservation of an open single market promotes an efficient allocation of resources throughout the Community for the benefit of consumers". In the US "the modern consensus is that the objective of antitrust policy is to maximize consumer welfare and promote economic efficiency through the optimal allocation of resources in a competitive market context" (OECD, 2003 Submission of the United States, "Objectives of U.S. Antitrust Law", p. 2).

considerations play a crucial role and the welfare of consumers is given more importance than the welfare of the firms.

1.17   The second implication is that when $\alpha = 1$ social welfare increases only if the incremental cost of an additional unit of output is below the amount that consumers are willing to pay for it, i.e. allocative efficiency matters. Whereas with $\alpha < 1$ an inefficient exchange may yield a social welfare improvement.

1.18   To understand how this can happen, consider that social welfare can be written as:

$$W = \alpha(R - C) + (WP - E)$$

Where:

-   R stands for the firms' revenues
-   E represents the total expenditure incurred by consumers
-   (R − C) is equal to the firms' profit (π), and
-   (WP − E) is equal to consumers' surplus (CS).

1.19   After a simple rearrangement and considering that, by definition, $R = E$ we obtain:

$$W = WP - \alpha C - (1 - \alpha)E$$

1.20   This equation tells us that social welfare can be improved also when consumers' willingness to pay (WP) is below the cost of production (C). For instance, consider a case where the willingness to pay is 5 and the cost is 10 and suppose that price is 0, so that E = 0. If $\alpha < 0.5$ this exchange increases welfare, even if the exchange is inefficient and there are no gains from trade to be shared.

1.21   Economists have proposed several explanations of why, notwithstanding the apparent flaws of a social welfare function of this kind, a competition authority may want to give more consideration to consumers' welfare.[6] These explanations rest on the idea that, while consumers are dispersed and unable to influence the outcome of an antitrust proceeding, firms are less numerous and have powerful means to intervene in the proceedings. It is then argued that this disparity of forces may need to be offset by giving the competition authority an objective function that weights more the interests of the underrepresented consumers. Note, however, that

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[6] For a "political economy" explanation of the welfare standard adopted by competition authorities see Neven and Röller (2000) and Baker (2005).

this explanation, as well as all the others proposed by economists,[7] are based on the assumption that the ultimate goal of competition law is an efficient use of economic resources and that in a situation of imperfect and asymmetric information and of coordination problems this goal might be better pursued by endowing a competition authority with an objective function that is skewed towards the welfare of consumers.

1.22   In this study we have assumed that the social welfare function against which the costs of erroneous antitrust decisions are to be assessed should give equal weight to both sets of agents (consumers and firms) and, thus, that the competition authority should consider distributive issues as irrelevant. This choice is based on our belief that the ultimate economic goal of competition law should be to ensure that the most efficient allocation of resources is attained. The possible presence of biases, discussed in the previous paragraph, does not affect our choice because in this report we are evaluating the outcome of the intervention, or non intervention, of a competition authority and not the means to reach such outcome. Hence, for this purpose there is no need to compensate for the firms' ability to influence the activity of a competition authority.

1.23   The framework that we develop in this study does not depend crucially on this assumption. It is always possible to adapt it to a different formulation of the objective function of the competition authority. However, in this case the costs of any erroneous antitrust decision will not be limited to the efficiency loss, but would also include redistributive issues.

Competitive, anti-competitive and abusive conducts

1.24   Having identified the benchmark against which the costs of the errors of a competition authority when policing the abuse of dominance prohibitions will be measured, we need to spell out clearly what is to be considered as an abuse of dominance.

1.25   It is important to stress that none of the conducts that can be undertaken by a dominant firm are abusive per se. Hence, it is not

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[7] In the context of merger regulation Lyons (2002) and Fridolfsson (2001) discuss some cases in which a competition authority whose objective function is to maximise consumer welfare decides to block a merger that is socially efficient (improves total welfare) because this would prevent more efficient mergers. In such a case, even if the objective of the competition authority is to maximise consumer welfare it ends up maximising total welfare.

possible to identify an abusive conduct without considering its effect on competition in the market and, thus, on social welfare. For example, the decision by a dominant firm to reduce the price of its product can be a competitive action determined by a reduction in its costs, which allows it to increase its market share and its profits but also benefits consumers. However, it can also constitute predatory pricing that serves the purpose of eliminating a major rival and, thus, allows the predator to increase prices in the future at the expenses of consumers.

1.26 Hence, whether a conduct is abusive depends on its effects and in this study we will adopt the following three definitions:

Definition 3 A conduct *x* undertaken by a dominant firm is "competitive" if it increases the present value of the flow of social welfare (or if it leaves it unchanged).

Definition 4 A conduct *x* undertaken by a dominant firm is "anticompetitive" if it decreases the present value of the flow of social welfare.

Definition 5 A conduct *x* by a dominant firm is abusive if it has the effect of decreasing total welfare and if in equilibrium the present value of the sum of profits earned by the rival firms is lower when conduct *x* is adopted than when it is not adopted (the exclusionary test).[8]

Anticompetitive behaviours that constitutes a breach of the abuse of dominance prohibitions

1.27 In Definition 5 we have identified an abusive behaviour as an anticompetitive behaviour that, in addition to reducing social welfare,

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[8] This condition is equivalent to requiring that the conduct reduces the present value of the flow of profits earned by the rival firms. Although a reduction of the rivals' profits does not seem to capture the idea of a weakened competitive pressure, in all the industrial organisation models in which this type of effect is present, it is described as the outcome of an abusive conduct. In these models following an abusive conduct the rivals either exit the market, which implies that they forego the profits they could have earned by staying in the market, or reduce their output in a way that decreases their profit. An equivalent approach could be to define the level of fixed cost that would induce a firm to leave the market. A conduct would then be exclusionary if it lowers this threshold. Note that the "profit" representation of the "exclusionary" effects of a conduct is not valid only in the pure theoretical case in which the rival firms have no economic profits also without the exclusionary conduct, so that their exit from the market does not diminish their profits.

excludes (totally or partially) existing or potential rivals from the market. The reason for separating abusive behaviours from all the other anti-competitive conducts is that this study is only concerned with behaviours that are in breach of the abuse of dominance prohibitions, while Definition 4 is more extensive.

1.28 Definition 4 indeed includes also conducts that may reduce welfare by increasing the probability of a tacitly collusive outcome. These facilitating practices are anticompetitive[9], but do not harm competitors[10]. They actually make them better off.

1.29 In addition, Definition 4 includes other exploitative conducts that are generally not pursued by competition authorities. For example, consider a market with just one firm which is not threatened by potential entry, this firm maximises its profits by setting its marginal revenue equal to its marginal cost and, hence, it sets its price above marginal cost. Had the monopolist firm charged a lower price, consumers would have bought additional units of its product for which their willingness to pay exceeds the economic cost of production. Hence, in this market social welfare is lower than it would have been if the price had been equal to its marginal cost and the behaviour can be classified as anti-competitive.

1.30 "Exploitative" conducts, such as the one just described, are rarely challenged by competition authorities. Several justifications may explain this attitude. In particular, to prevent firms from charging prices above marginal costs a competition authority would require very precise information on the firm's costs and on demand conditions. This information is very difficult, costly and time-consuming to obtain. In addition, some behaviours aimed at increasing firms' market power, such as R&D or advertising investments, are part of the process of competition. If they were punished when undertaken by a dominant firm, firms would be deprived of any incentive to grow and a law meant to avoid abuses of a dominant position may *de facto* turn into a prohibition to hold a dominant position.

1.31 Definition 5, hence, allows us to identify the subset of anti-competitive behaviour that are of interest to this study. It is anyhow important to

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[9] Cartels cause a reduction in social welfare because they lead to an increase in price above marginal costs.
[10] These conducts are not caught under the antitrust prohibition of abusive conducts by dominant firms, but are subject to a separate prohibition (Article 81 and section 18(2) of the UK Competition Act).

stress that for a behaviour to qualify as abusive it is by no means sufficient that it meets the exclusionary test (i.e. that it harms competitors). It is essential that the behaviour is also anti-competitive, i.e. it reduces social welfare. There are indeed cases in which a behaviour by a dominant firm reduces the profits of some its rivals (for example the dominant firm lowers its price forcing some firms to exit the market), but increases social welfare.

Interaction between the behaviour of a dominant firm and the characteristics of the relevant market

1.32   Since social welfare at each point in time is given by the sum of the profits earned by the firms operating in the relevant market and by consumers' surplus and these in turn depend on the consumers' willingness to pay and the cost of production, to assess any welfare we need to examine the effects of the conduct on these market characteristics.

1.33   In Annex A we examine in detail the interaction between a potentially abusive conduct by a dominant firm and the level of output, the social costs of production and the willingness to pay. We show that a conduct x increases social welfare if it:

> reduces the average social cost of producing the relevant good or service;
> increases consumers' willingness to pay for it (i.e. expands demand at each level of price); or
> expands output, provided that the consumers' willingness to pay for these additional units of output exceeds the marginal cost of producing them.

Erroneous interventions and non-interventions

1.34   The object of this study is to analyse the cost of erroneous decisions by the competition authority in applying the abuse of dominance prohibitions. In deciding a case concerning an allegedly abusive conduct a competition authority can commit two types of errors:

1)   it can decide to prohibit a conduct that is competitive (i.e. a conduct that falls in the set defined by Definition 3) – this error is usually referred to as "false conviction", or type I error;

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2) it can decide to allow a conduct that is abusive (i.e. a conduct that falls in the set defined by Definition 5) – this error is usually referred to as "false acquittal", or type II error.

1.35 These errors can stem either from a lack of complete and accurate information or from the choice of a flawed or inappropriate economic theory on which to base the decision[11]. They can also take place because the competition authority employs a test to verify the abusive nature of a conduct, whose 'triggering facts' may be present even when the behaviour is competitive, or may not be there even if the behaviour is abusive. In this study we do not consider errors arising only from a formal misapplication of the law.

Ex post perspective on costs

1.36 In the first part of this study we adopt a purely *ex post* (or direct) approach when assessing the costs caused by these errors. Hence, all that we consider is what happens in the relevant market after the decision of the competition authority, given that that the conduct *x* has already been adopted by the dominant firm and the authority has to decide whether to allow its continuation or stop it.

1.37 With this approach and bearing in mind that the objective function of the competition authority consist of maximising social welfare, the cost related to an erroneous judgement is the loss in the flow of social welfare (L) it causes, i.e. the difference between the social welfare that would have prevailed if the authority had taken the correct decision and the level it actually reaches with the erroneous one. This implies that the effect of conduct *x* on social welfare is not measured by comparing the market before and after x has been undertaken, but the appropriate counterfactual is how the market would have developed if *x* had not been implemented (or the reverse if the conduct is stopped). For example, if new firms could have entered the market had x not deterred them, the appropriate benchmark should be how the market would have been if these competitors had entered.

1.38 By employing our definition of social welfare (Definition 2), we can then easily calculate the costs associated with the two possible errors in terms of welfare loss as follows[12]:

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[11] The sources of the errors are discussed more in details in Chapter 5.
[12] Annex A contains a more formal representation of this analysis that uses a decision theory approach.

Cost of a false conviction = L_I = W (intervention, conduct was competitive) – W (no intervention, conduct was competitive)

Cost of a false acquittal = L_{II} = W (no intervention, conduct was abusive) – W (intervention, conduct was abusive)

Ex ante perspective on costs

1.39   The discussion on the costs of false convictions and false acquittals presented above hinges on the assumption that the decision of the competition authority does not have any effect on the *ex ante* decision of the dominant firm to adopt conduct *x*, or on the decision of other dominant firms in other markets – or in the same market in the future – to adopt the same or similar conducts.

1.40   A different perspective emerges if we consider that a decision by a competition authority affects social welfare also because it modifies the dominant firm's choice of which conduct to adopt. Under these circumstances the *ex ante* (or indirect) cost of an erroneous decision is given by the welfare reduction stemming from under-deterrence of abusive conducts and from over-deterrence of competitive conducts.

1.41   This study will mainly adopt an *ex post* perspective, however in Chapter 5 and 6 we will discuss how the results change if the *ex ante* perspective is employed.

Conclusions

1.42   This study will deal only with the costs caused by decisions of the competition authority that allow conducts that are abusive or that condemn conducts that are competitive. Since the real nature of a conduct depends on its effect on social welfare and on its rivals' profits, the next step in building an analytical framework for measuring these costs will consist in developing a classification of potentially abusive conducts that relies on their effects.

2.   WHAT CONDUCTS CAN BE ABUSIVE

Introduction

2.1   In this chapter we discuss in greater detail those conducts that are frequently investigated by competition authorities in the application of abuse of dominance prohibitions and introduce a classification that will help us in the forthcoming analysis of the costs of inappropriate interventions, or non-interventions, under these prohibitions.

2.2   Potentially abusive conducts have been traditionally classified according to their the actual characteristics, i.e. to their form, between conducts that determine a change in the dominant firm's price(s) and conducts that cause a variation in one or more of the firm's non-price variables, such as level of advertisement, contractual relationships with input providers and production capacity.

2.3   We believe that this taxonomy is not the most helpful one because the economic effects of a conduct, which should guide a competition authority in making a correct decision and avoid errors, may not depend on its formal characteristics. Hence, in this chapter we propose a different classification and we provide some concrete examples of conducts that fall within each new category.

> The proposed taxonomy classifies potentially abusive strategies in two ways according to their effect on the pay-off functions of the rival firms.
>
> The first category of "structural strategies" comprises all those strategies that *change the rivals' payoff functions*. These are further subdivided between those that raise rivals' cost and those that lower rivals' demand.
>
> The second category of "output strategies" comprises all those strategies that *lower the level of the rivals' profit* without modifying their payoff functions.
>
> Structural strategies can also affect the dominant firm's payoff function and this should be taken into account in the analysis of their welfare effect.
>
> This classification will be used in the rest of this report to analyse the impact on social welfare of potentially abusive strategies and to assess the cost of their erroneous acquittal or condemnation.

The traditional classification of potentially abusive conducts

2.4   Those behaviours that, when undertaken by a dominant firm, could be deemed abusive are[13]:

> below-cost or predatory pricing;
> margin squeeze (from above and from below);
> refusal to supply a more efficient input;
> refusal to supply a higher quality input;
> exclusive dealing;
> non-linear prices and multi-product discounts; and
> tying and bundling.

2.5   In both the legal and the economic antitrust literature, these potentially abusive conducts are normally classified according to their formal characteristics, rather than their effects. They are divided into pricing and non-pricing strategies, depending on whether the allegedly anticompetitive conduct consists of setting a price/price structure, or of setting a non-price variable at a level which may have the effect of reducing social welfare. The first group includes below-cost pricing (such as predatory pricing), margin squeezes (from above and from below), non linear pricing and multi-product discounts (to input suppliers, distributors and customers). The second group comprises refusal to supply a more efficient input or a higher quality input, exclusive dealing (with input suppliers, distributors and customers) and tying and bundling.

2.6   We believe that this classification is not very helpful when it is used to support the economic analysis of the effects of a conduct. We assume that the aim of competition law, as discussed in Chapter 1, is to maximise social welfare, so the costs of an erroneous decision on a conduct are also measured in terms of welfare losses. Hence, a classification based on the effect of a behaviour, rather on its characteristics, would be in line with this approach and would better support the necessary economic analysis.

2.7   In addition, the pricing/non-pricing distinction is sometimes only a matter of convention, as it can depend on how the behaviour is described. For instance, a refusal to supply is normally classified as a non-pricing strategy. However, a decision by the owner of an essential input to

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[13] See the OFT Guidelines 419 "Vertical Agreements" and the Draft OFT Guidelines 414 "Assessment of Conduct". See also DG Competition's "Discussion paper on the application of Article 82 of the Treaty to exclusionary abuses" (December 2005).

charge an extremely high price, such that its rivals are not willing, or capable, to pay it, is considered a pricing strategy, but it is not different in its effect from a refusal to supply. Similarly, the tying of two products, which is classified as a non-pricing strategy, can also be seen as a predatory behaviour in the tied market, because the effective price for buying the tied good for a customer who has already bought the tying good is zero[14] and it could, thus, also fall into the pricing strategy category. In cases like the ones just described, the traditional taxonomy does not add much value to the analysis of the conducts and we believe that, as far as their economic consequences on the rivals of the dominant firm and on final consumers are exactly the same, there is no reason to use a classification that distinguishes between them.

2.8   Therefore, in this study we propose a different classification which avoids the ambiguities discussed above and provides greater support to the economic analysis of these behaviours. Section 2.3 below describes this approach in more details.

2.9   Even the assessment of whether a firm is dominant, which is a pre-requisite for any intervention by a competition authority under the abuse of dominance prohibitions, is normally ascertained on the basis of a form-based approach. However, if the enforcement of competition law was more pervasively effect-based (as we propose), then the traditional concept of dominance could also be challenged[15]. The decision to apply competition law would, in this case, have to be based on the effective magnitude of the change in social welfare caused by a firm's behaviour, and not on any proxy. However, in this study we do not discuss the approach to the identification of a dominant position and we simply refer to the firm whose behaviour is investigated as the "dominant firm".

A different approach

2.10   The classification that we suggest, and that we will use in the course of this study, is based on a distinction that relies on a game theoretic approach to competition.

2.11   An oligopolistic market is a market in which a small number of interdependent firms choose their strategies taking into account the rational reactions of their rivals. This can be represented through a game, whose "rules" are summarised in the firms' (i.e. the players') payoff functions. These functions indicate the level of profit each player gains

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[14] See Tirole (2004).
[15] See Gual et al. (2005).

for any of the strategies it undertakes, given the strategies adopted by its competitors.

2.12 A potential abusive conduct may modify the rivals' payoff functions, because it shifts the cost or demand curves upon which their payoff (i.e. their profit) depends, or it may change the outcome of the game without modifying the rivals' payoff functions. The first type of conducts affects the structure of the game so we refer to them as "structural strategies". The second type, instead, occurs when the dominant firm expands its output *lowering the level of rivals' profits* without affecting their cost or their demand functions. We refer to them "output strategies".

2.13 Some simple examples may better explain this distinction. Suppose that a dominant firm owns an essential input and that it increases the price charged to rivals for access to this input. Such a strategy modifies the rivals' payoff functions because they now bear a higher cost for each level of output. Similarly, if a firm signs an exclusive contract with a major client it modifies its rivals' payoff functions because it reduces the demand they face at a given price. Instead, if a dominant firm lowers its price and steals some customers away from its rivals, its conduct changes the outcome of the game, as it causes a reduction in rivals' profits, but it does not change the rivals' payoff *functions*. Hence, while the first two strategies change a determinant of the rivals' payoff functions, the last one modifies neither the rivals' cost curves nor their demand curves.

2.14 From these examples, it becomes clear that structural strategies can be further subdivided depending on how they modify the payoff functions. The reduction in profits experienced by the dominant firm's rivals and the ensuing foreclosure effect can arise from either of two possible consequences of the conduct:

1) a reduction in the demand faced by one, or more, of the dominant firm's rivals – we will refer to this as a conduct that lowers rivals' demand or a LRD conduct; or

2) an increase in the costs (variable, fixed, or both) borne by one, or more, of the firm's rivals - we will refer to this as a conduct that raises rivals' costs or a RRC conduct.

2.15 Table 2.1 below summarises this classification showing which of the potentially abusive behaviours as classified in the formal taxonomy are most likely to fall into each of the effect based categories proposed.

TABLE 2.1: THE EFFECT-BASED CLASSIFICATION

	Structural conducts	Output conducts
RRC conducts	refusal to supply a more efficient input margin squeeze from above non linear pricing to input suppliers or distributors exclusive contracts with input suppliers or distributors.	predatory pricing margin squeeze from below price discrimination
LRD conducts	refusal to supply a higher quality input exclusive contracts and fidelity rebates to customers; tying and bundling.	

2.16   In the following sections we will further discuss this taxonomy and provide some concrete examples of conducts that fall within each category.

Structural strategies: conducts that raise rivals' costs

2.17   Typical RRC strategies are: refusal to supply, margin squeeze from above, exclusive dealing with input suppliers and distributors, and non-linear prices to input suppliers and distributors (of one or more products). Each is discussed below.

Refusal to supply a more efficient input

2.18   Refusal to supply a more efficient input[16] takes place when an monopolist of an input decides not to provide the input to its downstream rival firms (either new or existing ones), thus forcing them to use a different, less efficient input, or to exit the market if no alternatives are available, or if the price for the alternative input is too high[17]. The input may consist of access to a physical infrastructure, a

[16] See paragraphs 2.31, 2.32 and 2.33 for a discussion of the refusal to supply a higher quality input, which represents a LRD conduct.
[17] In EC competition law no distinction is made in general between a refusal to supply a higher quality input and a refusal to supply a more efficient input, despite the fact that the two conducts affect rivals in different ways.

license to use an intellectual property right, a good, or a bundle of goods and services (such as a distribution system). This behaviour raises rivals' costs.

2.19   In the vast majority of cases a decision to exclude other firms from the use of a proprietary facility or a good does not alter the competitive process. The very essence of property rights is to bestow on their owners the ability to exclude others from using the relevant assets. However, if the refusal to supply by a dominant firm results in the elimination of competition it may be considered an abuse.

2.20   The most important, though rare, case in which a refusal to deal amounts to an abuse is in relation to access to an "essential facility". If a dominant firm owns and manages a "facility" that is "essential" for entering a downstream market (in that it cannot be duplicated or the cost of duplicating it is very high), it has a duty to deal with would-be competitors at non-discriminatory conditions, provided that it is not capacity constrained.

2.21   For instance, suppose that the downstream product is a railway transportation service between two towns and that the firm dominant in this market owns the only available track between the two cities. The track is essential for providing the services. If it is extremely expensive (or even impossible) for the firm's rivals to duplicate the track (e.g. if there are environmental constraints or simply spatial limitations), the track would be an essential facility. In fact if the bottleneck owner did not share the track with the other firms (or imposed a very high price), the downstream market would become a monopoly.

2.22   In *Sealink*[18] the European Commission found that the port of Holyhead was an essential facility and that Sealink's refusal to provide Sea Container with access on reasonable and non-discriminatory terms was an abuse. Other examples of "essential facilities" identified by competition authorities are: the electricity grid, gas distribution pipelines, spare parts of durable equipments[19], intellectual property for television listings[20], and interlining arrangements[21].

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[18] Case IV/34.689 *Sea Containers/Stena Sealink*, Commission decision of 21 December 1993; but see also *Sealink/B&I Holyhead*, (22nd Report on Competition Policy at point 219), Case 94/119/EC *Stena/DSP* (*Port of Rodby*) Commission decision of 21 December 1993.
[19] See Case 22/78 *Hugin/Commission*, Judgment of the ECJ of 31 May 1979.
[20] Joined Cases C-214/91 P and C-242/91 *RTE/Commission* (*Magill*) ECR I-743 (1995).

Margin squeeze from above

2.23   A margin squeeze takes place when a vertically integrated firm that has a dominant position in the market for an "essential" upstream input, charges a pair of prices, one in the upstream market and one in the downstream market, such that its rivals in the downstream market cannot achieve a viable price-cost margin. If the margin squeeze occurs because of an excessive upstream price, it can be qualified as "from above". A margin squeeze from above[22] is another case of a RCC conduct because it increases the cost per unit of output of the rivals.

2.24   An example of such behaviour can be found in the market for fixed telecoms services. In most countries there is only one local access network (also known as the local loop), that would be costly and difficult to replicate. This network represents an essential input for the provision of fixed telecoms services. A margin squeeze occurs if the provider of fixed telecoms services that owns this network sets a price for access to it, and a downstream price for its telecoms services, such that rival service providers would earn a margin that it is not sufficient to cover the costs of the other inputs. This margin squeeze may force alternative providers to exit the market, or it may considerably impair their ability to compete (e.g. small rivals could only survive by offering higher quality niche services, because by differentiating their products they would be able to charge a higher price and earn a sufficient margin to remain in business).

Exclusive contracts with input suppliers or distributors

2.25   Another possible RRC strategy consists of signing exclusive contracts with suppliers of a more efficient input, so as to force rivals to use a less efficient one. For instance in *Alcoa*[23] it was alleged that Alcoa entered into exclusive supply agreements with some electric power suppliers in order to raise the cost of electricity for other aluminium manufacturers.

2.26   Signing exclusive contract with distributors is also an RRC strategy, because distribution can be seen as a service that manufacturers purchase in order to have their products delivered to the final market. If the dominant firm manages to sign exclusive contracts with more

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[21] Case IV/33.544 *Aer Lingus/British Midland* Commision decision of 26 February 1992.
[22] See paragraphs 2.43 and 2.44 for a discussion of a margin squeeze from below which is an output strategy.
[23] *US v. Aluminium Co. of America* (*Alcoa*), 148 F.2d 416.

efficient distributors, its rivals are faced with a cost increase because they have to use a less efficient and, hence, more costly distribution network.[24]

2.27 In *Michelin II*[25], the European Commission decided that the fidelity rebates that Michelin offered to independent dealers in France, which were based on the quantity of Michelin tyres bought and on the share of total tyres sourced from Michelin, were abusive, because they were aimed at limiting other manufacturers from accessing the existing sales network.

Non linear pricing to input suppliers or distributors

2.28 Prices that are conditional on the share of the supplier's production that is sold to the dominant firm, and that make input providers willing to supply most (or all) of their goods or services to this firm, represent another type of RRC conducts. This strategy is similar to an exclusive contract, but without the legal obligation that comes with a contract, because it has the same effect of forcing rivals to use a less efficient input or to exit the market. This type of practice includes loyalty rebates, quantity forcing, multi-product discounts, and bundling and tying of products to distributors.

2.29 In the *BA/Virgin* case[26] the European Commission held that British Airways (BA) abused its dominant position by offering commission schemes to travel agents that included extra payments in return for meeting or exceeding their previous year's sales of BA tickets. Since BA tickets accounted for a large share of travel agents' sales to final consumers, this compensation scheme could have caused a substantial increase in the value of commissions that other airlines had to offer to travel agents to induce them to sell their tickets.

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[24] It is possible that distributors do acquire the good (or service), rather than simply act as intermediaries, and, hence, incur themselves the risk of not selling the firm's goods (or service). However, even in this case we can consider the distributors as input providers rather than clients, because they are not the final consumers or the good (or service) and they would stop buying and reselling the good, if they did not find it convenient, thus leaving the firm with its goods unsold because it can not access directly its final consumers.

[25] Case COMP/E-2/36.041/PO *Michelin*, Commission decision of 20 June 2001.

[26] Case IV/D-2/34.780 *Virgin/British Airways*, Commission decision of 14 July 1999.

Structural strategies: conducts that can lower rivals' demand

2.30   A LRD conduct is a conduct by a dominant firm that reduces the amount of output that its rivals are able to sell given the price charged in the market (i.e. it alters their demand functions). The dominant firm can achieve this by making its rivals' products less attractive or by preventing rivals reaching a portion of the market demand by means of exclusive contracts. Typical LRD strategies are: refusal to supply an input that would make the rivals' product more attractive and marketable, exclusive contracts with customers, and tying and bundling.

Refusal to supply a higher quality input

2.31   The dominant firm can reduce its rivals' demand by refusing to provide them with an input, of which the dominant firm is the sole supplier, that would make their product more attractive and marketable. This form of refusal to supply reduces rivals' demand by making their goods less attractive[27].

2.32   In *IMS*[28] the European Commission issued a decision, in July 2001, ordering interim measures that required IMS Health to license its structure for ordering information on German regional sales of pharmaceutical products, on the basis that the IMS's refusal constituted, *prima facie*, an abuse of its dominant position. The Court of First Instance and the ECJ suspended the Commission's decision and the case has now gone back to the German courts. See case study II for a more detailed discussion of this case.

2.33   In *BMI/Aer Lingus*[29] the European Commission accused the Irish airline Aer Lingus, which was dominant on the London - Dublin route, of abusing its position by withdrawing from its interlining agreement with BMI when the latter started operating on the same route. Interlining is a standard practice in the air transport industry whereby airlines are authorised to sell each other's services with large benefits for airlines and passengers. A new entrant without interlining facilities is likely to be considered as a second-rate airline by travel agents and travellers alike, making it more difficult for the entrant to acquire the commercial standing necessary to operate profitably.

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[27] If the refusal concerns a more efficient input the conduct is RRC (see paragraphs 2.18 to 2.22 above).

[28] Case COMP D3/38.044 *NDC Health/IMS Health Interim Measures*, Commission Decision of 3 July 2001.

[29] *British Midland/Aer Lingus* [1992] OJ L96/34, [1993] 4 CMLR 596.

Exclusive contracts with customers

2.34   With an exclusive contract a dominant firm induces some buyers to commit to buy only from it. This type of contract increases the demand for the dominant firm's products and reduces the demand for rival firms' products.

2.35   The dominant firm can achieve the same result also by offering rebates based not simply on the quantity sold to a customer but also on the quantity needed by that customer. These rebates, though not legally binding, exhaust the buyer's requirements[30] and reduce the demand faced by rivals.

2.36   In *BPB Industries*[31], the European Commission accused British Gypsum (BG), a subsidiary of BPB that held a dominant position in the plasterboard market in the UK and Ireland, of abusing its market power by introducing a system of regular payments to merchants who were prepared to obtain all their supplies exclusively from BG. These payments were made in the form of regular contributions to the merchants' advertising expenses and were offered only to selected merchants, rather than under a general scheme based on objective criteria. The European Commission considered these rebates to be aimed at preventing the merchants in question from buying and selling imported plasterboard.

Tying and bundling

2.37   Tying occurs when the dominant firm makes the sale of one good (the tying product) conditional upon the purchase of a second good (the tied product) and makes only the tied product available separately. Bundling refers to situations where two (or more) goods are sold together. Bundling is 'pure' if the components of the bundle are not available on a stand-alone basis and is 'mixed' if both the bundle and the separate components are available but the bundle is sold at a discount relative to the prices of the components. Tying and bundling may have the effect of reducing the demand of rival firms. For example, if when buying a computer from a dominant manufacturer, consumers also get a free

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[30] This type of conduct amounts to charging non-linear prices to customers, to induce them to buy a large share of the products they need from the dominant firm. It is very similar to an exclusive contract, though it uses a different system to tie in the customer.

[31] Case IV/31.900 *BPB Industries plc*, Commission Decision of 5 December 1998.

operating system, this practice may have the effect of reducing demand for operating systems by rival software companies.

2.38   In *Tetra Pak II*[32], the European Commission held that Tetra Pak had abused its dominant position in the aseptic carton and machine markets, *inter alia*, by imposing contracts that obliged its customers to use Tetra cartons on its machines. This conduct impeded other carton manufacturers getting access to a substantial number of potential customers.

2.39   In *Microsoft*[33], according to the European Commission, one of the abusive conducts adopted by the software producer consisted of bundling Microsoft's Windows Media Player (WMP) with its PC operating system, Windows 2000, which accounted for more than 90% of the PC operating system market. The European Commission argued that the ubiquity that was granted to WMP as a result of it being sold in a bundle with the Windows operating system artificially reduced the demand for competing media players (see case study IV for a more detailed discussion of this case).

Output strategies

2.40   A firm may abuse its dominant position if it adopts a strategy that, by expanding its output, decreases social welfare and reduces the profits of one or more of its competitors. According to the traditional classification such conducts are: below cost or predatory pricing, margin squeezes from below; and price discrimination to customers.

Below-cost or predatory pricing

2.41   A price is predatory if the dominant firm deliberately foregoes profits by lowering its price in order to drive its rivals out of the market with the aim of recouping the foregone profits by charging higher prices. This strategy reduces rivals' profits because it drives the equilibrium price down, but it does not affect their demand curves or their costs.

2.42   In *Wanadoo*[34], the European Commission found that Wanadoo was pricing below cost in order to drive its competitors out of the market for

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[32] Case C-333/94P, *Tetra Pak International SA v Commission* (1996) ECR I-5951, (1997) 4 CMLR 662.
[33] Case COMP/C-3/37.792 *Microsoft*, Commission decision of 24 March 2004.
[34] Case COMP/38.233 – *Wanadoo Interactive*, Commission Decision of 16 July 2003.

the provision of high-speed Internet access to residential consumers. This pricing strategy was deemed to be predatory and hence in breach of Article 82 of the EC Treaty (see case study III for a more detailed discussion of this case).

Margin squeeze from below

2.43   In paragraph 2.23 - 2.24 we have defined a margin squeeze as a conduct that reduces the margin between the price of the upstream input, of which the dominant firm is the main or only provider, and the prevailing downstream price, to a level that makes it difficult for its competitors to compete. This represents a RRC structural strategy if rivals' margins are squeezed by a high input price, and an output strategy if, instead, the margin squeeze occurs because the dominant firm sets a downstream price below cost. This practice is similar to a predatory strategy. This strategy is also referred to as a "margin squeeze from below".

2.44   In *Napier Brown/British Sugar*[35], the European Commission maintained that British Sugar, which held a dominant position in the upstream industrial sugar market, abused this position by setting a retail price such that, given the prevalent wholesale price, the margin it earned was below its repackaging and selling costs. The low retail price prevented its competitor Napier Brown from earning a viable margin.

Price discrimination

2.45   A firm can expand its output by charging different prices to customers for the sale of identical goods or services, if no arbitrage between customers can take place. This behaviour can sometimes be abusive[36]. Price discrimination can take the form of rebates granted to some group of customers identified according to some relevant attributes (like age, gender, location etc.), or subject to some objective conditions such as the quantity purchased or how far in advance of use it is bought. In the first case, the firm directly segments its buyers so as to be able to charge a different price to each segment. In the second case, the firm offers its pricing scheme to all customers and their segmentation is obtained through a process of self-selection.

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[35] Case IV.30.178 *Napier Brown/British Sugar*, Commission Decision of 18 July 1998.

[36] Price discrimination can increase welfare if it allows an expansion of the market because, by charging different prices to consumers with different willingness to pay, it allows more consumers to buy than if a single average price was imposed.

2.46   The *Irish Sugar*[37] case represents an example of the first type of price discrimination. The European Commission found that Irish Sugar had abused its dominant position in the market for crystallised sugar in Ireland by charging discriminatory prices to its customers. Irish Sugar was indeed offering a sugar export rebate to its customers that exported their final product, such as confectionery or soft drinks, to other Member States. Both the practice of offering sugar export rebates and the ad hoc manner in which the scheme was administered were considered discriminatory.

2.47   Tying and bundling can also be instrumental to price discrimination. For instance, by tying a durable good, which is consumed in fixed amounts, with another good, whose consumption varies across individuals, a firm can effectively apply a two-part pricing scheme. Consumers pay a low price for the durable good and an inflated price for the consumable good. In this way consumers end up paying different unit prices for the system good, composed of the durable and the consumable good, according to their intensity of usage.

Effects of potentially abusive conducts on the dominant firm

2.48   So far we have classified potentially abusive conducts according to the means used to reduce rivals' profits. However, these conducts can also affect the dominant firm's payoff function and it is important to be aware of this in assessing the costs that a competition authority causes if it erroneously judges these conducts. These considerations apply only to RRC and LRD strategies as output strategies by definition do not affect the payoff functions.

2.49   If a competition authority forces a firm to supply some of its input to rivals (or to charge a lower price for the same input to rivals) it may provoke an increase in the cost faced by the dominant firm due to some diseconomies associated with the provision of the input. For instance, an essential infrastructure may become congested if the dominant firm has to meet the demand coming from a rival, causing an increase in the dominant firm's cost.

2.50   An obligation to supply can also change the level of investment of the dominant firm affecting its cost or the quality of its products. A potentially abusive conduct, such as a refusal to supply a more efficient input or an exclusive contract, may be aimed at protecting an investment in an input or a facility. Hence, an antitrust decision to prohibit this

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[37] Case IV/34.621– *Irish Sugar plc*, Commission Decision of 14 May 1997.

conduct may reduce the level of investment that could maintain or improve the quality of the output or the efficiency of the production method. The reduced level of investment could increase the dominant firm's cost or force it to reduce the quality of its products[38].

2.51   Exclusive dealing or non-linear compensation schemes are sometimes used to protect investment that the dominant firm, or its distributors, makes to improve the distribution network (e.g. the dominant firm provides its retailers with costly demonstration facilities or training) that would increase consumers' willingness to pay. If the firm cannot impose some form of exclusivity, it will have a lower incentive to make such investments because other manufacturers could also benefit from them, without incurring any of the costs, and this will affect the quality of its goods.

2.52   In all these cases the structural strategy adopted by the dominant firm will affect not only the payoff functions of its rivals, but also the firm's own payoff function.

Conclusions

2.53   This Chapter has proposed a new classification of potentially abusive conducts, based on their economic effects rather then their form. We will employ this classification in the rest of the study because structural and output strategies generate different effects on the market and this influences their impact on welfare and consequently on the cost of errors. The next Chapter will explain how to perform such an assessment by helping to understand the effects that an antitrust decision can have on the determinants of social welfare.

2.54   Since the loss in social welfare caused by an erroneous antitrust decision is given by the difference between the level of social welfare that would be achieved with and without this intervention (or non intervention), its assessment is equivalent to assessing the welfare consequences of the conduct under investigation. Hence, measuring the cost of an inappropriate antitrust intervention requires an in depth understanding of

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[38] On the other hand, an antitrust decision that allows a RRC or LRD conduct can also reduce the dominant firm's incentives to invest in R&D activities, if the conduct causes a reduction in the competitive pressure faced by the firm. As a consequence innovation will dwindle, the quality and variety of products available to consumers will be reduced and their willingness to pay will increase less then it would have done. In addition, the firm will also have fewer incentives to minimise production costs.

the impact on the key market variables of the conduct the competition authority is investigating.

2.55 The next chapter presents this analysis, focussing on the welfare effects of potentially abusive strategies (classified as proposed in Chapter 2). From these welfare effects, it will derive conclusions on the costs of erroneous antitrust decisions that stop/allow them.

3. THE WELFARE EFFECTS OF POTENTIALLY ABUSIVE CONDUCTS

Introduction

3.1 In Chapter 1 we explained that the cost of an inappropriate intervention, or non intervention, under the abuse of dominance prohibitions should be measured in terms of the social welfare loss it causes. This Chapter will explain how to perform such an assessment by analysing the effects that an antitrust decision can have on the determinants of social welfare.

3.2 Since the loss in social welfare caused by an erroneous antitrust decision is given by the difference between the level of social welfare that would have been achieved with and without this intervention (or non intervention), its assessment is equivalent to assessing the welfare consequences of the conduct under investigation. Hence, measuring the cost of an inappropriate antitrust intervention requires an in-depth understanding of the impact on the key market variables of the conduct the competition authority is investigating.

3.3 The analysis we will present in this Chapter will, therefore, focus on the welfare effects of potentially abusive strategies (classified as proposed in Chapter 2) and from these will derive conclusions on the costs of erroneous antitrust decisions that stop/allow them[39]. Given the complexity of the subject this Chapter will only highlight the most relevant results, while a detailed description of these results, with all the caveats necessary to fully appreciate them, and an explanation of how they have been derived are included in Annexes C, D and E.

3.4 These annexes also contain a set of questions that we have developed to help a competition authority to focus its attention on the market variables and the characteristics of the conduct that determine the sign and magnitude of the welfare change. To make use of these questions it is necessary to have understood the details of our analysis of the welfare effects.

3.5 The key findings we will discuss in this Chapter are:

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[39] It is important to remember that variation in social welfare is measured with respect to the market situation had the conduct not taken place. This is not necessarily the market conditions in place before the conduct occurred. For example, if a conduct had the effect of preventing new entry, the appropriate comparison should be with the market equilibrium that would have prevailed if entry had taken place.

If there are no spill-over effects or links with other markets, a potentially abusive strategy in the short term always reduces rivals' market shares. If the conduct achieves this by increasing their cost or lowering their demand (structural strategies), it also reduces the market output, whereas if it expands the dominant firm's output (output strategies), it may increase the total production level.

The effect of a potentially abusive conduct on the social costs of production depends on the type of conduct undertaken, the difference in efficiency between the dominant firm and its rivals, the magnitude of the loss in efficiency suffered by the rivals, and the variation in the market shares.

In the longer term, all abusive conducts (structural and output strategies) can diminish the level of competition faced by the dominant firm. This can lead to a reduction in the level output, in the willingness to pay and in the level of investments in cost reduction and product innovation. However, some structural conducts, such as a refusal to supply or an exclusive contract with distributors, may actually protect investments in the maintenance and upgrade of inputs and infrastructures.

Where there are economies of scale, additional output and cost effects are possible. With network externalities and proprietary standards any change in output can have a secondary effect on consumers' willingness pay, and any increase in the willingness to pay can lead to a further expansion of the network. These additional effects can weaken or even off-set the primary ones.

A potentially abusive behaviour can also affect more final markets, either because the markets are connected by the technology used or by the shape of the consumers' preferences, or because the behaviour itself creates a link between the demand curves. In these circumstances the welfare assessment requires consideration of the effects that changes in the variables in one market can have on the others.

The structure of the analysis

3.6   Social welfare, as we have defined it in Chapter 1, is given by consumers' total willingness to pay less the costs of production. Since consumers' willingness to pay depends on the position and elasticity of the demand curve and on the quantity consumers buy, and the costs of production are determined by the firms' cost functions and their market shares, these are the variables on which our attention will focus.

3.7   Hence, to understand the effect of a potentially abusive conduct on social welfare it is necessary to understand:

1)   whether the cost per unit of output produced (to society) has changed and how this has affected social welfare, i.e. if there is any cost effect and its sign and magnitude;

2)   whether consumers' willingness to pay has changed and how this has affected social welfare, i.e. if there is any demand effect and its sign and magnitude; and

3)   whether the output level has changed and how this has affected social welfare, i.e. if there is any output effect and its sign and magnitude.

3.8   In this Chapter we will discuss determinants of the sign and magnitude of each of these effects, but it is important to remember that to arrive at a complete assessment of the short term variation in social welfare it is necessary to combine all these effects, which may offset or strengthen each other.

3.9   In performing the analysis we will assume that competition between the dominant firm and its rivals is oligopolistic and that it may be over price or quantity.

3.10   Depending on the number of final markets affected, and on whether these are characterised by external effects, the assessment of the welfare effect of a potentially abusive conduct can be quite complicated. Hence, we will start by analysing the impact that a potentially abusive strategy can have on the determinants of social welfare in a very simple setting: a single final market in which there are no spill-over effects. We will then extend the analysis to more complex market conditions by considering how the results obtained in the basic setting change when there are spill-over effects on the supply and demand side, and by considering what happens if the conduct under examination affects more than one final market.

One final market versus more than one

3.11   We separate the analyses of conducts that affect one or more final markets because if only one final market is involved then we can assess the welfare consequences of a practice, and of the decision of a competition authority about this practice, only on the equilibrium of that market, as is typical in a partial equilibrium analysis. Conversely, if more final markets are involved, we need to jointly assess the effects of the conduct on the equilibria of all the relevant markets, and the consumers'

preferences and the firms' cost functions may be related across these markets in complex ways.

3.12   We note that this distinction does not necessarily coincide with the distinction between one and more products. First and foremost, for competition purposes a market is defined so as to include, not just the product directly affected by the conduct, but all those products (if any) that are its demand or supply-side substitutes[40] In addition, of two products sold into two different markets, one may be an input for the production of the second so that the two markets, though separate from an antitrust point of view, are vertically linked. In these instances, we do not need to consider both markets to assess the change in total social welfare. The welfare assessment depends only on the demand of the consumers in the downstream market, as the intermediate demand for the input sold in the upstream market is derived from the downstream demand, and on the social costs of producing the final product. Annex B contains a formal analysis that proves this point.

3.13   Hence, when we talk about the number of markets affected, we refer to economic markets, as normally defined in antitrust investigations, and to final markets, so that all those markets that are vertically integrated with the final one are not considered as different for the purpose of this classification.

Short term and long term

3.14   Once a potentially abusive conduct is adopted, the competitors react and adapt their production choices to the changes brought about on output, cost or demand. The dominant firm then adjusts to those changes. A new equilibrium thus emerges, in which output and prices are different and market shares have changed.

3.15   However, before reaching a conclusion on the welfare change generated by a conduct it is important to consider that some of its effects may require a long term commitment or may take time to materialise[41]. These long term reactions are relative to the level of investments made by the dominant firm and its rivals and relate to entry into and exit from the market, variation in the level of production capacity, investment in R&D

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[40] For an explanation of how markets are defined for the purpose of competition investigations refer to OFT Guidelines 403 "Market Definition".

[41] The longer time can be due to information asymmetries, as rivals may take time to understand that market conditions have changed, or to the fact that some decisions require time to be enacted (e.g. closing down a factory)

and in the maintenance and upgrade of assets. These effects cause a further shift in the market equilibrium and so have an impact on the level of social welfare. An overall assessment of a conduct has to consider both the short- and long-term effects.

Welfare assessment in one market with no spill-over effects

3.16 In this section we will consider the effects that a potentially abusive strategy can have on the determinants of social welfare in a single final market in which there are no spill-over effects. This may appear simplistic, as this scenario is rare in practice, but it has the advantage of allowing us to highlight the key relationships between a potentially abusive behaviour and output, willingness to pay and social costs of production.

3.17 In the next section we will examine one by one the output, cost and demand effects, separately for a structural and an output strategy, to understand what determines their sign and magnitude. It is important, however, to remember that the overall short term impact on social welfare depends on the combination of all these effects. Hence, even though one effect is negative, the others may offset it and lead to a welfare increase.

The output effect

3.18 An output strategy, by definition, has the effect of expanding the overall level of production in the market. Conversely, the determination of the output effect of a structural strategy is quite complicated because it depends on the strategic interaction between the dominant firm and its rivals. Therefore, we cannot set out any definitive and precise conclusions on how the level of output will change but we can provide some general conclusions: when a potentially abusive conduct has the effect of raising rivals' costs or lowering rivals' demand, the short term output effect, ceteris paribus, is negative.

3.19 The reason a structural strategy in general reduces the level of output is easily explained. Consider a case in which rival firms have the same production function with constant returns to scale[42], and that the dominant firm adopts a strategy that increases their marginal cost or lowers their demand. The market is now no longer in equilibrium because

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[42] In this section we are considering markets without spill-over effects, hence firms operating in this market do not enjoy economies of scale or scope, i.e. each firm's average cost is equal to marginal cost and is constant.

the rival firms are producing a higher quantity than would maximise their profits[43]. Hence, these firms have to lower their output, either directly (if competition is over quantity), or by increasing their price (if competition is over price).

3.20   The magnitude of this output reduction will vary depending on the subsequent reaction of the dominant firm, which depends on how firms compete, on the magnitude of product differentiation, the degree of loyalty to rivals' brands, and the size of switching and search costs.

The demand effect

3.21   In general with an output strategy there is no demand effect because the demand functions of firms active in the market are not affected. Similarly RRC conducts are unlikely to generate a demand effect because they normally affect only the level of costs and output. By definition, however, a LRD strategy decreases consumers' willingness to pay for rivals' products, generating a negative demand effect (unless the product is homogeneous).

3.22   If the LRD strategy, in addition to reducing rivals' demand, increases consumers' willingness to pay for the dominant firm's product, for example because the dominant firm offers a better product, there will be a positive demand effect that may compensate for the negative demand effect outlined above.

The cost effect

3.23   The sign of the cost effect of an output strategy depends on how efficient are the targeted rivals with respect to the dominant firm. Since the dominant firm's market share increases when it adopts an output strategy, if this firm is more efficient than its rivals, the costs of production per unit of output will decrease and social welfare will improve. The reverse will happen if it is less efficient.

3.24   The same applies to LRD strategies because they do not directly affect the cost functions of the rivals, but, by reducing rivals' demand, increase the market share of the dominant firm and lower those of its rivals. Hence, if all firms are equally efficient, the social cost of production does

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[43] In equilibrium the profit of a firm is maximised when its marginal revenue is equal to its marginal cost (MR = MC). If a firm was in equilibrium and then its marginal cost increases, it has to reduce output to ensure the equality is restored.

not change, and if the dominant firm is more efficient the output strategy has a positive cost effect.

3.25   In the case of an RRC conduct the analysis is more complex. Even though this type of conduct by definition affects the cost of the rivals of the dominant firm, it may have no impact on the social cost of production[44]: what determines whether there is a cost effect is not whether the monetary costs of production have changed but whether, on average, a different amount of resources are necessary to produce a unit of output. Hence, if the dominant firm simply exploits its monopoly power to charge its rivals an excessive price, but these firms do not switch to a different input or to a technology that makes a less intensive use of that input, this behaviour would affect rivals' costs but not necessarily the costs to society. If the dominant firm instead monopolises an input and, by refusing its provision, forces its rivals to use another, less efficient, input, this behaviour would increase the cost to society and there would be a negative cost effect.

3.26   *Postel*[45] (see case study I) is an example of a strategy that has a negative cost effect, even if it simply raises the rivals' monetary costs because of a difference in the level of efficiency between the dominant firm and its competitors. The Italian postal incumbent increased the wholesale charge for accessing its nationwide distribution network, which represents a key input for its rivals in the hybrid mail market. Since these firms had no alternatives but to continue using the network, their cost went up and so did their prices. Their efficiency was not affected but the price increase shifted some of their demand to the less efficient ex-public monopolist, leading to a negative cost effect.

3.27   When the RRC strategy reduces rivals' efficiency, there is always a cost effect. In this case it is more complicated to assess the sign of the cost effect, because it depends on a combination of factors:

> the magnitude of the loss in efficiency suffered by the rival firms because of the RRC strategy;
> the difference in efficiency between the dominant firm and its rivals before and after the strategy; and
> the variation in their market shares[46].

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[44] As discussed in Chapter 1, the social cost of production is the amount of resources employed on average in the market to produce one unit of output.
[45] Italian Competition Authority, Decision No. 6698 of 17 December 1998.
[46] The change in the size of the market share is a relative change in the output produced by each firm, which is different from the output effect of a variation in the absolute level of output produced in the market.

The long run effects

Exit from the market

3.28 Both structural and output strategies may lead rival firms to leave the market, or to commit to a lower scale of production, if they render the rivals' profits negative. Whether the exit or the downsizing of rival firms is a likely outcome depends on the type of competition that takes place in the relevant market. For example, if competition is on prices and the goods are differentiated it is more likely that rival firms, despite the harm caused by the strategy adopted by the dominant firm, are able to maintain a profitable presence in the market. Hence, product differentiation makes exit less likely. High switching costs can have the same effect if the rivals benefit from them.

3.29 This long term effect on the number and the size of the players in the market generates additional effects on output, cost and demand. The level of production is always reduced and this has a negative effect on welfare.

3.30 As for the cost effect, the exit or downsizing of some firms does not affect the sign of short term cost effect, but it may actually strengthen it. For example, if rivals are less efficient than the dominant firm, their exit from the market will reduce the cost to society per unit of output and have a positive impact on social welfare.

3.31 Exit can also introduce a demand effect, even for RRC and output strategies, if it eliminates a rival that offers a product that is different from the existing products with respect to some relevant characteristic. The sign of this effect depends on whether the new product is horizontally or vertically differentiated[47] and whether there is an information asymmetry between firms and consumers.

3.32 If the product offered by the rival is horizontally differentiated, so that it suits better the preferences of some consumers, a RCC strategy that forces this firm to leave the market has a negative demand effect. The

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[47] A product can be described as a bundle of characteristics: location, quality, availability, etc. A set of products are vertically differentiated if all consumers agree on the order of their preferences across this set. This normally happens for similar goods that differ in quality (e.g. cars). A set of products is horizontally differentiated if their ranking varies across consumers (e.g. jumpers of different colours).

same would be true if the product offered by the rival is vertically differentiated and it is of a superior quality

3.33 The demand effect when the foreclosed rival firm offers an inferior product is less clear cut. If consumers can observe the quality of the existing products, the presence of a low quality good does not affect their willingness to pay for the high quality good. Moreover, the availability of the low quality product allows consumers whose willingness to pay is below the price of the high quality good, but above that of the low quality one, to be in the market. Hence, the exit of this product leaves a group of consumers unsatisfied and causes a loss in social welfare. However, if information is asymmetric, so that firms know the true quality of their product but buyers do not, the existence of a low quality product in the market has the effect of reducing the expected value of any purchase so that consumers are willing to pay a lower price for it[48]. This situation may arise for experience goods or for credence goods for which consumers can judge their quality only after consumption or by relying on the opinion of some expert. In these cases a strategy that forces a low quality supplier to leave the market or to reduce its output can produce a positive demand effect.

3.34 In conclusion, the long-run demand effect is generally negative if it provokes the exit of some rivals, because it reduces the variety of products on offer. However, it may be positive if it prevents the provision of an inferior product and there is an asymmetry of information between buyers and sellers.

Entry to the market

3.35 A potentially abusive conduct can also influence the decision by a potential rival to enter a market, or by an existing competitor to commit to expand its production capacity. As in the case of exit, the sign of the output effect is negative because entry deterrence causes a reduction in the level of production with respect to the level that would have been attained if the potential competitor had entered.

3.36 Welfare is further reduced if the potential entrants were more efficient than the dominant firm, because there would be a negative cost effect. However, the sign of the cost effect depends also on the presence of sunk costs[49] because these represent an additional cost to society. If

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[48] See Akerlof (1970).
[49] The same consideration does not apply to exit because these costs have already been incurred and, being sunk, cannot be recovered.

these costs are very high entry could be "excessive" and welfare-reducing.

3.37 As in the case of exit, the sign of any demand effect would depend on the degree and type of product differentiation and on the presence of asymmetries of information.

Effects on investment

3.38 In assessing the long-run welfare consequences of a potentially abusive conduct, and of the related antitrust decision, one has to consider also the impact it has on firms' incentives to invest to improve the quality of their product or the efficiency of their production processes. For instance, a dominant firm by refusing to supply a more efficient input or by signing an exclusive contract may try to protect its investment in an input or a facility. Hence, an RRC conduct that reduces welfare in the short term may in the long term guarantee a level of investment that improves the quality of the output or the efficiency of the production method leading to an overall increase in social welfare[50].

3.39 On the other hand, an antitrust decision that allows an RRC or LRD conduct can also reduce the dominant firm's incentives to invest, if, as discussed above, the conduct causes a reduction in the competitive pressure faced by the firm[51]. Similarly, an effective exclusionary strategy may deprive rivals' of the opportunity to market their products and reduce their level of investments. As a consequence innovation will dwindle, the quality and variety of products available to consumers will be reduced and their willingness to pay will diminish. In addition, firms may also have fewer incentives to minimise production costs.

3.40 Hence, when assessing the long term impact of a potentially abusive strategy on the level of investment, it is necessary to consider two different types of effects, which affect social welfare in opposite ways.

Welfare assessment in one market with spill-over effects

3.41 In section 3.3 we have examined the consequences for social welfare of potentially abusive conducts that affect only one final market where no

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[50] Clearly this result assumes that the level of investment of the other firms in unaffected, otherwise it is also necessary to consider the effects on cost and willingness to pay of a change in the investment of the rivals.

[51] Leibenstein (1966) pointed to potential cost inefficiencies, that he labelled x-inefficiency, arising from a lack of effective competition within a market.

spill-over effects are present. In this section we extend this analysis to the case of a market in which there are externalities, either on the production or on the consumption side, and we explain when and how the welfare consequences of structural and output strategies are different from those derived above.

3.42 When there are externalities the welfare analysis becomes more complicated, because potentially abusive conducts can generate additional changes on the determinants of social welfare. When there are supply side spill-over effects, additional output and cost effects are possible. If the externalities are on the demand side, there can be secondary effects on output and on consumers' willingness pay. These additional effects can have a different sign from the primary ones and, thus, weaken or even off-set them.

Welfare analysis with positive spill-over effects on the production side[52]

3.43 Spill-over effects on the production side exist if the average cost of production diminishes when output increases. In a static setting this definition coincides with the classical notion of economies of scale; in a dynamic setting, to the notion of "learning by doing".

3.44 Economies of scale can arise if some inputs are indivisible, so that they can only be increased or decreased by some given scale factor. In this case, the firm's average cost diminishes as output increases, but not its marginal cost. Hence, a change in output does not lead to a variation in the firm's prices. Examples of indivisible inputs are research and development activities, the setup costs necessary to establish a new firm or a new business, and, to some extent, investment in advertising, distribution networks, replacement parts, buildings and backup machinery.

3.45 Economies of scale can also arise because different technologies can be used at different levels of output, or because labour can be used in more specialised tasks as production increases. In addition, certain physical laws generate economies of scale. For example, a pipeline does not have to be doubled in size to transport a twice the amount of oil. Hence, since the cost of the pipeline depends on the amount of steel it takes to make it, this cost does not double if the amount of oil it can transport doubles. In these cases both the average and the marginal cost of production vary

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[52] In this study we consider only positive spill-over effects because they are likely to be found in markets with a dominant firm.

with output and, therefore, a change in the level of production causes a change in the level of prices.

3.46   Learning by doing is the process by which a firm learns through experience and becomes more efficient in the use of resources (in particular labour), so that over time the average cost of production declines. Since this reduction in cost can affect either fixed or variable costs, with learning by doing both the marginal cost and the average cost curves can be downward sloping[53].

3.47   As economies of scale are the most frequent form of spill-over effects on the production side, our analysis will focus on a market in which all firms benefit from them.

The short term welfare effects of structural strategies

3.48   When there are economies of scale the conclusions reached in the simpler setting discussed in section 3.3 have to be amended to consider that additional cost and output effects are possible. These further effects happen because any change in the level of output of a firm affects its costs. In addition, if this leads to a change in price, it will cause a further variation in the level of output, which will again affect costs.

3.49   In section 3.3 we established that the sign and magnitude of the cost effect of a structural strategy depend on: the loss in efficiency suffered by the rival firm, the size of the cost increase, and the difference in efficiency between the firms and the relative changes in their market shares. If there are economies of scale, the results qualitatively do not change, but it becomes necessary to consider the secondary cost effects caused by the change in the levels of production of the dominant firm and of its rivals.

3.50   This secondary cost effect is important because it can be the reason behind the structural conduct. The dominant firm may have undertaken this practice in order to be able to acquire a larger market share and increase its output, so as to reach a more efficient scale of production. If the economies of scale are very strong, the minimum efficient scale of production may be quite large and the conduct, even though it reduces rivals' profits, may lead to an overall positive effect on welfare.

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[53] Another type of spill-over effect arises if the unit cost of production depends on the combination of goods produced and marketed by a firm, i.e. economies of scope. Since this effect concerns multiple markets simultaneously, it will be discussed in the next section.

3.51   If the change in the unit costs of firms, due to the variation in their scale of production, affects not just their average cost, but also their marginal one, it causes profit-maximising firms to adapt their pricing and production decisions, so that there is a secondary effect on output. In these circumstances the overall sign of the output effect (which is negative in the absence of economies of scale) can no longer be determined *a priori*.

The short term welfare effect of output strategies

3.52   In section 3.3 we concluded that, in the short run, an output strategy produces a positive cost effect if and only if the dominant firm is more efficient that its rivals. With economies of scale, while the sufficiency condition remains valid, the necessary condition is not required anymore. Indeed, the possibility of reaching a more efficient scale of production often provides the business justification for adopting an output strategy. A dominant firm may seek to improve its efficiency by increasing its output, if the larger scale of production results in lower costs. For example, in the *Wanadoo* case (see case study III) the low pricing strategy adopted by the French ADSL service provider, by increasing the size of its customer base, may have reduced its unit costs to a level that could also have lowered the social cost of production and increased social welfare.

The long term welfare effect

3.53   According to the classical characterization of barriers to entry proposed by Bain (1936), the presence of economies of scale should provide dominant firms with an incentive to undertake exclusionary practices and force rivals out of the market, because the lower threat of entry would allow them to better exploit their market power.

3.54   However, more recently, McAfee et al. (2003), have proposed considering an antitrust barrier to entry as "a cost that delays entry and thereby reduces social welfare relative to immediate, but equally costly, entry". This suggests that there are "primary" and "ancillary" barriers to entry and that the latter have a deterrent effect only when the former are present, by reinforcing them. According to this definition economies of scale are an "ancillary barrier to entry". Therefore, if in the market there are, for instance, frictions in customer mobility, due to high switching costs or strong brand loyalty, the presence of economies of scale might deter entry. Hence, in a market characterised by high natural or strategic barriers to entry, the presence of economies of scale makes it more likely

that a dominant firm can successfully earn excessive profits without attracting new entry.

3.55   A consequence of this consideration is that a potentially abusive strategy undertaken to reach a more efficient size can bring a short term welfare increase, because of the reduction in the cost of production to society and of the short run output expansion. However, if the market is characterised by high barriers to entry, in the long term it can allow the dominant firm to charge excessive price and invest less in product innovation. For example in the *Wanadoo* case (see case study III), the economies of scale that characterised the business of the ADSL service provider, coupled with high switching costs and a strong brand loyalty, could have led rival providers to exit the market and deterred new entry, allowing Wanadoo to charge supra-competitive prices.

Welfare analysis with positive spill-over effects on the demand side[54]

3.56   Positive spill-over effects on the demand side, also referred to as positive network externalities, represent the increase in the net value of an action that occurs as the number of agents taking equivalent actions increases[55]. Network effects are more common than one may think. In addition to the markets for telephone, internet and postal services, also the fashion and media industry, for instance, are characterised by them.

3.57   Network effects are generally classified into two types: direct and indirect[56]. Direct network effects exist when consumers' willingness to pay for a product increases with the number of agents consuming the same product[57]. Typically communication services, such as emails or postal and telecoms services, are characterised by this kind of network externality. Indirect network effects arise when the value that consumers attach to a product increases as the number and variety of complementary goods or services grows. The markets for software operating systems, videogame console and music players (e.g. CDs and MP3 players) benefit from indirect network externalities.

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[54] Although positive externalities have received greater attention from the literature, negative network externalities, or congestion externalities may also arise. See, on the issue, MacKie-Mason and Varian (1993).
[55] See Liebowitz and Margolis (1993).
[56] See Katz and Shapiro (1983) and Economides (1996).
[57] See Katz and Shapiro (1983).

3.58   In this section we will focus on the direct network effects, however at
        end of it we briefly discuss how to analyse the impact on social welfare
        of a potentially abusive conduct in a market with indirect network
        effects.

Direct network externalities

3.59   The presence of direct network effects renders consumers' expectations
        about the future size of the network a critical determinant of their
        decision on whether to buy the good. Hence, current adoption depends
        on the expected behaviour of late adopters and the demand curve shifts
        upwards when the number of (actual or expected) customers increases.
        Figure 3.1 below, where D_0 represents the "initial" demand curve and D_1
        the demand curve corresponding to a higher number of customers,
        shows how the expected size of the network influences consumers'
        willingness to pay.

        FIGURE 3.1: SHIFT OF THE DEMAND CURVE IN A MARKET WITH
        NETWORK EXTERNALITIES
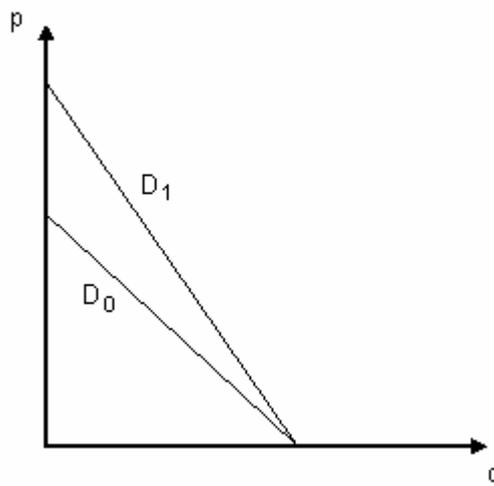
3.60   Hence, the presence of network externalities can change the welfare
        effect of potentially abusive strategies from the conclusions reached in
        section 3.3 because it generates a link between output and willingness
        to pay, so that any change in output causes a shift in the demand curve.

3.61   However, this link is relevant for a welfare analysis of potentially abusive
        strategies only if there are proprietary standards, as with compatible
        goods the network size is like a public good, since each customer's utility
        depends on the joint size of all the networks, and there is no difference
        in the analysis. Indeed only when the goods are incompatible:

> if a firm poaches a customer from a rival's network, it strengthens its offering and, at the same time, weakens its rival's position in the competition for other customers[58]; and

> if a firm wins a new, unattached customer it improves the size of its network and hence consumers' willingness to pay for its network but not for the networks of competing firms.

3.62 A second element that needs to be considered in assessing the welfare effect in a market with spill-over effects on the demand side is whether the market is at an early stage of development, where the network effects have not yet been fully exploited, or is a mature market, where gaining new, unattached, customers has a minor, or no, impact on consumers' willingness to pay.

Welfare analysis in markets with positive network effects at an early stage of development

3.63 In the early stage of development of a market with positive network effects, firms must decide whether to make their own product compatible with those of their competitors or to develop a proprietary standard. Both strategies involve a trade-off for the firms:

> compatible products allow firms to avoid a risky and costly battle for the prevailing standard, however the prospective profits for each firm are lower as the market will accommodate more firms; while

> incompatible products ensure much higher profits to the firm that wins the standard battle, but the risk is much higher.

3.64 From the point of view of society, which of the two scenarios is preferable is also unclear. With an early standardization it is likely that the market develops faster, as the common standard reduces consumers' uncertainty, which is likely to delay their adoption of the new technology[59]. However, the battle for a standard may spur new innovations, because the prospect of gaining substantial profits may encourage firms to invest in R&D activities, which could improve the products on offer and increase the consumers' willingness to pay.

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[58] See Farrell and Katz (2000).

[59] Joint-ventures or industry-wide agreements aimed at creating an industry standard may also provide the occasion for collusive agreements.

3.65   As mentioned above, when firms choose a common standard (or are forced to so by some public policy)[60] the analysis of potentially abusive strategies is not affected by the existence of network externalities, as these externalities do not generate any secondary effects. For example, in the *Wanadoo* case (see case study III), the network externalities mattered because they allowed the ADSL service provider to better exploit better economies of scale, but the standard was non proprietary.

3.66   If firms adopt incompatible standards, each one has a much stronger incentive to increase its market share and, at the same time, to weaken the position of rivals. In this case a firm with an initial lead may adopt potentially abusive strategies to strengthen its market position. The consequences for social welfare of these strategies depend on the balance between two effects. On the one hand, the quick emergence of a winning standard (even if it is a proprietary standard) fosters the adoption of the new technology, so that consumers can benefit earlier and on a larger scale from the positive network effects. On the other hand, once the dominant firm has acquired an installed base of consumers, it can exploit its market power by charging supra-competitive prices and may have less incentive to invest in research and development.

3.67   In performing the welfare analysis the distinction between short and long run is still important. In assessing the short-run demand effect, it is necessary to consider that the change in output has a secondary effect on consumers' willingness pay through the network externalities. This secondary demand effect spurs an additional output increase, as it raises the number of consumers who are willing to adopt the new technology[61].

3.68   With respect to the long-run effect, we must consider that the market is now an established and grown one in which a standard has prevailed and the network externalities are close to being exhausted. In such an

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[60] As, for example, for the GSM standard in the mobile communication industry or the DTT standard for digital terrestrial television.

[61] In section 3.3 we concluded that the sign of the short-run output effect of an output strategy is positive, while that of a structural strategy is negative. The presence of network externalities generates a secondary positive effect. Hence, even with a structural strategy the overall output effect may be positive. To see why, consider that such a strategy, by forcing rivals' prices up, shifts some consumers from the rivals to the dominant firm. If this shift allows the proprietary technology of the dominant firm to reach a critical mass, this may attract customers from rival networks, and it may, above all, substantially increase the number of consumers who are willing to adopt the new technology, as their uncertainty regarding the standard that will prevail is largely reduced. This demand expansion leads the dominant firm to sell more goods.

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environment it is likely that the winning firm is a quasi-monopolist and may act as such. However, in analysing the welfare effect we must take into consideration at least three factors that can limit the incumbent's market power:

1) High consumer heterogeneity, the existence of a small minimum critical mass for competing products, and the presence of local network effects can limit the degree of dominance of a single firm[62] because they can facilitate the survival of other standards.

2) With proprietary standards competition is mostly for the market, rather than in the market. Indeed, since reaching a critical mass may trigger the exponential market growth of a rival firm, the market may tip in favour of a new entrant, which benefits from the "winner takes (almost) all" scenario. Hence, even if stealing customers from the dominant firm is more difficult for potential (or actual) competitors, the pay-off is higher because a successful competitive strategy may quickly extract most (if not all) of the customers from the (former) monopolist. Thus, the incumbent may find it rational to adopt a limit pricing strategy aimed at deterring entry, rather than earn the full monopoly profit. The lower price attracts a larger installed base of users, which reduces the probability of entry but at the same time increases the level of social welfare compared to an unrestrained monopoly situation[63].

3) Some practices may serve the purpose of protecting the investments made by the dominant firm to develop its proprietary technology or to improve/upgrade its products.

Welfare analysis in markets with positive network effects at a late stage of development

3.69 In a market with positive network effects and a prevailing proprietary standard, when the size of the network has already reached its full potential, competition can benefit consumers only if it leads to better sale conditions or superior products. It follows that LRD and RRC strategies cannot have the positive secondary short-run output effect that stems from the coordination of consumers' choices and the consequent enlargement of the network size, and the same conclusions reached in section 3.3 will apply here.

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[62] See Koski and Kretchmer (2003) for a survey of this topic.
[63] See Fudenberg and Tirole (2000).

3.70   In this context, the main consequence of a structural strategy is to reduce the probability of successful entry by preventing any potential new rival from gaining a sufficient mass of customers that might allow it to pose a serious threat to the established incumbent. The *IMS* case (see case study II) is an interesting example of a well-established market where the dominant firm undertook an LRD strategy to prevent entry.

3.71   However, when the network effects of the prevailing standard are exhausted, new entry that forces a shift to a new standard is not necessarily welfare-improving. This entry is likely to cause some cost in the transition period in which the two technologies coexist and, thus, reduce the extent to which consumers benefit from the network externalities. The magnitude of this cost depends on the speed of the transition. The faster the transition, the lower the cost of mis-coordination this shift brings about. This represents a cost to society and needs to be included when the cost effect of a potentially abusive practice is evaluated.

3.72   In addition, if the entrant is able to take over the market, consumers benefit only because the new technology is superior, as the entrant becomes the new incumbent and has the same incentives as the old one to adopt the same exclusionary strategies. These two considerations should be also taken into account when considering the welfare effect of an intervention by the competition authority that allows entry.

Indirect network effects and two-sided markets

3.73   Markets characterised by indirect network effects are also referred to as two-sided markets, because firms are actually serving two groups of customers at the same time and providing them with a valuable service as long as both groups are "on board". For example, suppliers of videogame consoles need to attract two different groups to be successful: game-players and game-developers. The value placed by each group on a specific type of videogame console depends on how many members there are in the other group. If there are too few players no one would develop games for that console, similarly, the number of users depends on the range of available games.

3.74   Other examples of two-sided markets are: debit and credit card payment schemes (which bring together merchants and consumers), directory services, magazines, newspapers, and free-to-air TV (all of which bring together advertisers and 'eyeballs'), and all those intermediation services that bring together sellers and buyers (e.g. real estate agents). In all these markets at least one side of the market does not attach any value

to the consumption of the good without the other side. For instance, the holders of a credit card give no value to it if there are no merchants who accept that card, and merchants do not consider cards for which there are no users.

3.75 Sometimes antitrust authorities regard the two sides of the market as two distinct relevant markets. For instance, newspapers are thought to compete in the market for readers, where they sell information and entertainment, and in the market for advertisements, where they sell spaces to companies that want to advertise their products. However, considering each of these two "markets" in isolation can lead to wrong conclusions, especially when it concerns the application of the abuse of dominance prohibitions. For instance, below-cost pricing is a widespread strategy in two-sided markets, whose rationality does not depend on the ability of firms to exclude rivals. A clear example is provided by the "free press" which offers newspapers and magazines at a zero price (obviously below cost of production) to readers, in order to increase the value of their offer to advertisers (thus financing all its costs with the revenues from the sales of advertising space).

3.76 Hence, in the analysis of the welfare consequences of a potentially abusive strategy on a two-sided market, one should employ the framework discussed in the next section and consider the impact of the strategies on both sides of the market before reaching a conclusion on its effects. If each market was considered separately this may lead to an incorrect assessment of the impact of the potentially abusive strategy and, hence of the cost of any erroneous antitrust decision on it.

Welfare assessment of conducts that affect more than one market

3.77 If a potentially abusive behaviour affects more than one final market, in the assessment of its welfare effect, it becomes necessary to consider the effects that changes in the variables in one market can have on those in other markets. For the sake of simplicity, in this section we focus on behaviour that affects only two markets, though our analysis can be easily extended to cases in which more markets are involved.

3.78 The reason a dominant firm's behaviour and, hence, a competition authority's decision on this behaviour can affect more than one final market lies in the existence of links that connect these markets. These links can be intrinsic to the markets (exogenous links) or can be generated by the behaviour of the dominant firm itself (endogenous links). Often both types of links are present.

Exogenous links

3.79   Exogenous links exist when either the production costs or consumers'
        willingness to pay in two separate markets are related. As far as costs
        are concerned, this happens if the available technology allows a firm to
        have lower unit costs if it produces (or markets) more goods jointly. For
        example, the technology is characterised by some fixed costs that can be
        shared across its whole product range, such as the costs of a distribution
        network or machinery that can be used in different production lines.

3.80   For consumers' willingness to pay, a link between two final markets may
        exist if consumers regard the two products as complements[64], because
        the utility they derive from one of them increases with the level of
        consumption of the other. There are different degrees of
        complementarity. If consumers do not give any value to one good
        without the other, the goods are perfect complements, as in the case of
        left and right shoes which have no value for most consumers unless they
        are bought together. It is also possible that the link is asymmetric if one
        good has no value without the other, but that latter is also consumed on
        a stand-alone basis. For instance, all software applications require an
        operating system to run on, so that they have no value without the
        latter, whereas an operating system has a stand alone value[65].

3.81   These exogenous links are simply spill-over effects that manifest
        themselves across different markets rather than within the same market.
        Hence, the welfare analysis differs from the one developed in previous
        section only in that any additional effect is going to occur in the linked
        market(s) rather than in the one where the conduct takes place. For
        example, cars and fuel tend to be consumed together, so if a low pricing
        strategy by a dominant car manufacturer increases the sales of cars, it
        will also cause a rise in the purchase of fuel.

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[64] The goods sold in two markets may also be substitutes, in which case if the
consumption of one increases that of the other falls. This type of relationship is
not relevant for this purpose because if two products are close substitutes, for
the purpose of antitrust cases these are included in the same relevant market,
hence any link is already taken into account. If, on the contrary, the two
products are weak substitutes they are in separate markets, but the link
between the two markets is by definition weak. Hence, to consider the two
markets as independent does not entail a significant miscalculation of the
welfare effects of an antitrust decision.

[65] The degree of complementarity depends also on whether the complements
are consumed together in fixed or in variable quantities. Sugar and coffee, for
example, tend to be consumed together in constant proportions, while a
different number of cartridges can be consumed with a printer depending on the
level of usage of the printer.

3.82   We believe that any additional effect that a potentially abusive behaviour has in linked markets should be considered when assessing whether the decision of a competition authority would increase or reduce social welfare, even if the conduct takes place only in one market, if the firm under investigation is dominant only in one of them or if the firm does not operate in some of these markets[66]. The assessment of the cost of an erroneous antitrust intervention, or non-intervention, should consider the overall loss in welfare that this causes to society and the analysis should not be limited only to the market(s) where the conduct was adopted.

3.83   This approach contrasts with standard antitrust analysis which considers only the effects on the market in which the potential abuse takes place. This may be partially justified by the fact that the cross-market consequences of a decision by a competition authority may be weak and hard to identify with sufficient clarity. However, in those cases where the links are strong and the additional effects can be assessed with precision, these should be included in the calculation of the welfare change (and they form part of the costs caused by an erroneous antitrust decision).

Endogenous links

3.84   Endogenous links are caused by the joint selling strategies undertaken by the dominant firm, such as tying, bundling and multi-product discounts. These strategies make the acquisition of one good, or the granting of a discount, conditional on the acquisition of another good, or allow only the joint purchase of the two products. Hence, their effect is to generate a link between the demand curves in the two markets, so that the sales of the dominant firm in one market become dependent on its sales in the other.

3.85   Tying and bundling are widespread strategies that can often be welfare-enhancing because they allow the firm that undertakes them to exploit the externalities generated by the presence of exogenous links between the markets. These externalities stem from savings on distribution costs, liability costs, search and sorting costs, and compatibility costs[67].

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[66] This, by definition, is not possible when links are due to the technology employed by the firm, but it can happen if the links are due to the shape of the consumers' preferences.

[67] See Annex E for more details on these savings.

3.86 Internalising these externalities is often the main justification behind a decision to undertake a joint selling strategy. However, tying and bundling have also the potential to be abusive because, if the firm that undertakes them is dominant in one of the markets involved, it can exploit the links these strategies generate either to leverage its market power into the other market (so-called offensive bundling), or to protect its market power from the threat of entry (so-called defensive bundling)[68].

3.87 Hence, when assessing the welfare change caused by a decision to bundle or tie it is important to carefully consider any cost savings or product improvements that the selling strategy can generate, because they constitute the main driver of the costs a competition authority can impose on society if it prohibits the strategy. However, it is equally necessary to consider if the strategy can have any long term effect on entry and exit that may off-set the short term welfare increase generated by the internalisation of the externalities.

Identifying markets mainly affected in the long term by antitrust decisions on tying and bundling

3.88 As mentioned above, the main competitive concern stemming from tying and bundling is that these strategies may drive one or more rivals out of one of the two markets, prevent new entry or considerably reduce rivals' production capacity. These long run effects may occur in both markets, or just in one of them, and it is important to identify which market is mostly affected.

3.89 If the tying or bundling strategy allows the firm to leverage its market power from the primary market (i.e. the one in which it has a dominant position) into the secondary one (i.e. the linked one), the long run welfare effects of an antitrust decision on this strategy will mainly arise in the secondary market. Instead, if the tying or bundling strategy is used to protect the market power enjoyed by the dominant firm in the primary market, the long term impact will mainly be on welfare in the primary market.

Factors that affect the likelihood of exclusionary effects

3.90 The likelihood that tying or bundling can have any long term effect on one of the affected markets depends on the heterogeneity of consumer

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[68] More details on the potentially abusive nature of these strategies can be found in Annex E.

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taste, the degree of product differentiation and the marginal cost of production of the secondary good[69]. If a sufficient number of consumers buy the secondary product on a standalone basis or have a strong preference for rivals' product that can be sold at a low price (because of low marginal costs), demand for rivals' products may remain high. However, a key condition for this to happen is that customers must be able to dispose of the unwanted part of the bundle and substitute it with a preferred competing individual component. If it is too costly or impractical to do so because the two bundled goods are assembled by the manufacturer rather than by the consumer, or are technologically integrated and competing components are not interoperable, exit is likely regardless of the nature of consumers' preferences[70].

Conclusions

3.91   In this Chapter we have explained how different types of potentially abusive strategies impact on social welfare by changing the level of output, by changing the social cost of production, and by changing consumers' willingness to pay. Since the loss in social welfare caused by an erroneous antitrust decision is given by the difference between the level of social welfare that would be achieved with and without this intervention (or non intervention), the assessment of the cost of an error is equivalent to evaluating the welfare consequences of the conduct under investigation. Hence, the results obtained in this chapter help in assessing the cost of erroneous antitrust decisions.

3.92   However, the analysis just presented is only qualitative. In the next chapter (and in Annex F) we will provide a preliminary assessment of the relative quantitative importance of these effects.

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[69] See Tirole (2003).

[70] In this case the negative demand effect will be stronger because consumers with very heterogeneous taste will suffer more from a lack of variety.

4. TOWARDS A QUANTITATIVE ASSESSMENT OF THE *EX POST* COST OF ERRORS: A SIMPLE MODEL AND SOME NUMERIC SIMULATIONS

Introduction

4.1   In the previous chapters we have proposed a methodology to identify the social welfare change caused by a potentially abusive conduct and, as a consequence, of the possible decision by a competition authority. According to our framework, this change depends on how the decision of a competition authority impacts on the amount of output that is exchanged in equilibrium (the output effect), on the social cost of production (the cost effect), and on consumers' willingness to pay (the demand effect) in the relevant market(s).

4.2   So far we have developed a qualitative analysis of these effects and of the total welfare change in different settings. We have explained how their sign and magnitude depends on the type of conduct and on some key market characteristics. However, it would be useful to gain some understanding of the relative quantitative importance of these effects so as to focus on the conducts and on the market characteristics that are more likely to produce a significant cost if the competition authority reaches an erroneous decision.

4.3   To do so in a conclusive manner would require a vast empirical research effort that is clearly beyond the scope of this study. What we can do, however, is to investigate with the aid of a simple game-theoretic model and some numerical simulations what the likely relative magnitudes are of the effects discussed so far on social welfare.

4.4   This chapter describes the results of this quantitative exercise. Annex F contains a formal description of the model and more details of the results. However, it needs to be stressed that these are by no means conclusive results but just hypotheses. The model we have used is very simplified and leaves out many of the complexities of real world markets. In addition, we have considered only structural strategies. We believe, nonetheless, that this exercise provides some interesting hypotheses that should be further tested and investigated.

4.5   The key results are that:

   A competition authority is more likely to make an error and the error is likely to be costlier if it neglects or undervalues the impact of the investigated conduct on the demand curve.

A competition authority has to be very cautious in condemning the abusive behaviours of a firm that enjoys a dominant position because of innovative or higher quality products, not just because a wrong decision may chill innovation in the same or other markets, but also because the possible efficiencies generated by the investigated conduct of the dominant firm have a larger impact on welfare exactly because consumers attach more value to the product of this firm.

A higher degree of substitutability between the products of the dominant firm and of its rival in most cases exacerbates the cost of an erroneous non intervention and alleviates the cost of an erroneous intervention.

The logic of the simulation and the model

4.6   The logic of the exercise we have carried out is quite simple. We have considered some firms that compete in a market according to a game defined by given consumer demand and cost functions, and by a specific mode of competition. We have assumed that one firm (the dominant one) is able with its conduct to modify its rivals' cost functions and/or its rivals' demand so as to disadvantage them. We have also considered that this conduct can simultaneously generate efficiencies for the dominant firm, in that it can lower its costs or expand its demand.

4.7   If the competition authority knew perfectly the type of game that is being played and the exact magnitude of the changes in the game brought about by the conduct of the dominant firm, it would not commit any error. However, the competition authority does not have such knowledge. Hence we have assumed that it can only identify a probability distribution for any of the effects caused by the investigated conduct. Hence, it has no certainty about the overall welfare change, but the knowledge of the types of effects caused by the conduct of the dominant firm and of their probability distribution allows it to determine the probability of committing the two types of error (i.e. false conviction and false acquittal) and their costs.

4.8   To be more concrete, suppose that the competition authority knew that a given conduct raises the marginal cost of the rivals, but it did not know by how much. It could only estimate that the increase in cost falls within a range that goes from 10% to 50% of the initial marginal cost and that all of these values have a known probability distribution. Similarly, assume that the competition authority knew that the same conduct increases consumers' willingness to pay for the product of the dominant

firm and that the choke price[71] of the dominant firm's individual demand will be increased by a factor that is between 0.5% and 5% with a given probability distribution.

4.9   Suppose that by solving the game with the modified cost and demand functions the competition authority found that, if the investigated conduct brought about a small increase in rivals' marginal cost (say 10%) and a high expansion of the dominant firm's demand (say 5%), social welfare would increase. By prohibiting the conduct a competition authority would falsely convict the dominant firm and the cost of this error would equal the foregone welfare gain that the conduct would have caused. Suppose now that in the opposite case (a high increase in the cost of rivals and a small expansion of the dominant firm's demand), the opposite conclusion is valid. The conduct of the dominant firm would cause a reduction in total welfare and the decision not to intervene would amount to a false acquittal whose cost would equal the welfare loss caused by the abusive behaviour.

4.10   Given the relevant features of the game, for each value of the increase in rivals' marginal cost, it is possible to find the value of the increase in consumers' willingness to pay for the product of the dominant firm that would compensate for the welfare loss caused by the cost effect, so that the overall welfare effect is nil. If the investigated conduct caused an expansion of the demand directed toward the dominant firm that is above this threshold, the net welfare effect would be positive and a decision to intervene would lead to a false conviction. The opposite would be true if the demand expansion was below the identified threshold.

4.11   Our exercise calculates the relationship between the cost and demand effects that identify all the pairs of these variables that leave total welfare unchanged. An example of this relationship is depicted in figure 4.1. The curve separates the space of all possible combinations of the cost and demand effects in two areas. The area above the curve is formed by all pairs of cost and demand increases that would cause a welfare improvement and for which a conviction of the dominant firm would represent an error. The area below the curve is formed by all pairs of cost and demand increases that would cause a welfare reduction and for which an acquittal would represent an error. If we knew the probability distribution of both variables we could compute the probability of committing both types of error and their cost. (In Figure 4.1, type I error is false conviction and type II error is false acquittal.)

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[71] The choke price is the price at which the quantity demanded become zero.

FIGURE 4.1: AN EXAMPLE OF A CURVE THAT IDENTIFIES ALL THE PAIRS OF
VARIABLES THAT KEEP TOTAL WELFARE UNCHANGED
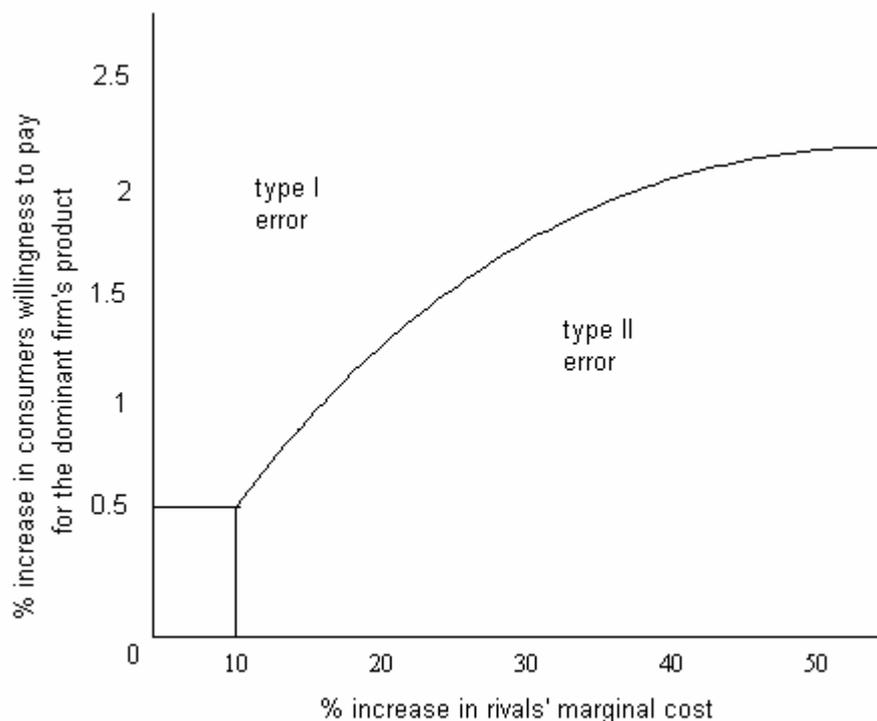
4.12　The shape and the position of this curve depends on the specific
characteristics of the market, such as the mode of competition, the
asymmetry between rivals in terms of costs and product differentiation,
the presence of spill over effects and the existence of links between the
markets. The scope of our numerical simulations is to obtain a
preliminary indication of the relative importance of the various welfare
effects of a possible abusive conduct in different market settings. It will
help us to understand, for instance, whether and in what circumstances
small positive demand effects may be sufficient to compensate high
negative cost effects or vice versa.

4.13　To run this simulation we have built a very simple game theoretic model.
The model describes a market in which firms producing horizontally
differentiated products compete by choosing their prices (Bertrand
competition). We have used a quadratic utility function for the
representative consumer to obtain two linear demand functions that
determine the quantity sold in equilibrium by the two firms. The profit of

each firm is given by its revenue minus the total cost of production. Given the market equilibrium of this game we have computed the corresponding total welfare.

4.14   At this stage we have assumed that one of the competing firms has the ability to perturb the game by adopting a conduct that has several conflicting effects on welfare. In particular in this model we have investigated RRC and LRD conducts that generate some efficiency for the dominant firm, in the sense that they either lower the cost of the dominant firm or increase the demand for its product, and we have evaluated the magnitude of the positive effects that are necessary to compensate the reduction in welfare caused by the negative effects of the conduct. Annex F contains the formal description of the game theoretic model adopted for our simulation and the analytical outcomes.

Main results

4.15   The first and most important result we obtain is that the impact on welfare of possible abusive conducts is largely dependent on its consequences on consumers' willingness to pay for the products offered by the dominant firm and its rivals. More specifically, we have found that the negative welfare effects of RRC strategies are often compensated for by relatively small increases in consumers' willingness to pay for the dominant firm's product. Conversely, the negative welfare effects of LRD strategies that entail a reduction in consumers' willingness to pay for the product offered by the rivals of the dominant firm are only compensated for by a large reduction in the dominant firm's cost of production.

4.16   The main implication of this finding is that a competition authority's error is likely to be costlier if it neglects or undervalues the impact of the investigated conduct on demand.

4.17   A recent document issued by the European Commission's DG Comp discusses the role of efficiencies as a possible justification of otherwise illegal conducts. The application of this defence requires that: "*The dominant company must thus in the first place be able to show that the conduct is undertaken to contribute to improving the production or distribution of products or to promote technical or economic progress, for instance by improving the quality of its product or by obtaining specific cost reductions or other efficiencies*"[72].

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[72] European Commission (2005), par. 85.

4.18 This statement treats cost reductions and product improvements alike. Our simulations suggest that they are not. Cost savings can improve total welfare, but product improvements do so to a much larger extent[73].

4.19 The second result is that the source of dominance is an important factor in the evaluation of various trade-offs. In our simulations we compare a benchmark case in which firms have the same cost structure and face the same demand with a case in which the dominant firm has a competitive advantage. This advantage may stem either from a superior product for which consumers are willing to pay a premium price, or from a more efficient technology that allows the dominant firm to have lower marginal costs. We find that a competition authority is more likely to falsely convict and that the cost of this error is higher when it prevents a dominant firm undertaking a conduct that lowers its own cost or expands its own demand, if the dominant firm has gained its market power by offering products that consumers value more than its rivals' products.

4.20 This finding is important because it shows that a competition authority has to be very cautious in condemning the abusive behaviours of a firm that has a dominant position because of innovative or higher quality products. This caution is necessary, not just because a wrong decision may chill innovation in the same or other markets, but also because the possible efficiencies generated by the investigated conduct for the dominant firm have a larger impact on welfare exactly because consumers attach more value to the product of this firm.

4.21 The third result is that a higher degree of substitutability between the products of the dominant firm and of its rival in most cases exacerbates the cost of an erroneous non intervention and alleviates the cost of an erroneous intervention. If we interpret the degree of substitutability between products as a measure of the intensity of rivalry between the two firms, this finding suggests that a competition authority should look very carefully at those cases in which the alleged victim is a very close competitor of the dominant firm.

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[73] Another important difference between cost and demand efficiencies relates to their impact on consumer welfare. According to the European Commission, cost savings are considered only insofar as they are passed on to consumers and that the dominant firm has the burden to prove that this condition is fulfilled. For efficiencies generated through the improvement of the products, which is reflected in an increase in the consumers' willingness to pay, this condition is true by definition.

Conclusions

4.22   We are aware that the results derived from our simple model and from the numerical simulations based on it cannot provide a definitive answer to the complex and intricate questions on the magnitude of the costs of erroneous antitrust decisions. Therefore, we think that it is wise to conclude this Chapter with some words of caution and to highlight the need for further analysis.

4.23   First of all, our numerical exercise is mainly meant to generate hypotheses rather than firm conclusions. We believe that the hypotheses we have outlined in this Chapter are sensible, but we think that more research is needed before they can be proven correct.

4.24   Secondly, we need to warn the reader that our numerical exercise is not meant to provide a quantitative response to the questions we are addressing in this study. The quantitative results we describe in Annex F are obviously dependent on the functional forms and the values of the variables used in the simulation. In other words, even if our assertions regard the "quantitative" effects of a potential abuse they remain "qualitative" in nature.

4.25   Thirdly, pure output strategies have been excluded from our simulations because we believe that our current knowledge is insufficient to build solid counterfactuals. To understand this statement, consider a situation in which a dominant firm undertakes an output strategy and lowers its price. This decision could be a predatory strategy aimed at excluding the rivals from the market or it could represent the reaction to a new entry. Suppose that it is the latter, but that the competition authority erroneously thinks that the conduct undertaken by the dominant firm is abusive. The competition authority will then require the dominant firm to stop the output strategy and raise its price. Since the initial price cut was socially efficient, the antitrust intervention causes a welfare reduction. This loss, which represents the cost of the erroneous decision, depends on the price the dominant firm will charge after its false conviction. However, we cannot determine this price because it is not the equilibrium solution of the game, unless we define the remedy imposed by the competition authority. A theory of remedies is clearly beyond the scope of this study and may be the subject of future research.

5. THE SOURCES OF THE ERRORS

Introduction

5.1   The first part of this study considered the costs of erroneous antitrust decisions from an *ex post* perspective. In this and the following chapter, we consider what happens when these costs are viewed from an *ex ante* perspective.

5.2   This Chapter discusses the main sources of the errors a competition authority can commit when applying the abuse of dominance prohibitions and concludes that:

> The first step towards ascertaining the source of the error is to understand whether the decision method used is a standard or a rule.
>
> A standard is a legal provision that requires the adjudicator to assess whether a conduct is abusive on the basis of a case-by-case analysis of its consequences on social welfare.
>
> With a standard, errors can only stem from the lack of complete and accurate information or because of the choice of flawed or inappropriate economic theory.
>
> A rule is a legal test that relies on the presence of a set of triggering facts to decide whether a conduct violates the abuse of dominance prohibitions.
>
> Decisions based on a rule can also be inappropriate because of a lack of information or because of the inclusion problem, i.e. the triggering facts may occur when the behaviour is not abusive, or may not be there even if the behaviour is abusive.
>
> Even though decisions made with a rule are subject to more sources of error, this does not imply that this decision method is more error-prone.

Rules versus standards in competition policy

5.3   In making a decision on whether a behaviour is in breach of the abuse of dominance prohibitions a competition authority can apply either of two decision methods. It might use a "rule", namely a legal test which establishes whether the conduct is violating the prohibitions by verifying the presence of a set of well-specified triggering conditions. Alternatively, it might employ a "standard", which is a legal provision

that requires the adjudicator to assess the effects of the conduct on a case-by-case basis.

5.4 The aim of both methods is to assess whether the conduct has reduced social welfare. However, they achieve this aim in different ways. A rule assumes that if certain conditions are met then the behaviour is abusive. Therefore, it does not require the competition authority to assess whether social welfare has actually been reduced by the conduct, but relies on some indicators (i.e. the conditions). The competition authority's role consists of considering whether the available evidence proves, with a predetermined degree of certainty, that the specified conditions are met. The application of the rule gives the competition authority some discretion in the interpretation of the evidence, but does not require it to verify whether the economic theory on which the legal test is based is correct, either in that particular instance or in general. Examples of rules are the legal test on predatory pricing and the one on essential facilities (see Box 5.1 below).

5.5 With a standard, the competition authority has to decide whether the conduct is reducing social welfare without relying on any predetermined indicator. Hence, the competition authority chooses the economic theories and the empirical evidence that it considers more appropriate to evaluate the effects of the conduct under consideration and is responsible for their correct selection.

5.6 The key difference between these two decisional methods is that:

the use of a rule simplifies the analysis and provides more certainty to the business community, as it specifies the facts that trigger an intervention on the part of the competition authority; whereas

the use of a standard allows flexibility and a more accurate consideration of whether all the facts do actually lead to a reduction in the level of social welfare, and gives more discretion to the competition authority.

5.7 In choosing between the adoption of a rule or of a standard, the competition authority has to balance the costs and the benefits of certainty against those of flexibility. It may prefer a rule because it creates a more stable legal environment and it decreases the costs of adjudication. On the other hand, it may choose a standard because this allows it to undertake a more thorough analysis of all the facts of the case and evaluates the impact of each one on social welfare.

5.8   As already discussed, a competition authority can commit two kinds of error when applying the abuse of dominance prohibitions: it can prohibit a conduct that is competitive (false convictions) or it can allow a conduct that is abusive (false acquittals). Both types of error can take place with the two decisional methods, however the source of the error can be different.

5.9   Understanding the difference between rules and standards is important because it helps identify the various sources of the errors. From an *ex post* perspective this does not have any impact on the cost of the error but from an *ex ante* perspective, the different sources of error influence firms' expectation in different ways and, hence, generate different costs.

Is it a rule or a standard?

5.10   Although there is an unequivocal conceptual difference between rules and standards, drawing such a clear line when considering specific decisions is often more difficult. Rules can indeed vary from a simple and clear set of pre-specified triggering facts, to a larger collection of vague criteria that leave a considerable degree of discretion to the adjudicator.

5.11   The nature of the abuse a dominant firm can commit is such that any rule that may be used to support the decision-making process of a competition authority is inevitably complex (i.e. it requires the identification of a large number of triggering facts) and vague (the competition authority has to integrate it with further economic or legal considerations). As shown in previous chapters, the behaviour of a dominant firm generates a number of effects, all of which contribute to the welfare change. Building a rule that captures most of them cannot yield a simple set of criteria. Box 5.1 below provides some examples to clarify this point.

BOX 5.1: EXAMPLES OF SIMPLE AND COMPLEX RULES

It is difficult, if not even impossible, to find examples of rules on abusive behaviours that are simple. Hence, we have had to consider rules relative to other prohibitions.

A good example of a simple legal test is the *de minimis* rule contained in the EC Regulation No. 2590/1999 on the application of Article 81(3). This rule states that vertical agreements between undertakings where the supplier has less than 30% of the relevant market are exempted from the application of Article 81.

This test is based on the assumption that agreements that cover a relatively small portion of a market have a small impact on social welfare and, as such, intervention is unnecessary. This is a very simple rule because it is based on a single, clear triggering fact: the 30% market share. To apply this rule the competition authority is only required to define the relevant market and calculate suppliers' market shares.

Another example of a simple rule is the per-se prohibition of price fixing agreements contained in Article. 81. This test only requires the competition authority to verify if the agreement between a group of undertakings relates to the level of their prices.

Article 82, and the other laws that prohibit abuses of dominance, provide a fertile ground for complex rules. One good example is the legal test for access to a privately owned facility developed in the *Oscar Bronner*[74] case. This case dealt with the request by a publisher, Bronner, to access the national delivery network of the publishing company Mediaprint. The European Court of Justice (ECJ) rejected Bronner's claim that the network was an essential facility and that restricting access to it amounted to an abuse of a dominant position.

In addressing this case, the ECJ formulated a legal test stating that a refusal to give access to a facility is generally lawful, except when the following conditions are met:

> the facility is indispensable in carrying out business (*the essential facility condition*);

> the refusal is likely to eliminate all competition in the downstream market (*the leveraging condition*); and

> the refusal is not objectively justified[75].

This rule is complex because the verification of whether the three conditions are met requires a demanding legal and economic analysis. However, the complexity of this test cannot be easily avoided, given the difficulty inherent in separating pro and anti-competitive behaviours in this context. While in the case of price fixing, as discussed above, a simple rule based on its *per se* prohibition can be formulated because economists agree on the fact that any form of price fixing is very likely to harm social welfare, the effects of a prohibition to access a privately owned facility are not so clear-cut.

The test for dominance is another example of a complex rule, because it

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[74] Case C5/95, Oscar *Bronner v Mediaprint* [1999] ECR I 2981
[75] This last condition implies that if granting access leads to a deterioration of the value of the facility (for example, because of congestion), the refusal is justified.

> does not detail the conditions that automatically lead to a finding of dominance. The rule identifies a number of indicators, such as the size and the stability of market share, the presence of barriers to entry and the degree of buyer power, but leaves the adjudicator to decide which ones to rely on.

5.12   Some confusion between rules and standards may arise when the competition authority claims to be adopting a rule, but changes the content of the test to adapt it to different cases. This method may seem like a rule, because it is presented as a test, but is actually a standard, because its constant evolution does not provide certainty on what the triggering facts are.

5.13   The competition authority may present these decisions as based on clear triggering facts to give some certainty to the business community but if the decisions are actually based on a case-by-case analysis, then the decision method is a standard. There can indeed be cases for which it is not possible to formulate a rule because the evaluation of the effects is complex and not amenable to the predefinition of general triggering facts. In our view, a good example of such a case is the so-called legal test relative to the refusal to license intellectual property rights (IPRs), which is discussed in Box 5.2.

BOX 5.2: AN EXAMPLE OF A RULE THAT IS ACTUALLY A STANDARD

If the competition authority is concerned about legal certainty and stability and wants to provide clear rules to the business community, when it is extremely difficult to do so, it may end up setting a rule which is actually a standard.

When *Magill*[76], an Irish publisher, requested access to the television programme schedules of three public TV broadcasters, in order to publish a comprehensive TV guide, it received a refusal on the ground that the information was covered by an IPR. The ECJ found the refusal abusive, despite the copyright owned by the three TV companies, on the basis of a test that mandates compulsory licensing of an IPR when:

> The IPR is *indispensable* in carrying out business (*the essential facility condition*).

> The refusal to license is likely to eliminate all competition in the downstream market (*the leveraging condition*).

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[76] Case C-241/91, *RTE and others v Commission* (*Magill*) [1995] ECR I-543

> The refusal is not objectively justified.
>
> The refusal to license prevents the emergence of a new product for which there is potential demand (*the new product condition*).
>
> The first three conditions are based on those included in the "essential facility test" (see Box 5.1). The additional condition, the so-called "new product" condition, was introduced to better preserve the incentives to innovate protected by the IPR, while, at the same time, preventing the strategic use of this right to foreclose competitors who are able to meet a new demand.
>
> When *Microsoft*[77] was accused by Sun Microsystems of abusing its dominant position in the PC client operating system market because of its refusal to disclose some interface information, the European Commission found this behaviour in breach of Article 82, despite the fact that the refusal to supply was not preventing Sun Microsystems from offering a new product.
>
> The European Commission reached this conclusion on the basis of the rule developed in the Magill case, which was adapted to the specific circumstances of this case. The test was amended to consider the effects of a refusal to license an IPR on potential new products, which the previous test did not cover. This was done by substituting the new product condition with an "incentive balance condition" stating that whether a refusal to license is legitimate or not depends on its effect on the incentives to invest.
>
> Both the European Commission and antitrust scholars claimed that the Microsoft decision had introduced a new legal test for compulsory licensing[78]. However, in our view, it is more appropriate to say that the European Commission was actually adopting a standard. Indeed the incentive balance condition does not indicate any triggering facts (as a rule would) but simply requires calculating the effect on social welfare of the refusal to license, as does a standard.

5.14   The reason we emphasise the importance of understanding whether the competition authority is relying on a rule or a standard is that the possible sources of error are different depending on the decision method adopted, and, f an *ex ante* perspective the costs of an error vary depending on its source.

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[77] Case COMP/C-3/35.592 *Microsoft* Commission Decision of 24 March 2004.
[78] See Lévèque (2005) and the EC discussion paper (2005).

Possible sources of errors when adopting a rule

5.15   When a competition authority bases its decisions on a rule it can commit an error because the rule is not appropriate for the case at hand, or because it erroneously assesses the existence of the triggering facts. We refer to the first source of error as the "inclusion problem" and to the second one as "imperfect information".

The inclusion problem

5.16   The inclusion problem is peculiar only to rules and stems from the fact that there can be cases in which the triggering facts occur even if the conduct is not abusive (or cases in which the facts do not occur even if the conduct is abusive). By definition a standard does not exhibit this problem because it does not rely on pre-defined indicators.

5.17   A rule is over-inclusive when it leads to the prohibition of a conduct even if it is socially desirable. Conversely, a rule is under-inclusive when it allows socially harmful conducts. A rule can be under and over-inclusive at the same time.

5.18   A good example of the inclusion problem is provided by the test for predatory pricing that was developed during the *Akzo*[79] case. This test determines whether a low pricing strategy is abusive on the basis of the following set of conditions[80]:

> if the price is above total average cost, the pricing strategy is considered lawful;

> if the price is below total average cost but is higher than average variable cost, the pricing strategy is considered abusive only if there is evidence that the dominant firm had the intent to exclude its competitors; and

> if the price is below average variable cost, the pricing strategy is considered abusive.

5.19   This legal test is over-inclusive, because there may be cases in which pricing below average variable cost can be welfare enhancing. For

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[79] Case C-62/86, *AKZO Chemie BV v Commission of the European Communities*, Judgment of the ECJ of 3 July 1991.
[80] Since it is a test relative to a violation of Article. 82, it is also necessary that the firm holds a dominant position in the relevant market.

example, a firm may charge prices below this threshold to launch a new and innovative product characterised by high network externalities. This behaviour would increase welfare allowing consumers to benefit from a new product and from the network externalities, but the Akzo test would prevent it. This test is also under-inclusive because there may be cases in which prices can be above total average costs and still harm social welfare. This could happen when a firm can set very low prices that its competitors cannot match because they are less efficient. If their exit reduces the competitive pressure on the dominant firm, this may increase prices and the overall effect of the strategy on welfare is negative.

5.20 One might argue that the "inclusion" problem could be addressed by specifying further conditions and exceptions that accommodate factual variations, i.e. by making the rule more complex. For example, the *Akzo* test could be integrated with an exception for emerging markets. However, even if the triggering facts spelled out in the rule are better specified, the problem of inclusion can never be eliminated. Since rules are specified *ex ante*, they can never take account of all the factual variations that might arise *ex post* which determine whether a conduct is reducing social welfare[81].

5.21 This problem disappears if the competition authority employs a standard, because a case-by-case analysis of the all circumstances that determine whether a conduct is harmful does not rely on any predefined criteria that may not capture all cases.

Imperfect information

5.22 Errors in the application of a rule can also originate from the lack of complete and correct information about some crucial variables that affect the competition authority's ability to verify if the triggering facts have actually occurred.

5.23 We can use the *Akzo* test for predatory pricing as an example to show how this can happen. The application of this rule requires an estimation of the cost function of the dominant firm. If the competition authority does not estimate it correctly, because it cannot obtain all of the necessary information or because this is a difficult and time consuming exercise, it may conclude that the price is below average variable cost when in fact it is above this threshold.

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[81] See Korobkin (2000) for a survey of the subject.

The costs of inappropriate intervention/non intervention under Article 82 September 2006

5.24 It is important to highlight that the combination of the inclusion problem and the lack of perfect information may lead a competition authority to make a decision that is formally wrong, but that actually achieves its goal of maximising social welfare. For instance, suppose that a firm sets its price below average variable cost, but that this strategy is not abusive as it is part of a penetration strategy for a new product. A competition authority that relies on the *Akzo* test could condemn the firm. However, the competition authority may underestimate the firm's cost and conclude that its price fails the test. While this decision is formally wrong, as the competition authority misapplied the rule, it is correct in that it allows the firm to continue with behaviour that is welfare enhancing. According to our definition of errors, which refers to the effect on welfare of the conduct under consideration, in such a case a competition authority is not committing an error.

5.25 The distinction between "formal" and "substantive" errors will be further discussed in Chapter 6, as it has important implications for the assessment of the *ex ante* costs of errors.

Sources of errors when adopting a standard: imperfect knowledge

5.26 The decisions of a competition authority based on a standard can be erroneous only because of imperfect knowledge, i.e. because of the lack of complete and accurate information or because of the choice of a flawed or inappropriate economic theory. By definition, standards are immune from the inclusion problem.

5.27 A standard requires that the competition authority analyses all the effects of the allegedly abusive conduct on the affected market(s). The competition authority relies on economics to structure this analysis. If the economic theory selected for this purpose is flawed, or is not appropriate for the case in question, the competition authority can consider the wrong factors or omit some variables from the analysis, thus reaching a conclusion that is incorrect.

5.28 In addition, even if the economic theories on which the competition authority rely are correct and appropriate, their application still calls for the observation of variables that are difficult (or sometimes even impossible) to measure with a dependable degree of precision. Examples include: marginal costs, barriers to entry, elasticities of demand and switching costs[82]. These difficulties arise because some of this

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[82] See Cooper at al (2005).

information is unavailable, or is very costly to obtain, or is under the control of the firms under investigation[83].

5.29   The asymmetry of information that characterises the position of a competition authority with respect to the behaviour of the dominant firm may also imply that it is not aware that this firm is undertaking an abusive practice and, thus, it can tacitly allow a welfare-reducing behaviour (i.e. incur in a false acquittal). However, this source of error is of minor importance because a potentially abusive conduct, by definition, harms competitors, so that these have a strong incentive to bring it to the attention of the competition authority[84].

Conclusions

5.30   The use of a standard as the decision method is more demanding because it imposes on the competition authority the burden of selecting the appropriate economic theory and of collecting all the data necessary to apply it to the case. Hence, since the resources it can devote to the decision making process are limited, a competition authority with a given budget constraint is more likely to commit an error due to imperfect information if it employs a standard than if it relies on a rule. On the other hand, the inclusion problem arises only if a competition authority bases its decision on a legal test.

5.31   Hence, it is impossible to say, *a priori*, if a competition authority is more likely to commit an error if it judges a case employing a rule or a standard. Any choice of the decision method to employ has, therefore, to be made on the basis of an evaluation of the costs and the benefits of flexibility versus certainty.

5.32   From an *ex post* perspective, knowing whether the competition authority is relying on a rule or a standard is not relevant for the assessment of the costs of an error. However, if the costs are assessed from an *ex ante* perspective (which is the subject of next chapter) it is important to

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[83] Because of this problem some antitrust scholars have proposed limiting the employment of economics in the application of competition law. This argument is, in our view, flawed because the only way to arrive at antitrust decisions that enhance social welfare, which is the goal of competition law, is to develop a better understanding of the effects of firms' behaviour on the determinants of welfare. Only more demand for good economic theories and reliable empirical methods can improve our understanding of how conducts affect social welfare and, thus, reduce the rate of erroneous decisions.
[84] This problem is much more relevant in the detection of cartels. On this point see Besanko and Spulber (1989).

identify the source, because this affects firms' expectations and hence the magnitude of error costs.

6   EX ANTE ERROR COSTS

Introduction

6.1   In Chapters 3 and 4 we discussed the impact of erroneous antitrust interventions, or non interventions, assuming that these yield no other consequences apart from the change they make on the course of action of the firms active in the relevant market(s). However, antitrust decisions also alter the conduct of firms operating in other markets because they provide information on the behaviour that a competition authority would take if a similar behaviour was undertaken in another market. This new information is taken into account by all dominant firms in any market when deciding their strategies.

6.1   In addition the simple threat of an antitrust intervention can modify the behaviour of firms, even before the competition authority reaches a decision. A thorough assessment of the cost associated with inappropriate interventions, or non-interventions, should therefore also examine the impact of possible false convictions and false acquittals on the behaviour of firms from an *ex ante* perspective. Since from an *ex ante* perspective the errors of the competition authority affect firms' conduct in any market that could be subject to an antitrust investigation, an *ex ante* assessment of the cost of these errors calls for a general analysis of the constraints exerted by competition law on the behaviour of firms.

6.2   This chapter examines the impact of erroneous decisions by competition authorities, or of the possibility of such errors, on firms, when these internalize the consequences of the application of competition law in setting their strategies. We find that:

>   Both false convictions and false acquittals reduce the level of compliance with the abuse of dominance prohibitions in the same way.

>   The claim that false convictions have a greater welfare decreasing effect than false acquittals is not supported by the current state of economic thinking, but, since the conducts normally investigated by competition authorities are more likely to be efficient than inefficient, this makes the expected cost of false convictions higher than the expected cost of false acquittals.

>   False convictions are costlier than false acquittals in dynamic economies where firms can become dominant mostly by innovating or becoming more efficient. The reverse holds if the

economy favours the acquisition of a dominant position through rent-seeking activities.

6.3   Due to its subject matter this chapter is more complex than the previous one and to be able to fully understand it the reader needs some knowledge of the theory of probability.

The impact of errors on compliance

6.4   Legal rules imposing liability on violators are usually designed to discourage individuals from committing harmful acts. This general principle of deterrence also applies to competition norms[85]. The prohibitions in Article 82, as well as in those national laws that mirror this provision, and, even more so, the practice established so far by antitrust agencies and the courts, are all meant to prevent firms from engaging in abusive conducts. How should these legal provisions and their enforcement be structured to achieve their goals in the most effective way? Further, how does the possibility of errors change the answer to the previous question?

6.5   Economic theory suggests that enforcement parameters should be set so as to render unattractive to individuals or firms any decision to breach the law. The simplest way to model this is to assume that individuals make binary choices between committing and not committing unlawful acts[86] and that, in so doing, they disregard any ethical or psychological consideration, but consider only the net economic benefit or cost associated with each choice[87]. Under these circumstances, any decision to commit an unlawful act is taken if, and only if, the expected gain from the act exceeds the expected gain from not committing it. With regard to Article 82, or similar laws, the private expected gain is the profit that the dominant firm derives from being able to exercise market power and set its price at a supra-competitive level. The private cost of violating the abuse of dominance prohibitions is given by the expected fine; that is the

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[85] For a general discussion about deterrence, see, for example, Andenaes (1966) and Zimring and Hawkins (1973).

[86] For a survey on this subject, see Polinsky and Shavell (2000).

[87] This simple setting could also be extended to the case in which individuals decide, not only between harmful and non-harmful acts, but also on their level, see Polinsky and Shavell (2000). For the sake of simplicity, in this report we do not consider this more complex case. For an analysis of marginal deterrence, see Mookherjee and Png (1994).

fine for the infringement multiplied by the probability of being detected and punished[88].

6.6　Let *g* be the profit from the unlawful act (i.e. the additional profit the firm would earn above the one that it would make if it behaved competitively), *f* the fine and *p* the probability of being investigated (which is equivalent to the probability of being convicted because we assume that there are no errors in the judgement process). If the firm takes the unlawful decision, it gains g but it has to pay (p*f) if it is investigated, whereas if the firm respects the law it does not earn the additional profit, but it also does not risk having to pay the fine if it is investigated. From this it follows that any unlawful decision will be taken if and only if the overall gain from the unlawful act is greater than the overall gain from the competitive behaviour (i.e. 0):

$$g - p^*f > 0 \qquad\qquad (6.1)$$

6.7　The competition authority's enforcement problem is how to influence the firm's balance of gains and costs, so as to render unattractive any decision to undertake a conduct that goes against the objective of the competition authority. Since the competition authority's objective is to maximise social welfare, its enforcement problem is to choose the probability of investigation[89] and the level of the fine that ensure the maximum level of social welfare. If the probability of investigation is given, the solution to this problem is to set a fine at level such that the expected fine equals the cost imposed on society. With such an expected fine a firm would only choose those conducts whose gain is higher than the cost they impose on others. That is, if and only if these behaviours improved social welfare.

6.8　Having explained how to set the expected fine so that the competition authority can reach its aim, we now consider how the possibility of error

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[88] Under EU competition law non-monetary sanctions, such as imprisonment, are not provided for. Were this to be the case, the cost of a harmful act should incorporate these elements also. Other costs may stem from the private enforcement of competition law, i.e. from civil actions brought about by the victims of an antitrust violation in order to recover damages.

[89] The probability of investigation could be thought of as being directly related to the amount of resources devoted to the enforcement of competition law: the greater the enforcement expenditure, the greater the probability of detecting harmful acts. This point is discussed in Polinsky and Shavell (2000). For the sake of simplicity, here we assume that the probability of detection is fixed. The main conclusions derived in this section, nevertheless, are not affected by this assumption.

in the application of the abuse of dominance prohibitions changes the above analysis.

6.9 Because of these errors, there is some probability that a dominant firm can be held liable even if it is adopting a competitive behaviour and some probability that it can be acquitted although it is violating the law. Let ε_I and ε_{II} indicate the probabilities respectively of a false conviction and of a false acquittal. The framework conceptualized in equation (6.1) can now be modified to take account of the possibility of errors. The possibility of false acquittals increases the overall gain that the firm would obtain from the unlawful behaviour because the probability of being investigated and convicted is now lower than the probability of being investigated[90]. The reward from competitive behaviour conversely is lower because the firm now risks being convicted when it is investigated and having to pay a fine. Hence, a firm will engage in an unlawful conduct, if and only if the gain, net of the expected fine, exceeds the cost borne if it does not commit it:

$$g - p * (1 - \varepsilon_{II})f > - p\varepsilon_I f \qquad (6.2)$$

or equivalently:

$$g > (1 - \varepsilon_I - \varepsilon_{II}) * pf \qquad (6.3)$$

6.10 From (6.3) it is clear that the possibility of errors in the application of the abuse of dominance prohibitions has the effect of diluting deterrence. Both types of error make the alternative of violating the law relatively more profitable than if these errors did not take place, because they lower the expected cost of the unlawful act, measured as the difference between the expected payoff in the case of a lawful and an unlawful behaviour.

6.11 The fact that both types of errors make the alternative of violating the abuse of dominance prohibitions more attractive has a straightforward policy implication. If we are interested in maximising deterrence, competition rules should be designed so as to minimize both errors.

6.12 Another important consideration is that, as this analysis shows, both types of errors have the same *ex ante* cost in terms of lower deterrence,

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[90] The probability of being investigated is *p* but the probability of being investigated and convicted is now $p * (1 - \varepsilon_{II})$.

as they reduce in the same proportion the level of the expected cost of the unlawful act[91].

6.13 In a nutshell, the economic analysis of the public enforcement of competition law shows that the *ex ante* cost of antitrust errors is to reduce the level of individual compliance with the law. Other things being equal, a higher probability of false convictions or of false acquittals reduces the cost associated with an unlawful behaviour and, therefore, renders the decision to breach the law more attractive. Furthermore, economic theory shows that the relative cost of these errors are symmetric.

Beyond compliance: formal and substantive errors

6.14 The economic analysis of the public enforcement of competition law outlined in the previous section hinges on the implicit assumption that the actions prohibited by the law harm all agents but the violator. As argued, this does not imply that they are always welfare reducing, as the harm imposed on other agents may be lower than the private benefit the violator enjoys by committing the unlawful act.

6.15 The assumption that all unlawful acts are harmful for all other agents but the violator does not hold in many areas of competition law and in particular it does not hold for the abuse of dominance prohibitions. We have shown that some conducts held by a dominant firm may improve the well-being of other agents (e.g. consumers) and yet, may be erroneously prohibited by a competition authority. To further clarify this point we can contrast the prohibition of hard-core cartels to that of abusive conducts.

6.16 Hard-core cartels always harm consumers and are welfare improving only if the extra-profits of the colluding firms exceed the harm suffered by consumers. In most cases this does not occur, and the cartel equilibrium entails a deadweight loss close to the portion of consumers' welfare that the firms are not able to recover in the form of higher profits. However,

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[91] It is also important to notice that equation (6.3) suggests that if the strategic decision of a firm does not affect the probability of being punished (whatever this is) all law enforcement parameters become irrelevant. Indeed, suppose that the probability of conviction is p and is fixed. If a firm decides to act legally the probability of a false conviction is $\varepsilon_l = p$. If the firm decides to act illegally, the probability of a false acquittal is $\varepsilon_{ll} = 1 - p$. Hence, $\varepsilon_l + \varepsilon_{ll} = 1$ and the right-hand side of equation (6.3) becomes zero. This means that the firm will base its decision only on the private gain that accrues to it and will totally disregard the prohibition set in the rule.

suppose that the collusive agreement is also the only available means to obtain important cost reductions. Even if consumers are damaged by the collusive agreement, the cartel may increase total welfare by improving the firms' profits more than it decreases consumers' welfare.

6.17   On the contrary, a potentially abusive conduct, for instance a low-price strategy, may increase welfare not only because the violator's gain exceeds the victims' harm, but also because it improves the well-being of other agents.

6.18   An important implication follows from this clarification. The notion of error traditionally employed in the economic analysis of the public enforcement of law is different from the one adopted in this study. According to our definition, a competition authority commits an error either if it prohibits a conduct that is welfare enhancing or if it condones a conduct that is welfare reducing. In the framework outlined in the previous section an error occurs either if a firm is convicted for committing an unlawful act (independently of the welfare effect) when in fact it did not, or if the firm is not convicted when in fact it committed an unlawful act (again independently of the welfare effect).

6.19   We may refer to the first one as the "substantive" notion of errors and to the latter as the "formal" notion of errors. The example of a hard-core cartel clarifies this distinction. A "formal" false conviction occurs if some firms are convicted for forming a cartel when in fact they did not. A formal false acquittal occurs if some firms that did form a cartel are acquitted. It is apparent that the welfare consequences of the cartel do not matter in these definitions of error. Suppose that some firms form a cartel and that the collusive agreement is an important source of savings, so that the extra-profits are higher than the consumers' harm. A competition authority that convicts the firms for a breach of Article 81 is not committing a formal error, but, since its decision results in a lower level of social welfare, it is committing a substantive error. The distinction between formal and substantive errors will be further elaborated in the next section, where it plays an important role.

Possible sources of asymmetry in ex ante error costs for rules and standard

6.20   We have seen in Chapter 5 that there are two decisional approaches that the competition authority may follow in assessing potentially abusive practices. The competition authority may apply a rule stating some triggering facts that, if proved, suffice to declare that the conduct under investigation is unlawful, or the competition authority may rely on a

case-by-case analysis (i.e. a standard) in which case it makes a decision on the basis of the assessment of the welfare effects of that specific conduct. These two decision methods have different implications in terms of the *ex ante* costs of antitrust errors.

6.21   Suppose that a firm in choosing how to maximise its profit has to decide whether to undertake a conduct *x* and that the firm knows whether *x* is competitive, *c*, or abusive, *a*, but that the competition authority does not. From an *ex ante* perspective, a cost arises if a firm for which *x* is competitive decides to refrain from adopting it because it anticipates the risk of a false conviction by the competition authority (over-deterrence). Similarly, if a firm for which *x* is abusive decides to undertake it as it anticipates that competition authority may incur in a false acquittal (under-deterrence).

6.22   Let $k(x)$ denote the cost of an erroneous assessment of *x*, that is the welfare loss stemming from the firm not undertaking a competitive conduct or undertaking an abusive conduct, and with $p(e_I)$ and $p(e_{II})$ the probability of over-deterrence and that of under-deterrence, where:

$$\text{expected cost of over-deterrence} = p(e_I) \times k(c) \quad (6.4)$$

$$\text{expected cost of a under-deterrence} = p(e_{II}) \times k(a) \quad (6.5)$$

6.23   In these equations and in the reminder of this chapter, *e* denotes the "erroneous" decision of the firm relative to the one that would maximize welfare; that is, the firm's decision to abstain from *x* when *x* is competitive (e_I) and its decision to undertake *x* when *x* is abusive (e_{II}). In order to investigate the *ex ante* costs of antitrust errors in terms of erroneous firm decisions they induce, it is useful to break down the probability of the two types of erroneous decisions as follows:

$$p(e_I) = p(e|c) \times p(c) \quad (6.6)$$

$$p(e_{II}) = p(e|a) \times p(a) \quad (6.7)$$

6.24   Equation (6.6) states that the probability a firm does not undertake *x*, when *x* is competitive is given by the probability that a firm takes a socially inefficient decision, given that *x* is competitive, multiplied by the probability that *x* indeed improves welfare. Similarly, equation (6.7) states that the probability that a firm does undertake *x*, when *x* is abusive, is given by the probability that a firm makes an erroneous decision, given that *x* is abusive, multiplied by the probability that *x* decreases welfare. Remember that a firm taking an erroneous decision means that it chooses a behaviour that does not maximise social welfare.

It does not mean that a firm wrongly anticipates the decision of the competition authority, nor that it selects a course of action that is not profit maximising. In our discussion we assume that firms are rational both in forming their expectations about the application of the abuse of dominance prohibitions, and in choosing the optimal strategy from their own point of view.

6.25 We can substitute equations (6.6) in (6.4) and equation (6.7) in (6.5) to obtain the *ex ante* cost of the two types of error, as in figures 6.1 and 6.2 below:

FIGURE 6.1: THE EX ANTE COST OF FALSE CONVICTIONS (OVER-DETERRENCE)

$$\text{cost}_{\text{I}} = p(e|c) \times p(c) \times k(c)$$

| overinclusion/ formal errors/ compliance | probability x is competitive | welfare loss in refraining from x when x is competitive |
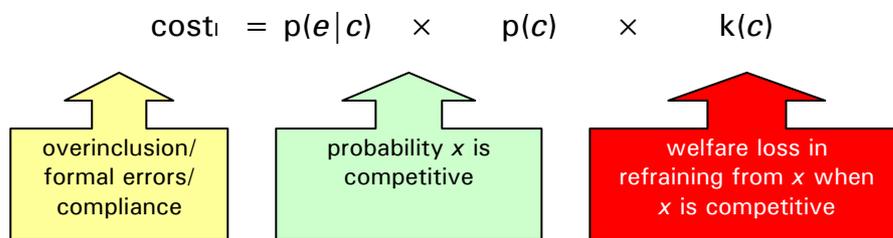
FIGURE 6.2: THE EX ANTE COST OF FALSE ACQUITTALS (UNDER-DETERRENCE)

$$\text{cost}_{\text{II}} = p(e|a) \times p(a) \times k(a)$$

| underinclusion/ formal errors/ compliance | probability x is abusive | welfare loss from undertaking x when x is abusive |
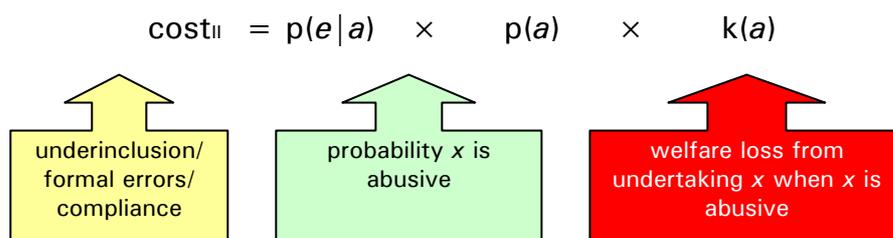
6.26 These expressions break down the two costs into their basic elements. An analysis of these elements will allow us to evaluate whether the two costs are symmetric or not.

6.27   The first component of the two costs is the probability that a firm will make an erroneous decision given the "value" of the action *x*. This probability is influenced by the expected behaviour of the competition authority and by all the parameters of the public enforcement of the law, i.e. the level of the fine and the probability of detection. The behaviour of the competition authority in turn depends on the decision method it employs, the degree of over/under-inclusion of the rules, the probability of formal errors and the degree of compliance with the norm. These themes will be addressed in section 6.4.3.

6.28   The second component is the probability that a given conduct is competitive or abusive. These probabilities are exogenous with respect to the firm's erroneous decisions. Nonetheless they matter because they determine the frequency of the two types of errors. We will discuss this point in section 6.4.2.

6.29   The third element is the welfare loss stemming from the firm either refraining from adopting a competitive conduct or undertaking an abusive conduct. In section 6.4.1 we will discuss whether there are reasons to believe that these welfare losses differ in the two cases.

The distribution of welfare losses

6.30   To assess the values of $k(c)$ and of $k(a)$ in the previous equations we need to address the following question: is the expected welfare loss stemming from impeding an efficient conduct higher or lower than the expected welfare loss stemming from allowing an abusive conduct?

6.31   This question is particularly tricky as one may be misled by considerations of the type: most conducts are efficient, impeding them would be terribly costly for society, whereas truly abusive conducts are rare. This statement matters for the assessment of the probability of competitive and abusive conducts, but it is not useful to answer the question we asked here.

6.32   To better tackle the issue at hand we should reason along the following lines: let us consider only efficient conducts, some of them improve welfare a little, so that impeding them would cause a tiny welfare loss, others improve welfare a lot, so that their impediment would cause a significant welfare loss; let us now consider only abusive conducts, we can say the same, some reduce welfare only a little and others by a substantial amount. To assess the impact of these welfare losses caused by erroneous decisions in the two sets, two aspects need to be evaluated. One is the range of values the welfare loss can take in the

two sets (i.e. the support) and the other is the frequency with which each value occurs in each set. The support and the relative frequency determine the *distribution* of these values in the two sets.

6.33　There are many factors that may influence the distribution of the welfare losses in the two sets. In general all those factors we have discussed in the first part of this study (Chapters 3 and 4) influence the frequency with which any value may occur.

6.34　An important qualification is that competition law, and in particular the abuse of dominance prohibitions, apply to a limited number of strategies and to a limited number of firms. The distribution of welfare losses caused by the adoption of socially inefficient conducts computed by considering all firms is likely to be different from the distribution of welfare losses stemming from allowing socially inefficient conducts when undertaken only by dominant firms.

6.35　Keeping in mind these qualifications, we can now discuss the claim, sometimes put forward in the economic and antitrust literature, that the welfare loss entering the cost of false convictions ($k(c)$) is generally higher than the welfare loss entering the cost of false acquittals ($k(a)$)[92]. This claim is based on two arguments:

1)　the negative impact on welfare of the impediment of an efficient conduct is more persistent than that stemming from the occurrence of an abusive conduct; and

2)　abusive conducts affect only a portion of the demand while efficient conducts affect the entire market demand.

6.36　Our interpretation of the first conjecture is that the welfare improvement lost when a firm decides not to undertake a competitive conduct for fears of an antitrust intervention is lost until the rule is changed and the firm can reconsider its decision. On the contrary, if a firm decides to act abusively, the welfare consequences are less negative as market forces sooner or later will correct the distortion it causes. This argument hinges on the assumption that markets are self-correcting[93], while rules are not; or, more precisely that "market corrections" are swifter than "rule corrections".

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[92] Recent contributions are those by Cass and Hylton (1999) and Evans and Padilla (2005).

[93] For this reason in some contributions it is referred to as the "market correction approach"; see for instance McGowan (2005).

6.37   The other conjecture concerning error costs relates to the nature of the efficiency losses deriving from the abusive practices. According to Easterbrook (1964) the cost of an abusive practice is the deadweight loss associated with supra-competitive prices. This loss, in his view, affects only a limited portion of the demand curve, whilst the cost of a competitive conduct not undertaken affects every single unit as this impedes a reduction in the production cost.

6.38   We believe that neither of these two claims is conclusive. It is true that market power may not last forever and that entry of new firms or technological change may drastically challenge even a well-established dominant position. However, there is no clear-cut explanation of why bad rules take longer to be reversed than the time required by markets to correct the anticompetitive effects of abusive conducts, nor has any empirical evidence so far been brought forward to sustain this conjecture. Mistaken decisions may be appealed and the courts may overturn them[94]. This suggests that mistaken convictions may be subject to the same competitive pressure as mistaken acquittals and that bad rules may be changed in courts just as the effects of abusive behaviours may be fixed by the market.

6.39   As for the statement that markets correct false acquittals, one has to remember that the very purpose of many abusive practices is to impede the market forces that erode the market power enjoyed by the dominant firm, or to slow down this process. For instance, if tying creates an artificial barrier to entry, one could not argue that entry will limit the market power the dominant firm enjoys thanks to the tying strategy, as this market power exists exactly because tying makes entry a less likely event. The argument that eventually this market power will be lost because of the evolution of the market may well be true, but does not provide a valid reason to maintain that the social cost of an abuse is low. Moreover, market evolution may also make rules generating false convictions irrelevant.

6.40   Lastly, the argument that abusive practices affect only a portion of the demand curve, while competitive conducts affect the whole market demand, is inherently flawed. On the one hand, maintaining or improving a dominant position by way of abusive conducts may deter entry of more efficient firms or may waste resources that could be destined to more

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[94] It is interesting to note that one of the most prominent members of the Chicago School, Richard Posner (1973), argues that common-law adjudication tends toward efficient rules and the application of competition law is akin to a common-law setting even in those countries with a well established civil law tradition.

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efficient uses. In both cases there is a welfare loss that affects the whole market demand, which goes beyond the loss in allocative efficiency (deadweight loss) generated by supra-competitive prices.

6.41   On the other hand, there are competitive conducts that may be misjudged as abusive, such as lowering price, which do not reduce costs. Therefore, their prohibition affects only the portion of demand that is not served because of the erroneous antitrust decision.

6.42   To sum up, arguments in favour of an asymmetry in the distribution of the welfare losses caused by the two types of errors do not seem to be well-grounded. Economic theory does not demonstrate that cost differences exist. Nor is relying on "experience", as some authors suggest, sufficient to bolster that position, unless experience is backed by rigorous and replicable empirical analysis. Our conclusion is that the question we asked cannot be answered with a satisfactory degree of confidence. This may sound unsatisfactory, but we believe that it truthfully reflects the current state of the economic knowledge on this point. Given this situation of ignorance we are forced to follow the *Principle of Insufficient Reason[95]* and work under the hypothesis that the distribution of welfare losses in the two cases is the same[96].

The probability of competitive and abusive conducts

6.43   The (a priori) probability that a given behaviour is competitive ($p(c)$, in equation (8.6)) may be considered as equal to the fraction of conducts, within a predefined universe of conducts, that increase social welfare. The (a priori) probability of an abusive behaviour (($p(a)$, in the previous equation) is the complementary fraction of conducts that lower social welfare.

6.44   Many scholars maintain that the probability of competitive conducts is much higher than the probability of abusive conducts. For instance, Cooper et al (2005) and Lafontaine and Slade (2005) summarize existing empirical studies on vertical restraints and find that in most documented cases vertical restraints improve welfare. Lafontaine and Slade conclude that:

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[95] For a discussion of this principle in statistics in a historical perspective see Stigler (1966). The principle of insufficient reason was renamed the "principle of indifference" by Keynes (1921). A succinct source is http://en.wikipedia.org/wiki/Principle_of_indifference
[96] This is a sufficient condition for the average welfare loss in the two cases to be the same.

"While different theoretical models often yield diametrically opposed predictions as to the welfare effects of vertical restraints, we find that in the setting that we focus on, namely manufacturer/retailer or franchisor/franchisee relationships, the empirical evidence concerning the effects of vertical restraints on consumer wellbeing is surprisingly consistent. It appears that when manufacturers choose to impose such restraints, not only do they make themselves better off, but they also typically allow consumers to benefit from higher quality products and better service provision".

6.45   The same claim has been made by Evans and Padilla (2004) and by Hylton and Salinger (2001) with respect to tying. Experimental studies (Isaac and Smith, 1965; Holt, 1995) performed to investigate predatory pricing suggested that this practice is rare.

6.46   If we consider the number of convictions for abuse of dominance decided by the European Commission (or by national competition authorities) we find that it is very low. We believe that this genuinely reflects the relative low frequency of anticompetitive conducts.

6.47   However, this conclusion warrants a caveat. As for the distribution of welfare losses, the probability of competitive and abusive conducts depends on how we define the relevant universe (population). Since the abuse of dominance prohibitions apply only to a limited set of strategies and to a limited number of firms (i.e. only those with a dominant position), we end up overestimating the probability of efficient conducts (and underestimating the opposite probability of inefficient conduct) if we consider all possible behaviours of all possible firms.

The probability of the firms committing errors

6.48   Finally we have to consider the probability that firms "err" in the sense that they decide not to adopt an efficient conduct or to adopt an inefficient one ($p(e|c)$ and $p(e|a)$ in the previous equations). These errors are caused by the anticipation of the errors the competition authority will make. Hence, contrary to the other elements of *ex ante* costs discussed above, the probabilities of the two types of errors firms can commit may depend on the decision method adopted by the competition authority.

6.49   To investigate this component of the *ex ante* expected cost of errors, suppose that the conduct x is abusive if, and only if, some conditions hold, and denote these conditions with z. If both the firm and the competition authority can observe whether z holds, the competition

authority will make no mistakes and the firm, anticipating the correct reaction of the competition authority, also will not err.[97] Suppose now that the firm observes z, but the competition authority does not. In these circumstances the competition authority may commit errors and misguide the *ex ante* firm's decision. We explore how this can happen in the two following sections devoted to rules and standards.

Rules

6.50   If the competition authority bases its decision on a rule it needs to define some triggering facts that, if proved, demonstrate that the conduct under examination is illegal. Let us denote with y the facts that, according to the rule, trigger a prohibition, with $\neg y$ the event in which some of the triggering facts do not occur and with $\neg z$ the event that condition z does not hold. The rule would be perfect if y occurs if, and only if, z holds. However, as explained in Chapter 5, a rule is inherently imperfect because of the inevitable inclusion problem. The rule is over-inclusive if y can occur in some cases in which z is not true; and is under-inclusive insofar as y may not occur in some cases in which z is true[98].

6.51   The probabilities of the two imperfections can be represented as:

$$p(y|\neg z) \quad \text{(over-inclusion)}$$

$$p(\neg y|z) \quad \text{(under-inclusion)}$$

6.52   The errors generated by the inclusion problem affect the *ex ante* decisions of the firms because they modify their expected payoffs as the expected fine becomes:

$$p(y|\neg z)f$$

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[97] We assume that the sanction is sufficiently high to discourage a firm to breach the law if it anticipates a conviction.

[98] A possible source of asymmetry in error costs that we do not discuss here regards the understanding of the rule by firms. Indeed, while all false convictions require a formal decision that spells out the facts that make a certain behaviour illegal, false acquittals may occur silently, without a public investigation and a formal decision. In this case firms may not be able to observe the competition authority's decision not to investigate the practice so that no "general inducement" effect is produced. This problem is less relevant if we assume that in general conducts are lawful unless prohibited. If this "closing rule" is valid, then the triggering facts defined in prohibition decisions (both when they are correct and when they are wrong) suffice to fully define the antitrust rule adopted by the competition authority.

if *x* is competitive, and

$$p(y|z)f = [1 - p(\neg y|z)]f$$

if *x* is abusive.

6.53   Hence a higher rate of over-inclusion increases the expected fine for a firm that acts competitively and increases the degree of over-deterrence. A higher rate of under-inclusion decreases the expected fine for a firm that adopts an abusive conducts and increases the degree of under-deterrence.

6.54   If a competition authority bases its decision on a rule, the inclusion problem is not the only source of errors. It may not perfectly observe some triggering facts due to imperfect information. This can generate some formal errors. The consequences of these formal errors on the *ex ante* decisions of the firms depend primarily on whether the imperfect information concerns the conduct possibly undertaken by the firm or some other triggering facts.

6.55   To see why, consider that once a rule has been defined, it can be read as "*x* is unlawful if *y* holds". This means that the facts that trigger a conviction are formed by the combination of *x* and *y*. In other words, the rule is (*x*, *y*) is prohibited. In applying this rule a competition authority may fail to have perfect information either on *y*, or on *x* or on both.

6.56   Let us examine each of these possible cases of imperfect information. In applying the rule the competition authority does not observe the value of the variable $Y \in (y, \neg y)$, but that of a different variable $\hat{Y} \in (\hat{y}, \neg \hat{y})$ and convicts if and only if $\hat{Y} = \hat{y}$. Hence, the competition authority can commit two types of formal errors, whose probabilities are:

$p(\hat{y} | \neg y)$ (formal error concerning *Y* that leads to a false conviction)

$p(\neg \hat{y} | y)$ (formal error concerning *Y* that leads to a false acquittal)

6.57   Combining the errors stemming from the inclusion problem and the formal errors about the triggering facts included in the rule, the expected fine for a firm that undertakes *x* becomes:

$$[p(\hat{y}\mid y,\neg z)+p(\hat{y}\mid\neg y,\neg z)]f \qquad =$$

$$[(1-p(\neg\hat{y}\mid y,\neg z))+p(\hat{y}\mid\neg y,\neg z)]f \qquad (6.6)$$

if *x* is competitive, and

$$[p(\hat{y}\mid y,z)+p(\hat{y}\mid\neg y,z)]f \qquad =$$

$$[(1-p(\neg\hat{y}\mid y,z))+p(\hat{y}\mid\neg y,z)]f \qquad (6.9)$$

if *x* is abusive.

6.58 From equations (6.6) and (6.9) we can see that the probability of a formal error concerning *Y* that leads to a false conviction increases the expected fine, while the probability of a formal error concerning *Y* that leads to a false acquittal decreases it. Hence the first formal error increases the degree of over-deterrence and decreases the degree of under-deterrence. The opposite is true for the second formal error: it decreases the degree of over-deterrence and increases the degree of under-deterrence. This shows that formal error may also be beneficial in that it may partially correct the inclusion problem.

6.59 Consider now the possibility that the competition authority cannot observe whether *x* occurred. We can apply the same formalization as above and say that the true variable is $X\in(x,\neg x)$, but that the competition authority observes $\hat{X}\in(\hat{x},\neg\hat{x})$ and convicts the firm if and only if $\hat{X}=\hat{x}$. Also with respect to *X* two formal errors may occur, whose probabilities are:

$p(\hat{x}\mid\neg x)$ (formal error concerning *X* that leads to a false conviction);

$p(\neg\hat{x}\mid x)$ (formal error concerning *X* that leads to a false acquittal).

6.60 If these formal errors are possible, a firm must consider that it may be erroneously convicted not only when its conduct is competitive, but also for a conduct that in fact it did not adopt. Hence, it faces a positive expected fine both if it decides to undertake *x* and if it decides not to undertake it. As argued in section 6.2, both errors reduce the degree of

compliance with the rule. Hence, both errors reduce the degree of over-deterrence and increase the degree of under-deterrence.

6.61 This can be formally proven as follows. A firm that has to decide whether to undertake *x*, knowing that *x* is competitive, will confront the expected payoff stemming from the two possible actions. If it chooses to adopt *x*, its payoff is:

$$g(x) - p(\hat{x}|x)p(y|\neg z)f = g(x) - [(1 - p(\neg \hat{x}|x))p(y|\neg z)]f , \quad (6.10)$$

where *g(x)* is the gain it derives from adopting *x*. If the same firm refrains from doing *x*, its payoff is:

$$- p(\hat{x}|\neg x)p(y|\neg z)f . \quad (6.11)$$

6.62 The probability of a formal error concerning *X* that leads to a false conviction increases the value of (6.10) and probability of a formal error concerning *X* that leads to a false conviction decreases the value of (6.11). In both cases the firm will have a stronger incentives to make the appropriate decision, that is to adopt the efficient conduct.

6.63 The same reasoning applies to the firm that has to decide whether to do *x*, knowing that *x* is abusive. Its payoff if it undertakes *x* is:

$$g(x) - p(\hat{x}|x)p(y|z)f = g(x) - [(1 - p(\neg \hat{x}|x))p(y|z)]f , \quad (6.12)$$

while if it does not undertake *x*, is:

$$- p(\hat{x}|\neg x)p(y|z)f \quad (6.13)$$

6.64 As before, the probability of a formal error concerning *X* that leads to a false conviction increases the value of (6.12) and the probability of a formal error concerning *X* that leads to a false acquittal decreases the value of (6.13), so that both formal errors increase the firm's incentives to make the inappropriate decision, that is to adopt the abusive conduct.

6.65 The combination of the probability of formal errors both on *Y* and on *X* does not change the qualitative results obtained so far. Therefore, we can summarize the effects of the different sources and types of errors by a competition authority on the probability of *ex ante* erroneous decisions by the firms. Table 6.1 below outlines these effects. The first two columns report the source of the error and its type. The last two columns

report how these errors, when rationally anticipated by firms, influence the degree of over-deterrence and of under-deterrence. The sign "+" indicates that the effect is to increase the probability of a socially inefficient decision (increase the probability of *ex ante* errors) and the sign "−" indicates the opposite effect. When there are no consequences this is indicated by a "0".

TABLE 6.1: THE EX ANTE COST OF FALSE CONVICTIONS

Source of error	Type of error	Effect on the degree of over-deterrence	Effect on the degree of under-deterrence
Inclusion problem	Over-inclusion	+	0
	Under-inclusion	0	+
Imperfect information	Formal error on *Y* that leads to a false conviction	+	−
	Formal error on *Y* that leads to a false acquittal	−	+
	Formal error on *X* that leads to a false conviction	−	+
	Formal error on *X* that leads to a false acquittal	−	+

6.66 The table shows that not all errors made by a competition authority increase the expected error costs from an *ex ante* perspective. Indeed, most of the formal errors due to the lack of perfect information reduce the degree of over-deterrence and increase the degree of under-deterrence. These effects must be taken into account in designing a rule for the application of the abuse of dominance prohibitions.

Standard

6.67 If a competition authority bases its decision on a standard rather than a rule (or a set of rules) the distinction between formal and substantive

errors disappears, as form and substance coincide with a standard. From an *ex ante* perspective, both types of errors will reduce the degree of compliance with the standard and, thus, will increase the probability that a firm, anticipating the decision of the competition authority, will make a decision that negatively affects welfare.

6.68   We can reach further conclusions if we assume that the errors of the competition authority, when it uses a standard, are unsystematic; that is if we assume that the competition authority decision making process is unbiased.

6.69   When a competition authority follows a standard, it assesses separately the welfare consequences of each conduct. Let us define with $w(x)$ the true welfare change caused by a conduct *x* and with $\hat{w}(x)$ the welfare change as computed by the competition authority. Given the possibility of errors we can define $\hat{w}(x)$ as equal to the true welfare change plus a random variable ε that generates the competition authority's errors:

$$\hat{w}(x) = w(x) + \varepsilon \ ^{99} \quad (6.14)$$

6.70   The assumption that the competition authority's decisions are unbiased means that the average value of ε is zero and that the distribution of ε is symmetric. The *ex post* rate of errors that the competition authority will make depends on how this random variable is dispersed around its mean.

6.71   This assumption implies that the competition authority in making each decision will take into account all those factors that influence the welfare effects of the conduct under examination. Hence, as figures 6.3 and 6.4 below suggest, the probabilities that firms will make socially inefficient decisions, anticipating an erroneous antitrust decision, are not independent of those factors that determine the welfare loss stemming from an inappropriate decision. This is due to the fact that these factors are exactly the ones that are assessed by the competition authority in its decision making process.

FIGURE 6.3: THE *EX ANTE* COST OF FALSE CONVICTIONS

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[99] In this chapter we have assumed that the relationship between the true level of welfare and the random probability of an error is linear. However, the relationship may be non-linear because more resources are devoted to the investigation of "bigger" cases reducing the distribution of the errors, while in smaller cases errors are more likely.

$$\text{cost}_\text{I} \quad = \quad \text{p}(e|c) \quad \times \quad \text{p}(c) \quad \times \quad \text{k}(c)$$

| error due to the standard | probability x is competitive | welfare loss in refraining from x when x is competitive |
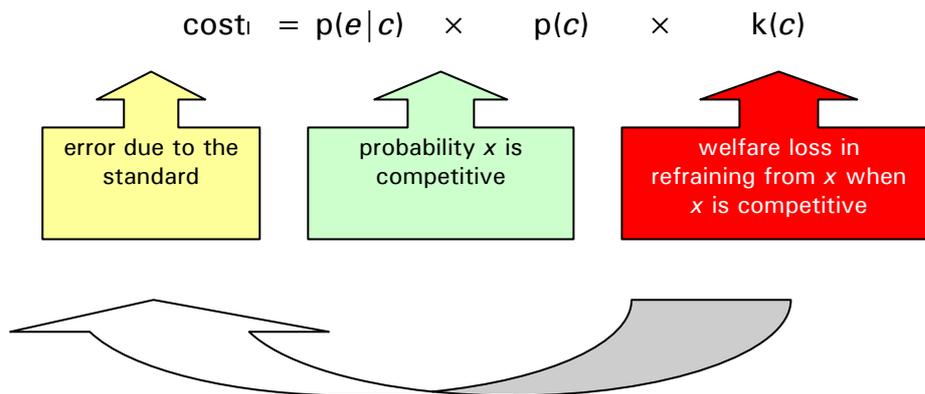
FIGURE 6.4: THE *EX ANTE* COST OF FALSE ACQUITTALS

$$\text{cost}_\text{II} \quad = \quad \text{p}(e|a) \quad \times \quad \text{p}(a) \quad \times \quad \text{k}(a)$$

| error due to a standard | probability x is abusive | welfare loss from undertaking x when x is abusive |
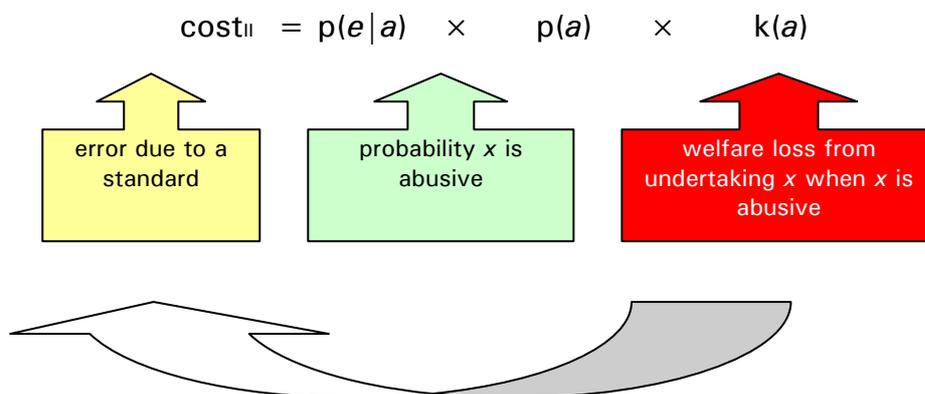
6.72   We can argue that, if *ex post* errors are unsystematic, the probability that a firm will refrain from adopting a competitive conduct is inversely related to the welfare loss that would result from not adopting the same conduct. Similarly the probability that a firm will undertake an abusive conduct is inversely related to the welfare loss that such an abuse may cause to the society.

6.73   If the distribution of the welfare loss is the same for competitive conducts wrongly avoided and for abusive conducts wrongly

committed[100], then the relative cost of the two types of error equals the ratio between the probabilities of a conduct being competitive or abusive, that is:

$$\frac{\text{Cost}_\text{I}}{\text{Cost}_\text{II}} = \frac{\text{p}(c)}{\text{p}(a)} \quad (6.15)$$

Ex ante error costs and dominance

6.74   The abuse of dominance prohibitions apply only to "dominant firms". Throughout the previous sections we have assumed that the firm under investigation had already gained a position of dominance, so that the question was how legal errors affected its behaviour. However, legal errors may also influence the very process by which a dominant position is created.

6.75   Both if a competition authority adopts a rule-based and a standard-based approach, its erroneous decisions will affect the incentive firms have to gain a dominant position or, in more economic terms, to gain considerable market power. In economic theory market power means any situation in which a firm is not price-taker and faces a downward sloping demand curve; that is, any situation in which there is a departure from perfect competition. In most markets firms will have some degree of market power and competition law is not concerned with all such situations. Only a substantial degree of market power can trigger the action of a competition authority.

6.76   The probability of false convictions and the probability of false acquittals obviously bear differently on the incentives firms have to acquire a significant degree of market power. False convictions make dominant firms vulnerable to the application of competition law and at a risk of receiving sanctions, even if they do not abuse their market power. On the contrary, false acquittals make the acquisition of a dominant position more desirable as a dominant firm has a greater chance to get away with unlawful conducts.

6.77   Therefore the impact of erroneous decisions on social welfare, in an *ex ante* perspective depends not only on how they affect the decisions that dominant firms have to make with respect to some socially efficient or inefficient conducts that may be misjudged by a competition authority,

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[100] In the absence of this information we can follow the *Principle of Insufficient Reason* that yields the same outcome, i.e. symmetry.

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but also on how they affect the decisions any firm makes with the aim of obtaining a dominant position in the first place.

6.78 The costs of errors are related to the way they shape firms' incentives to obtain market power and depend on the source of the dominant position. Firms can obtain a stronghold on a market either by means of innovative and efficient strategies or through rent-seeking activities, such as lobbying for the introduction of barrier to entry[101]. While the former activities increase social welfare, the latter ones add welfare losses to those that may derive from the exercise of market power.

6.79 It follows that erroneous antitrust decisions may have drastically different consequences on social welfare depending on whether the degree of market power enjoyed by the firm under investigation stems from more efficient conducts or from rent-seeking activities. The *ex ante* cost of false convictions can be very burdensome if the economy is characterized by rapid technological change and firms strive to become dominant through innovation and efficiencies. On the contrary, if in the economy the prevalent means used by firms to achieve dominance is the adoption of rent-seeking activities, then it would be less costly to be very strict in the application of the abuse of dominance prohibitions, even if this implies allowing more false convictions to occur.

6.80 The reverse holds with respect to false acquittals. A lenient approach in the application of the abuse of dominance prohibitions, that increases the rate of occurrence of such errors, is less costly in dynamic economies; whereas, if market power is generated by rent-seeking behaviours, a lenient policy will ultimately encourage other firms to replicate these conducts, thus producing wasteful competition for monopoly rents.

Conclusions

6.81 The enforcement of competition law is primarily a matter of deterrence. Its objective is not to determine how markets should develop, nor which conducts firms should adopt, rather competition law enforcement is chiefly concerned with providing firms with the incentives to avoid welfare reducing conducts. This raises the issue of what are the costs associated to firms internalizing incorrect signals because of erroneous interventions, or non-interventions, by the competition authorities.

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[101] For example, a firm that is well established in the market for which a license is necessary may lobby the government for the introduction of stricter conditions for issuing new licenses or for higher prices for these licenses so as to limit entry.

6.82   Drawing upon the literature on the public enforcement of law we have seen that the *ex ante* cost associated with the probability of flawed decisions is under-deterrence, i.e. reduced compliance with the law. If competition authorities make mistakes in judging potentially abusive conducts, both types of errors have the effect of making the alternative of violating the law relatively more attractive.

6.83   We have investigated whether there are reasons to believe that there are asymmetries in the costs of the two possible types of errors such that one type of error may weigh more than the other. This analysis has been conducted having regard to distinction between rules and standards made in Chapter 5. We have found that the claims, made in some of the literature, that false convictions have a greater welfare-decreasing effect do not appear sufficiently grounded both when the competition authority follows a rule and when the competition authority adopts a standard. In our opinion the only difference in the costs of the two types of errors stems from the higher probability that some conducts normally investigated by competition authorities are competitive rather that abusive.

6.84   Lastly, we have looked at the way erroneous antitrust decisions impact on the creation of dominant positions. We found that the relative *ex ante* cost of antitrust errors depends on the prevalent source of market power. False convictions are costlier in dynamic markets where firms achieve a dominant position mainly through the adoption of innovative and efficient conducts. The same type of error is much less costly in those markets with heavy-handed regulations that make rent-seeking a suitable means to gain privileged positions and market power. The opposite is true with the other type of error.

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