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## Is it Worth all the Trouble? The Costs and Benefits of Antitrust Enforcement

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The Costs and Benefits  
of Antitrust Enforcement**

Kai Hüschelrath

**ZEW**

Zentrum für Europäische  
Wirtschaftsforschung GmbH

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### **Non-technical summary**

There is no significant doubt among economists that competition policy has established itself in most industrialised countries as an integral part of public policy that contributes substantially to the improvement of the wealth of nations. However, the follow-up question of how substantial these benefits of competition policy have been (compared to the costs), has not yet attracted huge research input by economists. This “state of the art” is unfortunate as, for instance, competition authorities have to justify their budgets (or requests for budget increases) and might find it helpful to show the significance of their work. Furthermore, economists also benefit from showing to what extent society benefits from their public policy recommendations.

Against this background, the paper aims at assessing the costs and benefits of antitrust enforcement. The analysis starts with an investigation of why competition is typically worth protecting followed by a collection of empirical evidence which shows that competition actually needs protection by antitrust policy in order to hinder firms to permanently abuse market power to the detriment of consumers.

Subsequently, an estimation of the costs and benefits of antitrust enforcement is undertaken for the United States and the Netherlands. The analysis differentiates between an aggregate level approach which basically focuses on deadweight losses and a disaggregate level approach which estimates the benefits of antitrust enforcement in particular antitrust cases and compares these figures with estimates of the costs of antitrust enforcement. The results basically show for the United States and the Netherlands that the realised benefits overtop the realised costs by far as long as overcharges/redistribution effects and deadweight losses are considered as welfare loss. However, if only the avoidance of deadweight losses is considered as benefit of antitrust policy, the benefits estimate for cartel and merger enforcement under a disaggregate approach cannot cover the derived cost estimate for the United States and the Netherlands.

## **Nichttechnische Zusammenfassung**

Unter Ökonomen bestehen keine nennenswerten Zweifel darüber, dass sich die Wettbewerbspolitik in den meisten industrialisierten Staaten als ein integraler Bestandteil der Wirtschaftspolitik etabliert hat der substantiell zum Wohlstand der Nationen beiträgt. Die sich unmittelbar anschließende Frage, in welcher Höhe dieser Wohlfahrtsbeitrag von Wettbewerbspolitik angesetzt werden kann (verglichen mit den entstehenden Kosten) hat bislang noch keinen größeren Einsatz von Forschungsressourcen erfahren. Dieser Zustand muss als bedauerlich bezeichnet werden, da beispielsweise Wettbewerbsbehörden ihre Budgets (sowie auch Forderungen nach Budgeterhöhungen) zu rechtfertigen haben und es im Rahmen dessen hilfreich sein kann, den Wohlfahrtsbeitrag ihrer Tätigkeiten verdeutlichen zu können. Darüber hinaus können auch die Ökonomen selbst von Studien profitieren, die Anhaltspunkte darüber geben, zu welchem Grad die Gesellschaft von ihren wirtschaftspolitischen Empfehlungen profitiert oder profitieren könnte.

Vor diesem Hintergrund verfolgt das Arbeitspapier das Ziel, die Kosten und den Nutzen der Durchsetzung von Wettbewerbsrecht abzuschätzen. Die Untersuchung startet mit einer Behandlung der Fragestellung, weshalb Wettbewerb typischerweise schützenswert ist, gefolgt von einer Sammlung von empirischen Indizien, die untermauern, dass Wettbewerb des Schutzes durch Wettbewerbspolitik bedarf um Unternehmen daran zu hindern, ihre Marktmacht dauerhaft auf Kosten der Konsumenten zu missbrauchen.

Im Anschluss daran wird eine Abschätzung der konkreten Kosten und Nutzen der Durchsetzung von Wettbewerbsrecht versucht und zwar sowohl für die Vereinigten Staaten von Amerika als auch für die Niederlande. Die Untersuchung unterscheidet zwischen einem aggregierten Niveau, das sich im Wesentlichen auf die Abschätzung der Netto-Wohlfahrtsverluste (der sogenannten ‚deadweight losses‘) konzentriert und einem disaggregierten Niveau, das eine Abschätzung der Wohlfahrtseffekte abgegrenzter wettbewerbspolitischer Fälle versucht. Beide Arten der Abschätzung von Wohlfahrtseffekten werden in Beziehung gesetzt zu einer Abschätzung der durch Wettbewerbspolitik entstehenden Kosten in den beiden Ländern. Die Ergebnisse zeigen für die Vereinigten Staaten wie auch für die Niederlande, dass die realisierten Nutzen die entstehenden Kosten klar überragen solange nicht nur die Netto-Wohlfahrtsverluste, sondern auch die Umverteilungseffekte Eingang in Quantifizierung finden. Wird der Nutzen von Wettbewerbspolitik aber lediglich in der Reduzierung der Netto-Wohlfahrtsverluste gesehen, so zeigen die Ergebnisse, dass der durch die Kartellverfolgung und die Fusionskontrolle realisierte Nutzen die entstehenden Kosten weder in den Vereinigten Staaten noch in den Niederlanden decken kann.

***IS IT WORTH ALL THE TROUBLE? -  
THE COSTS AND BENEFITS OF  
ANTITRUST ENFORCEMENT***

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**Abstract** The paper aims at assessing the costs and benefits of antitrust enforcement. The analysis starts with an investigation of why competition is typically worth protecting followed by a collection of empirical evidence which shows that competition actually needs protection by antitrust policy in order to hinder firms to permanently abuse market power to the detriment of consumers. Subsequently, an estimation of the costs and benefits of antitrust enforcement is undertaken for the United States and the Netherlands. The analysis differentiates between an aggregate level approach which basically focuses on deadweight losses and a disaggregate level approach which estimates the benefits of antitrust enforcement in particular antitrust cases and compares these figures with estimates of the costs of antitrust enforcement. The results basically show for the United States and the Netherlands that the realised benefits overtop the realised costs by far as long as overcharges/redistribution effects and deadweight losses are considered as welfare loss. However, if only the avoidance of deadweight losses is considered as benefit of antitrust policy, the benefits estimate for cartel and merger enforcement under a disaggregate approach cannot cover the derived cost estimate for the United States and the Netherlands.

**Keywords** Antitrust policy, antitrust enforcement, cost-benefit analysis

**JEL Classification** L40, L49, K21

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## 1 Introduction

Among the few things most economists would agree on is the social desirability of competition. Given the extensive theoretical and empirical economic research that has been able to prove a positive, strong and stable relationship between the degree of competition in a market, an industry or an economy and the correspondingly realised degrees of allocative, productive, transactional and dynamic efficiency, it is extremely difficult to find convincing arguments for alternative views. However, the finding that competition is typically worth protecting is only a necessary but not sufficient condition to justify a need for some kind of antitrust policy. And indeed, different schools of thought came to quite different answers with respect to the question if protection - and what kind of protection of competition - is needed. The spectrum reaches from laissez-faire approaches with no or only skeletal antitrust rules up to quite interfering approaches which plan to create an optimal competition intensity.

Antitrust policy, as opposed to regulation, is applied in markets in which the competitive process is in principle viable, and only occasionally endangered by actions of individual firms or groups of firms. Therefore, in the words of Geroski (2004: 4), antitrust policy only "... swings into operation when serious, egregious problems are believed to exist". Although most economists would probably still agree on the desirability of these 'selective and episodic swings' in an artificial world of perfect information, a considerable group of scholars becomes sceptical about how to decide 'when to swing' as well as 'the accuracy of the swings' in a world of imperfect and incomplete information in which the antitrust authority has to judge on complex forms of business behaviour in complex markets with a multitude of knock-on effects. Especially in such environments, it is believed that market forces (at least in the long run) will 'automatically' select the most efficient firms and lead to efficient market outcomes. Antitrust interventions, on the other hand, are believed to do more harm than good, especially because "... economists ... have not reached a consensus about the ultimate effects of various business practices ... [I]t seems likely that well-intentioned prosecutors and judges face .. some difficulty in distinguishing good from bad business practices" (Bittlingmayer, 1996: 371).

Against this background, the paper aims at assessing the costs and benefits of antitrust enforcement. The analysis starts with an investigation of why competition is typically worth protecting followed by a collection of empirical evidence which shows that competition actually needs protection by antitrust policy in order to hinder firms to permanently abuse market power to the detriment of consumers. Subsequently, an estimation of the costs and benefits of antitrust enforcement is undertaken for the United States and the Netherlands. The analysis differentiates between an aggregate level approach which basically focuses on deadweight losses (for industries or even economies) and a disaggregate level approach which estimates the benefits of antitrust enforcement in particular antitrust cases and compares these figures with estimates of the costs of antitrust enforcement. In particular, the lysine cartel case in the United States and the Nuon-Reliant merger

case in the Netherlands are taken to estimate these disaggregated benefits of antitrust enforcement. While the former case allows an estimation of the aggregated benefits via so-called ‘but-for’ prices, the later case uses merger simulation results to derive reasonable estimates of the post-merger prices that would have existed absent of the remedies which were imposed. The paper concludes with a roundup of the key empirical results.

## 2 Competition is worth protecting

Economists and philosophers have both studied competition and the benefits of competition in a multitude of ways. Notwithstanding the potential relevance of any of these efforts - some of which having been very influential, such as Adam Smith’s “invisible hand” or Friedrich August von Hayek’s “competition as a discovery procedure” - the most fundamental result of all these research efforts is probably the insight that competitive markets allocate resources efficiently because they provide products to all customers willing to pay the opportunity cost of production (see, for example, Debreu, 1959).

*Market power* is generally defined as deviation from this competitive benchmark. If a company can profitably raise and maintain a price above its marginal cost (i.e., the market price under perfect competition), then it possesses some degree of market power. The degree of market power is maximised in a monopoly, as the company can set the profit-maximising market price absent of other firms.<sup>1</sup> Although both monopoly and perfect competition are typically artificial constructs, a comparison of both extremes is a fruitful way to derive an upper bound for the benefits of competition.

From a static perspective, the presence of monopoly leads to a welfare loss that results from the absence of customers who derive a value that is lower than the price of the product but greater than the marginal cost of production (see Chart 1a in Fig. 1 below). The size of the welfare loss can be expressed as a function of the price-cost margin, industry revenue (a measure for market size) and the industry elasticity of demand:

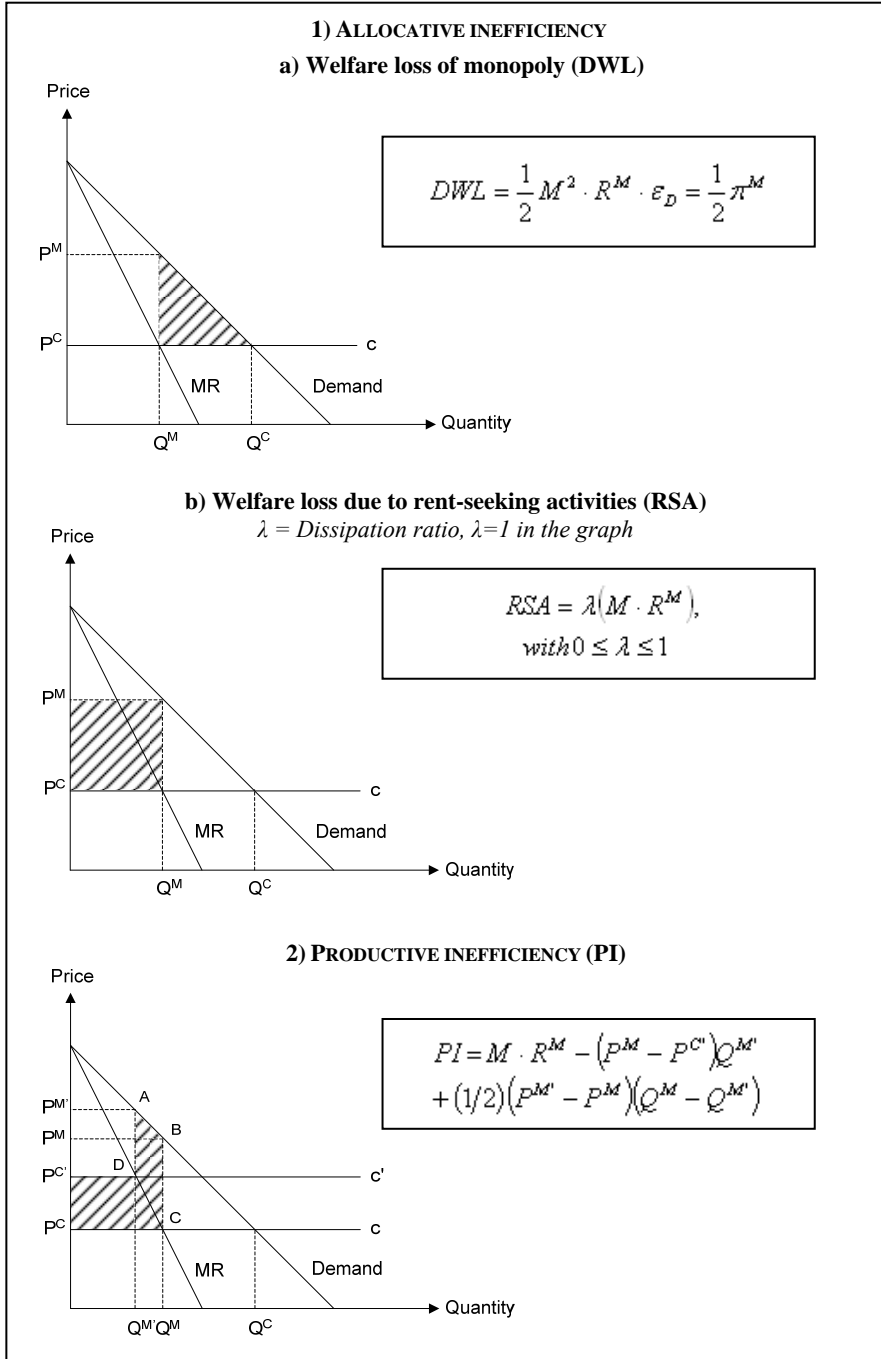
$$DWL = \frac{1}{2} M^2 \cdot R^M \cdot \varepsilon_D. \quad (1)$$

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<sup>1</sup> Although monopolists do not face constraints of direct competitors in their price-quantity decision, they cannot act independently. They maximise profits subject to demand conditions.



**Fig. 1.** Inefficiencies caused by the exercise of market power



Harberger (1954) undertook one of the first attempts to estimate the deadweight loss for 73 US manufacturing industries from 1924 to 1928. His estimations, based on Equation (1) above, led to a monopoly welfare loss of around 0,1%<sup>2</sup> of the Gross Domestic Product (GDP). Surprised by this (seemingly) small size of the welfare loss, Harberger concluded that “we can neglect monopoly elements and still gain a very good understanding of how our economic process works” (Harberger, 1954: 87). In response to Harberger’s analysis and conclusion, economists undertook numerous attempts to recalculate the welfare triangle loss by replacing some of his oversimplifying assumptions and/or using different data sets (see, for example, Schwartzman, 1960; Kamerschen, 1960). Furthermore, scholars increasingly investigated the follow-up question, “If the conventional loss is so small, are there other, more significant losses?” (Farrell, 1983: 1).

One possible additional loss of monopoly was traced out by Tullock (1967). He pointed out that if firms compete to gain and to preserve market power, these resources diverted to unproductive activities must be added to the welfare loss of monopoly, and the overall loss therefore has the geometrical form of a trapezoid rather than a triangle. Referring to Chart 1b) in Figure 1 above, the additional welfare loss due to so-called rent-seeking activities is determined by the dissipation ratio  $\lambda$  (i.e., the percentage of the total rent dissipated by rent-seeking activities), the price-cost margin  $M$  and the monopoly revenue  $R^M$ .<sup>3</sup>

$$RSA = \lambda(M \cdot R^M) \text{ with } 0 \leq \lambda \leq 1. \quad (2)$$

Although rent-seeking expenses are typically viewed as a welfare loss of monopoly, Neumann (2000: 107) points out that such a classification of rent-seeking activities already involves a value judgment. This is because the expenses

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<sup>2</sup> Please note that in order to comply with the graphs, which were created with German-language software packages, the comma is used in place of the decimal point (i.e., 2,0% instead of 2.0%) and the full stop in place of a comma (i.e., 5.000€ instead of 5,000€).

<sup>3</sup> Tullock (1980) himself studied the determinants of the size of the dissipation ratio. He shows in a basic rent-seeking game that the expenditure on rent-seeking  $\kappa$  by each of the  $n$  individual rent seekers is given by  $\kappa = \frac{1}{n-1/n^2} (M \cdot R^M)$ . This means that if the rent to win (i.e., the monopoly profit) is given by 50 and there are 7 firms in the contest, each firm will spend about 6,12 in the contest. This would lead to an overall investment in the contest of  $7 \cdot 6,12 = 42,84$  and a dissipation ratio of  $(42,84/50) = 85,7\%$ . Hazlett and Michaels (1993) studied lotteries conducted by the US Federal Communications Commission to award cellular telephone licenses. There were 643 licenses available, and almost everybody was (seemingly) allowed to participate in the lottery (i.e., no barriers to entry were initially noticed). In such an environment, Hazlett and Michaels would have expected total rent dissipation (as  $n$  is large, in fact about 320.000). However, their empirical results show that overall costs were \$325 million, while the rents were estimated to about \$611 million, leading to an (average) dissipation ratio of about 0,53. Hazlett and Michaels explain this result with the existence of entry barriers in the application process (such as a factual entry fee of nearly \$3.500 per application due to general fees and attorney fees).

for rent-seeking activities are not lost surplus (as the deadweight loss discussed above) but rather income of other individuals and therefore not a loss of total welfare. Therefore, the classification of rent-seeking activities as welfare loss is dependent on a value judgment that these expenses and the resulting incomes are of lower value than other incomes.

Posner (1975) was one of the first scholars who actually incorporated rent-seeking into a measure of *overall* welfare loss due to monopoly power. He studied the relative size of the deadweight loss and the resources wasted on competition to acquire and maintain monopoly profits and showed that the deadweight loss *DWL* relative to the rent-seeking loss *RSA* is given by

$$\frac{DWL}{RSA} = \frac{U^C}{2(1/\varepsilon_D - U^C)}, \quad (3)$$

with  $U^C = \Delta P/P^C$  (price-cost markup). Equation (3) shows that the RSA is large relative to the DWL when  $U^C$  is small. For instance, if  $\varepsilon_D = 1$  and the price-cost markup is given by 0,2, the loss due to rent-seeking activities is about eight times larger than the deadweight loss. Using Harberger's data as well as his estimate of the DWL, Posner estimated that, while the deadweight loss is 0,1% of GDP, rent-seeking activities account for about 3,3% of GDP, leading to an aggregated welfare loss due to monopoly of about 3,4% of GDP for the United States.

Cowling and Mueller (1978) also extended Harberger's work by changing several assumptions. For instance, instead of using unity elasticity, they applied the (inverse) Lerner index  $(P^M/(P^M - MC)) = \varepsilon$  and showed that the deadweight loss is then equal to half of the monopoly profits:<sup>4</sup>

$$DWL = \frac{1}{2} M \cdot R^M = \frac{1}{2} (P^M - MC) Q^M = \frac{1}{2} \pi^M. \quad (4)$$

By using this estimate, Cowling and Mueller avoided using separate estimates of the price markup and the demand elasticity (and therefore considered the interdependence of the observed price-cost ratios and of the value of the elasticity of demand; see, for example, Clarke, 1985: 234). Furthermore, Cowling and Mueller also incorporated the cost of reaching and maintaining a monopoly by extending their study with several combined measures of deadweight loss and advertising expenses (as a measure for rent-seeking activities; see Table 1 below for an overview of their measures). Their results show, depending on the used measure, aggregated welfare losses ranging from 3,96% to 13,14% for the United States and ranging from 3,86% to 7,20% of the Gross Corporate Product (GCP) or equivalent for the United Kingdom. An overview of influential studies on monopoly welfare losses is presented in Table 1 below.

Masson and Shaanan (1984) present a methodology for estimating welfare losses caused by market power which departs from the studies discussed thus far, because they explicitly take different levels of market power into account. The authors provide estimates for the actual social costs arising from existing market

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<sup>4</sup> Cowling and Mueller's results, however, hold only in the absence of fixed costs.

structures as well as the expected monopoly social costs that would occur if there were no competition. They define the difference between actual and monopoly welfare losses as the *value of competition* in existing markets. Masson and Shaanan find that the actual *oligopoly* deadweight loss averages 2,9% of the value of shipments for a sample of 37 US manufacturing industries from 1950 to 1966. Furthermore, they estimate a potential (average) monopoly deadweight loss of 11,6%, leading to a value of competition of 8,7%.

**Table 1.** Monopoly welfare loss estimates

Study	Country	Measure	Welfare loss	Scope	Assumptions / Remarks
STUDIES FOCUSING SOLELY ON DEADWEIGHT LOSS					
Harberger (1954)	US	$0,5 * M^2 * R^M * \epsilon_D$	0,1	2.046 firms in 73 US manufacturing industries from 1924 to 1928;	Unity elasticity, competitive rates of return given by average rate of return in sample
Schwartzman (1960)	US	$0,5 * (P^M - P^C) * z \pi$	<0,1	Sample of Canadian and US industries in 1954	Used direct price-cost margins data; allowed elasticities up to 2
Kamerschen (1960)	CAN	Similar to Harberger	1,9	US industry from 1956/7 to 1960/1	Inclusion of other non-manufacturing and non-corporate sectors
Worcester (1973)	US	General equilibrium model of welfare loss	0,43-0,73	Data on 500 largest industrial individual firms from 1956 to 1969	Used firm-level instead of industry-level data
STUDIES FOCUSING ON DEADWEIGHT LOSS AND RENT-SEEKING EXPENSES					
Posner (1975)	US	$DWL/RSA = (U^C / (2(1/\epsilon_D - U^C)))$	3,4	Uses Harberger data	Assumed that resources committed to rent-seeking equal revenues obtainable
Cowling/Mueller (1978)	US	$\pi/2$	3,96	734 large US firms from 1963 to 1969	Used half monopoly profit rather than separate estimates for price-cost margins and elasticities; used independent estimate of the competitive rate of return; used firm-level monopoly profits; used advertising as estimates of rent-seeking expenditures
	US	$(\pi+A)/2$	6,52		
	US	$A+(\pi+A)/2$	12,27		
Cowling/Mueller (1978)	US	$\pi'+A+(\pi+A)/2$	13,14	Largest 103 UK firms from 1968 to 1969	
	UK	$\pi/2$	3,86		
	UK	$(\pi+A)/2$	4,36		
	UK	$A+(\pi+A)/2$	5,39		
	UK	$\pi'+A+(\pi+A)/2$	7,20		

Welfare loss is in % of GNP or equivalent; C&M use gross corporate product;  $z$  is arc elasticity of demand;  $A$  is advertising; and  $\pi$  and  $\pi'$  are pre- and post-tax profits (see Clarke 1985: 235).

Davies and Majumdar (2002: 30ff.) express their concern about the general value of measuring deadweight losses of monopoly for large parts of economies basically due to the oversimplifications which are necessary for such a quantification (such as an average demand elasticity and an average price-cost margin for large parts of an economy). However, in aiming at showing the sensitivity of such models, they adopt the methodology of Cowling and Mueller (1978) and apply the well-known relationship in a homogenous Cournot model that the price-cost margin equals the Herfindahl-Hirschman concentration index divided by the market demand elasticity. Making use of this relationship by inserting it into the general deadweight loss formula derived above leads to the following estimate for the deadweight loss:

$$DWL = \frac{1}{2} HHI \cdot M \cdot R^M . \quad (5)$$

As Equation (5) shows, the DWL now depends on a measure of market concentration, namely the Herfindahl-Hirschman Index, which is somehow easier to estimate than market demand elasticity (as a lot of countries have statistics at least for the major industries). In the following, Davies and Majumdar (2002: 31) attempt to calibrate Equation (5) for the UK. For the average price-cost margin, they decide to use a value of 0,1 as a defensive estimate, compared to a value of 0,08 used by Cowling and Mueller and a broader survey by Scherer and Ross (1990), which found price-cost margins between 0,1 and 0,2. In terms of HHI, they assume a value of 0,1 (in a properly defined market), largely based on rough approximations due to the fact that the UK only publishes data on concentration ratios.<sup>5</sup> Inserting the  $M$  and  $HHI$  values in Equation (5) leads to an aggregated welfare loss of 0,5% of GDP.

A third kind of possible loss due to monopoly is the loss in productive efficiency if a monopoly slacks off and prefers “the quiet life” to profit maximisation. As shown in Chart 2) in Figure 1 above, such inefficiencies lead to a higher marginal cost level and a corresponding welfare loss given by<sup>6</sup>

$$PI = M \cdot R^M - (P^M - P^{C'}) Q^{M'} + \frac{1}{2} (P^{M'} - P^M) (Q^M - Q^{M'}) . \quad (6)$$

At first glance, it seems implausible why the shareholders of a monopoly firm would be less willing to keep costs down (and let slacking happen) than those of a competitive firm (see Rasmusen, 2000: pt. VII, no. 33). To the question “Why

<sup>5</sup> For the United States, data on the Herfindahl-Hirschman Indices for 443 US manufacturing industries (four-digit SIC) for the year 1992 is available (see [www.census.gov/epcd/www/concentration.html](http://www.census.gov/epcd/www/concentration.html)). The average HHI for the US for these industries in 1992 can be calculated to 725,49.

<sup>6</sup> In the same way as explained for the case of rent-seeking activities, a value judgment stating that society values the distribution of pecuniary and non-pecuniary rents in a quiet-life monopoly state less than the results that competition would bring is needed in order to interpret the entire hatched area in Fig. 1-2) as a welfare loss due to monopoly (see also Neumann, 2000: 107).

would a monopolist spare efforts to reduce costs when it stands to reap all the incremental profits arising from the cost reduction (i.e., when it does not have to worry about the incremental profits being competed away)?” (Chen and Chen, 2005: 25), Farrell (1983) provides an intuitive explanation based on the separation of ownership and control. In a world of imperfect information, managers find it costly to search for better techniques. The firm itself cannot reliably tell when the manager is searching, and so cannot reimburse him for these costs. The firm also cannot reliably tell by results whether or not the manager has been diligent partly due to missing comparator firms. The best the shareholders can do is to provide a contract with some incentive to increase profits; however, the manager's risk aversion limits the effectiveness of such contracts.<sup>7</sup> According to Farrell (1983: 1), “[t]he inefficiency which results is ameliorated if more information becomes available about the manager's activities; and, if there is a competing firm, the market interaction may convey such information”.<sup>8</sup>

Empirical evidence on productive inefficiencies is diverse but still fragmentary (see Davies and Majumdar, 2002: 35ff.). In probably the most influential paper, Nickell (1996) investigates the question whether competition improves corporate performance. His results based on an analysis of 670 UK companies largely support this view. Nickell finds that market power - captured by market share - generates reduced levels of productivity. More importantly, he presents evidence that competition is associated with a significantly higher rate of total factor productivity growth. Furthermore, a study by Jenny and Weber (1983) derive an estimate for productive inefficiencies in France of 5,18% of GDP for the years 1971 to 1974. Additionally, Ahn (2002: 53ff.) provides an overview of the main methods and main findings of further studies on the competition-productivity relationship in certain sectors or industries (see especially Bailey, 1993; Baily and Gersbach, 1995; Zitzewitz, 2003; Disney et al., 2000). The results mostly show that increases in product market competition led to increases in the overall levels of productive efficiency. In line with these findings, Scherer and Ross (1990: 672) conclude their survey on productive inefficiencies by expressing their belief that productive inefficiencies are “at least as large as the welfare losses from resource misallocation.”

An alternative to the study of the general relationships between competition and productivity across different product markets is an analysis of recently liberalised sectors. In such environments, economic theory would expect significant productivity improvements after deregulation due to the inefficiencies typically caused by economically largely obsolete regulation schemes (see OFT, 2007).

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<sup>7</sup> Nalebuff and Stiglitz (1983: 281) argue in a comparable way by focusing on principal-agent problems and conclude that monopoly does not cause productive efficiency losses in an owner-managed firm.

<sup>8</sup> As discussed in more detail in McAfee and McMillan (1996: 263ff.), “revealing hidden information” is an important characteristic of competition from a game-theoretical point of view. Other important characteristics include: “competition works better than bargaining”, “competition creates effort incentives” and “competition mechanisms are robust”.

Certainly, the almost unanimous result of studies by Maher and Wise (2005), Ehrlich et al. (1994), Pilat (1996) and Griffith and Harrison (2004) is that deregulation in such industries as electricity, gas, water, airlines and road freight led to substantial increases in total factor productivity growth. An overview of the results of several studies focusing on improvements in productive efficiency (as well as consumer welfare) after regulatory reforms in the United States is presented in Table 2.

**Table 2.** Improvements in productive efficiency and consumer welfare after regulatory reforms in the United States

Industry	Studies	Improvements in productive efficiency	Improvements in consumer welfare
Airlines	Morrison and Winston (1998)	Average industry load factors have increased from roughly 52% the decade preceding deregulation to roughly 62% since deregulation. Real costs per revenue ton-mile have declined at least 25% since deregulation. Industry profits have been very volatile during deregulation, although higher, on average, than they would have been under regulation.	Average fares are roughly 33% lower in real terms since deregulation, and service frequency has improved significantly.
Less-than-truckload trucking	Corsi (1996a)	Carriers have substantially reduced their empty miles since deregulation. Real operating costs per vehicle mile have fallen 35%, but operating profits are slightly lower than they would have been under regulation.	Average rates per vehicle mile have declined at least 35% in real terms since deregulation, and service times have improved significantly.
Truckload trucking	Corsi (1996b)	Carriers have substantially reduced their empty miles since deregulation. Real operating costs per vehicle mile have fallen at least 75%, but operating profits are slightly lower than they would have been under regulation.	Average rates per vehicle mile have declined at least 75% in real terms since deregulation, and, because of the emergence of advanced truckload carriers, service times have also improved significantly.
Railroads	Winston et al. (1990)	Railroads have abandoned one-third of their track miles since deregulation. Real operating costs per ton-mile have fallen 60%, and rail profits are much higher than they would have been under regulation.	Average rates per ton mile have declined more than 50% in real terms since deregulation, average transit time has fallen at least 20%, and the standard deviation of transit time has fallen even more than 20%.



Banking	Berger et al. (1995)	The real cost of an electronic deposit has fallen 80% since deregulation. Operating costs have declined 8% in the long run because of branch deregulation. Recent industry returns on equity exceed those just before deregulation.	Consumers have benefited from higher interest rates, better opportunities to manage risk, and more banking offices and automated teller machines.
Natural Gas	Henning et al. (1995); Costello and Duann (1996); Crandall and Ellig (1997)	Pipeline capacity has been much more efficiently utilised during peak and off-peak periods since deregulation. Real operating and maintenance expenses in transmission and distribution have fallen roughly 35%.	Average prices for residential customers have declined at least 30% in real terms since deregulation, and average prices for commercial and industrial customers have declined even more than 30%. In addition, service has been more reliable as shortages have been almost completely eliminated.

Source: Winston (1998)

In addition to the described efforts to estimate the *true* welfare losses due to monopoly<sup>9</sup>, some scholars argue that the economic impact of even small welfare losses can be substantially larger if other factors are taken into account. Dickson (1982), for instance, shows that a small welfare loss in a monopolised market can cause multiple damages if the transmission of monopoly distortions through successive vertical stages is considered. Neumann (1999) contributes to the discussion by adding the intertemporal dimension. He uses a simple growth model to estimate the effect of a static welfare loss due to monopoly on the growth rate of the GDP and indeed finds that the long-run welfare loss due to monopoly typically dwarfs the static loss analysed above.<sup>10</sup> Kwoka (2003: 11) remarks that it is not the average deadweight loss (derived by an average demand elasticity and an average price-cost margin for large parts of an economy) that matters but rather its distribution. Losses are greater in several industries where competition does not reign, and the deadweight losses can be quite substantial in these industries (although relatively low on average).

Although the analysis thus far has drawn a solely negative picture of monopoly with respect to its (static) welfare effects, economic analysis has shown that this is not generally the case. Economies of scale, for example, are one prominent reason why a monopolistic market structure might occasionally be socially desirable. On

<sup>9</sup> The maximum welfare loss due to monopoly is given by  $(1/2)(P^{M'} - P^C)(Q^C + Q^{M'})$ .

<sup>10</sup> In a simplified example, Neumann (2000: 110f.) shows for a fixed interest rate and potential growth rate that a static welfare loss of 0,1% (the Harberger estimate) would lead to a yearly welfare loss of about 1%. A static welfare loss of 3% (one of the Cowling and Mueller estimates) would lead to a long-term welfare loss of about 26% per year.

the supply side, economies of scale can lead to situations in which a monopoly is able to supply the entire market at a lower unit cost than two or more firms. Technically, such *natural monopolies* exist if the demand curve intersects the average cost curve in its downward-sloping or subadditive part. On the demand side, economies of scale are reflected in the so-called network effects:<sup>11</sup> As the value of a network for an individual increases with the number of users,<sup>12</sup> the overall value is maximised in a monopoly network and a fragmentation would lead to consumer welfare losses.

In addition to a discussion of the largely static concepts of allocative and productive efficiency, a fundamental benefit of competition is seen in its ability to meet customer requirements *dynamically* and to ensure that old inferior products are replaced by superior new products. As stated by Kolasky and Dick (2002:6), “Dynamic efficiency arises from market processes that encourage innovation to lower costs and develop new and improved products. Whereas allocative and productive efficiency can be viewed as static criteria - holding society’s technological know-how constant - a more dynamic view of efficiency examines the conditions under which technological know-how and the set of feasible products optimally can be expanded over time through means such as learning by doing, research and development, and entrepreneurial creativity”.

From such a dynamic point of view, it has been discussed extensively in the economic literature whether market power must be seen as an important precondition for technical progress and therefore, to a certain extent, as socially desirable.<sup>13</sup> Notwithstanding the existence of such a trade-off between static and dynamic efficiency, the empirical evidence by the majority shows that monopoly power is more likely to slow down the pace of innovative activity<sup>14</sup> (see, for

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<sup>11</sup> See Farrell and Klemperer (2006: 58f.) for a discussion as to why network effects are not always (positive) externalities. Generally, negative externalities (such as pollution caused by a production process) might be another reason to prefer monopoly over competition, simply because a monopoly reduces output and therefore reduces the negative externality. However, it is likely that an optimally regulated market in such a case would reach better performance levels than either monopoly or perfect competition.

<sup>12</sup> If there are  $n$  people in a network and the value of the network to each of them is proportional to the number of other users, then the total value of the network to all the users is proportional to  $n(n-1)=n^2-n$ . For example, a tenfold increase in network size leads to a hundredfold increase in its value. This relationship is known as Metcalfe’s Law (see Shapiro and Varian, 1999: 184). Given the functional form, it is obvious that demand-side economies of scale do not dissipate (as supply-side economies do when the market gets large enough).

<sup>13</sup> See Evans and Schmalensee (2001) and Shapiro and Varian (1999) for overviews and discussions of implications for business strategy and public policy.

<sup>14</sup> From a theoretical perspective, the relationship between market power and process innovations can be characterised by two conflicting effects. The *replacement effect* (Arrow, 1962) speaks for lower innovation incentives for a monopolist compared to a competitive industry (under the assumption that the respective firms are in each case the only firms who could implement the respective process innovation[s]). The basic

example, Weigand, 1996; Audretsch, 1995; Geroski, 1990). However, recent discussions on “very innovative industries” with winner-take-all markets suggest that although these firms might be dominant in their market, they face the constant threat of being replaced by firms seeking to develop better products. Following Schumpeter (1942), these monopolists competed vigorously, not necessarily in the market but for the market (see Veljanovski, 2006: 119f. as well as Geroski (2003) for round-ups). As a consequence, a (temporary) high level of market power in such markets might be socially desirable.

An acknowledgment of the importance of market power in keeping up innovation incentives can be seen in the existence of patent systems. As part of such a system, the state factually grants temporary monopolies to innovative firms in the form of patents. This is seen as a necessary instrument to allow these firms to recoup their investments in research and development by avoiding immediate imitation by rivals. A patent system is therefore a necessary public policy instrument to keep up the innovation incentives for firms and therefore ensure technological progress and economic development.

In addition to allocative, productive and (possibly) dynamic inefficiencies<sup>15</sup>, the distributional effects of market power might be another reason to prefer competition over monopoly. As prices above marginal costs not only lead to net losses in overall welfare but also to a (total welfare-neutral) transfer of consumer surplus into producer surplus, market power also influences the process of wealth creation as well as the distribution of wealth in a society. Comanor and Smiley (1975) investigate the impact of enterprise monopoly profits on the distribution of household wealth in the United States between 1890 and 1962. They basically find that past and current monopoly has had a major impact on the current degree of inequality in the distribution of wealth. Creedy and Dixon (1998) estimated the relative burden of monopoly, measured as the static loss of consumer surplus for different household income levels, and find that the welfare loss associated with monopoly power is higher for low-income households compared with high-

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reason for the lower incentives of the monopolist is that by being innovative he is just replacing an already high (monopoly) revenue stream with a revenue stream that is even a bit higher. The competitive firm, on the other hand, starts from a situation of zero profits and therefore has higher incentives to implement the process innovations. If it is, however, assumed that both the monopolist and a potential rival are able to implement a certain process innovation, the *efficiency effect* shows that a monopolist now has a higher incentive to be innovative than his rival from the competitive industry, because he is in danger of losing his high monopoly excess profits in case the rival firm implements the process innovation (Schumpeter, 1942).

<sup>15</sup> A fourth efficiency type which might be distorted by the presence of market power is the *transactional efficiency*. “The basic insight offered by the school of thought known as ‘transaction cost economics’ is that market participants design business practices, contracts, and organisational forms to minimise transaction costs and, in particular, to mitigate information costs and reduce their exposure to opportunistic behavior or ‘hold-ups’ ... transactional efficiencies frequently facilitate firms’ efforts to achieve allocative, productive, and dynamic efficiencies” (Kolasky and Dick, 2003: 249).

income households. However, as Martin (1994: 38) has pointed out, the decision whether this is considered a problem from a social point of view is a matter of politics rather than economics.

In a nutshell, this section has characterised several important economic arguments why monopolies are typically inferior to competition from a total welfare point of view. Although the striving for a monopoly position remains probably the most important individual motivation for undertaking business activities<sup>16</sup>, the permanent (ab)use of such a position likely leads to welfare-reducing inefficiencies. Although empirical studies on deadweight and rent-seeking losses show that the performance differential between perfect competition and monopoly can be surprisingly small, a closer interpretation of these results show that the true losses are very likely significantly larger. Therefore, economists might still serve a more useful purpose in fighting monopolies instead of fires or termites.<sup>17</sup>

### 3 Competition needs protection

The finding that competition is typically worth protecting is a necessary but not sufficient condition to justify a need for some kind of competition policy. Although the desirability of competition is probably one of the few things most economists generally agree upon, different schools of thought arrive at quite different answers to the questions of whether protection is needed and what kind of protection is needed. The spectrum reaches from laissez-faire approaches with no or only skeletal antitrust rules to quite interfering approaches, which plan to create an “optimal competition intensity”.

Without wanting to enter into these debates in detail (see, for example, Kovacic and Shapiro, 2000; Mueller, 1996; and van den Berg and Camesasca, 2001, for overviews of the US and the EU antitrust policy history), the basic theoretical justification for some kind of antitrust policy is its potential to reduce the so-called deadweight welfare loss of market power and, consequently, to realise better market performances than without such a policy. If the aim of antitrust policy is simply to promote economic efficiency, then the additional allocative inefficiency caused by productive inefficiencies (trapezoid *ABCD* in Fig. 1-2 above) must be

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<sup>16</sup> The importance of (temporary) market power as a key element in market systems is expressed in great clarity by Justice Antonin Scalia in the US Supreme Court’s *Trinko* (2004) decision: “The mere possession of monopoly power, and the concomitant charging of monopoly prices, is not only not unlawful; it is an important element of the free-market system. The opportunity to charge monopoly prices at least for a short period is what attracts business acumen in the first place; it induces risk taking that produces innovation and economic growth. To safeguard the incentive to innovate, the possession of monopoly power will not be found unlawful unless it is accompanied by an element of anticompetitive conduct” (*Verizon Communications v. Law Offices of Curtis V. Trinko LLP*, 540 U.S. 398, U.S., 2004).

<sup>17</sup> The original quote stems from George Stigler (1966).

added to the deadweight loss to trace out the overall potential of antitrust policy to improve total welfare. The inclusion of rent-seeking activities and the fraction of productive inefficiencies without allocative distortions is only feasible if the underlying aims of competition policy are changed (for example, by adopting a consumer surplus standard) or extended (for example, by including the aim of promoting a fair income distribution).<sup>18</sup>

Antitrust policy, as opposed to regulation, is applied in markets in which the competitive process is in principle viable, and only occasionally endangered by actions of individual firms or groups of firms. Therefore, in the words of Geroski (2004: 4), competition policy only “swings into operation when serious, egregious problems are believed to exist”. Although most economists would probably still agree on the desirability of these selective and episodic swings in an artificial world of perfect information, a considerable group of scholars becomes sceptical about how to decide *when* to swing as well as about the accuracy of the swings in a world of imperfect and incomplete information, in which the antitrust authority has to judge on complex forms of business behaviour in complex markets with a multitude of knock-on effects. Especially in such environments, it is believed that market forces (at least in the long run) will automatically select the most efficient firms and lead to efficient market outcomes. Antitrust interventions, on the other hand, are believed to do more harm than good, especially because “economists ... have not reached a consensus about the ultimate effects of various business practices ... [I]t seems likely that well-intentioned prosecutors and judges face ... some difficulty in distinguishing good from bad business practices” (Bittlingmayer, 1996: 371).

The so-called private interest theories of regulation (and antitrust) even go one step further and question the general existence of well-intentioned prosecutors. These theories are based on the disbelief that the responsible individuals really base their decisions on the public aim of promoting economic efficiency. Stigler (1971), for instance, argues that enforcers - as well as politicians - will get captured by interest groups, and that these groups will use their regulatory and coercive powers to shape laws and regulations in a way that is beneficial to them (see Hüscherlath, 2005: 192ff., for a general description of these theories in a regulatory context). These public versus private-interest explanations for the development and persistence of antitrust law and enforcement are investigated back to the passing of the Sherman Act in the United States in 1890<sup>19</sup> (see Box 1 below for an overview as well as Rowley and Rathbone, 2004, for a survey).

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<sup>18</sup> The economic literature discusses a multitude of aims of competition policy. Motta (2004: 177ff.), for instance, discusses welfare, consumer welfare, defense of smaller firms, promoting market integration, economic freedom, fighting inflation, fairness and equity, as well as other public policy factors effecting competition. See also Furse (1996) for a discussion on different aims of competition policies in the United States, the European Union and the United Kingdom.

<sup>19</sup> Ghosal and Gallo (2001) study the cyclical behaviour of the US Department of Justice’s antitrust enforcement activity between 1955 and 1994. They find that case activity is countercyclical; i.e., in an economic downturn, antitrust enforcement

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**Box 1.** Congressional intent on passing the Sherman Act

The motivations of the US Congress on passing the Sherman Act in 1890 has been the subject of several economic studies (see, for example, DeLorme et al., 1997). In general, two different types of economic explanations are offered. The first type is based on a *public interest theory* of antitrust and assumes that government interventions are motivated by correcting market inefficiencies resulting from monopolies. From that perspective, antitrust laws were initially designed to prevent higher prices for reasons of increased efficiency or preventing wealth transfers from consumers to producers (see, for example, Bork, 1966). The second type is based on a *private interest group theory* and assumes that special interest groups pressure legislators to create regulations that promote market inefficiencies. In other words, these approaches argue that US antitrust laws were designed to generate higher prices and lower outputs, protecting some special-interest groups rather than consumers (see, for example, DiLorenzo, 1985; Shughart and Tollison, 1991; Shughart, 1996).

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In addition to opportunistic behaviour of captured politicians and enforcers, the companies themselves might strategically (ab)use antitrust policy for their purposes. Baumol and Ordover (1985: 263) identified that such rent-seeking behaviour by competitors is widespread (and costly to the economy) and consequently asked for easy and costless remedies for such abuses of antitrust “by those who use it for protection from competition”. McAfee and Vakkur (2004) developed a taxonomy of strategic uses of antitrust laws.<sup>20</sup> They identified the following seven strategic (ab)uses: 1) Extort funds from successful rival; 2) change the terms of the contract; 3) punish non-cooperative behaviour; 4) respond to an existing lawsuit; 5) prevent a hostile takeover; 6) discourage the entry of a rival; and 7) prevent a successful firm from competing vigorously. Without wanting to go through the whole taxonomy (see McAfee and Vakkur, 2004: 4ff.), a prominent example of a misuse of antitrust law (reflected in points 1 and 2 of the taxonomy) is to extort funds of a successful rival by saying “give me something (cash, better contract terms) and I won’t expose your vulnerability to an antitrust lawsuit”. Another typical misuse (reflected in point 3) exploits the expensive

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activity increases, and vice versa. Based on this empirical finding, the authors conclude that private interest group theories of antitrust enforcement are not supported, as they would expect increases in producer protection in economic downturns (i.e., procyclical enforcement). One possible explanation for the identified countercyclical pattern of antitrust enforcement activity is that the number of antitrust violations increases in economic downturns.

<sup>20</sup> It is important to remark that the literature on the strategic abuse of antitrust law concentrates on a system of private antitrust enforcement which is predicated on the idea that firms can sue firms. It is straightforward to see that such a system (as applied in the US) opens more possibilities for strategic behaviour than a system of public enforcement (such as currently dominant in the EU), in which the firms can only inform the antitrust authority about possible breaches of competition law but typically cannot directly bring a suit against a competitor. Such a system is likely to provide fewer opportunities for the strategic abuse of antitrust laws.

nature of antitrust lawsuits and the fact that it is typically cheaper to bring a lawsuit than to defend against one.<sup>21</sup> This opens possibilities, for instance, to use antitrust law as a (threat of) punishment for the purpose of enforcing collusive agreements. In line with this argumentation, Yao (1998: 355ff.), in his survey on antitrust restrictions of competitive strategies, differentiates between strategies that simply include antitrust restrictions in business decisions defensively<sup>22</sup> and strategies that use antitrust as an aggressive strategic weapon, for instance, to reach a ban for a certain merger which might threaten the own market position.

From an empirical perspective, one way to investigate the necessity of competition policy is to analyse historic episodes with no or only lax antitrust enforcement. In the United Kingdom, Adam Smith (1776) already used this approach in his *An Inquiry into the Nature and Causes of the Wealth of Nations* and observed a general “tendency for collusion”. In Germany, Walter Eucken, amongst others, analysed historical experiences and found a general “tendency of monopolisation”<sup>23</sup> (Eucken, 1952: 31). He concludes that competition policy is necessary to secure competitive market structures in the medium and long term and to preserve freedom as well as the organisation of the economic system (*Wirtschaftsordnung*) in general.

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<sup>21</sup> Bizjak and Coles (1995) study the implications for shareholder wealth of inter-firm (so-called private) antitrust litigation and find that the average defendant loses more than the average plaintiff gains. The average wealth loss for defendants is a statistically significant 0,6 percent of the equity value, or an average of \$4 million. Given the fact that managerial compensations are often linked to performance, the negative price reaction for the defendant upon a filing suggests that lawsuits can provide significant incentives for firms to comply with antitrust laws. The average wealth gain for a plaintiff was estimated at approximately 1,2 percent of the equity value of the firm, or equivalently an average gain of \$3 million.

<sup>22</sup> The relevance of so-called antitrust compliance programs as an integral part of a firm’s business strategy is shown by Yoffie and Kwak (2001). They explain how Intel avoids antitrust litigation while Microsoft has to cope with multiple antitrust suits. “Intel’s success is not a matter of luck. It’s a matter of painstaking planning and intense effort. The company’s antitrust compliance program, refined over many years, may not receive a lot of attention from the press and the public, but it’s been an integral element in the chip maker’s business strategy. In an age increasingly characterised by global markets that are dominated by a few huge companies, Intel’s approach to compliance provides a valuable model for any enterprise that may come under regulators’ scrutiny” (Yoffie and Kwak, 2001: 120). In the past, Michael Porter had been criticised for not considering antitrust violations as part of his books on *Competitive Strategy* and *Competitive Advantage* (see especially Fried and Oviatt, 1989).

<sup>23</sup> “Anbieter und Nachfrager suchen stets - wo immer es möglich ist - Konkurrenz zu vermeiden und monopolistische Stellungen zu erwerben oder zu behaupten. Ein tiefer Trieb zur Beseitigung der Konkurrenz und zur Erwerbung von Monopolstellungen ist überall und zu allen Zeiten lebendig. ... Universal besteht der ‘Hang zur Monopolbildung’ - ein Faktum, mit der alle Wirtschaftspolitik zu rechnen hat.” (Eucken, 1952: 31).

More recently, Baker (2003: 42) concluded in an essay that “[c]ompetition does not invariably happen by itself”, as firms have incentives to restrict competition either collusively or exclusively. Baker (2003: 36ff.) substantiates his view by evaluating evidence from four episodes of no or lax antitrust enforcement in the United States:

- *Industry performance before and shortly after the enactment of the Sherman Act (1890)*  
Studies of major industries during that period show successful though imperfect collusion in steel (Scherer, 1996), bromine (Levenstein, 1997), railroads (Ellison, 1994; Porter, 1983) and petroleum refining (Granitz and Klein, 1996). The activities of Standard Oil and American Tobacco also illustrated harmful exclusionary behaviour and showed the effects of anticompetitive mergers (see Granitz and Klein, 1996; Burns, 1986; Lamoreaux, 1985).
- *Industry performance in sectors in which the United States has successfully repealed the antitrust laws as they apply to export cartels (since 1918)*  
Dick (1996) conducted a study on 111 cartel episodes covering 93 industries during the years 1918 to 1965 and found many examples of long-lived export agreements motivated by price-fixing; he also found, however, examples of cartels undermined by price wars and fringe competition.
- *Industry performance during the National Industrial Recovery Act (mid-1930s) which allowed industries to develop the Codes of Fair Competition*  
Several industries used the Codes as a vehicle for price-fixing through various methods. Studies by McGahan (1995), focusing on breweries, and Baker (1989), analysing steel producers, show that at least these industries exploited the opportunity to collude and even managed to stabilise agreements for years after the Codes were declared unconstitutional.
- *Industry performance during the second term of the Reagan administration (mid-1980)*  
The second period of the Reagan administration was a period of relaxed antitrust enforcement (see Box 2 below for some empirical evidence), during which the antitrust authorities wanted to prevent certain likely anticompetitive mergers but the transactions were nevertheless later permitted (e.g., by the Department of Transportation). In particular, the acquisitions of Republic Airlines by Northwest Airlines and the purchase of Ozark Air Lines by Trans World Airlines were both characterised by substantially overlapping route networks of the merging parties. A study by Peters (2006), among others, shows that these mergers indeed led to higher fares (as well as a decrease in service quality) in some markets with estimated average price increases of at least 5-10% in city pairs where the two carriers had previously competed (see Pautler, 2003: 167ff., for an overview). Hüscherlath (1998b: 347ff.) shows that the belief that airline markets are “perfectly contestable” in the sense of the theory of Baumol, Panzar and Willig (1982) led to the approval of these mergers.



An alternative way to study the effects of antitrust policy is to look at cross-national studies. In a recent working paper, Krakowski (2005), for instance, explores the relationship between competition policy, experience in the application of competition policy, the intensity of local competition and the standard of living. He finds that the effectiveness of antitrust policy has a significant influence on the intensity of local competition. Furthermore, his results show that in countries with a high intensity of local competition, the standard of living is higher than in countries with a low intensity of local competition.

Baker (2003) summarises studies which seek to understand why some nations have grown wealthy and others have not. These studies almost unanimously find that impediments to competition impede innovation, growth and prosperity (see, for example, Baumol, 2002; Shleifer and Vishny, 1998; Olson, 1982). Similarly, studies by business economists (see, for example, Porter, 1990) allow drawing the conclusion that differences in the power of competition across developed countries have been an important factor in explaining the difference in the performances of major industries across economies.

Although the historical review so far corroborates the need for some kind of antitrust policy, there is also oppositional evidence. Crandall and Winston (2003) collected historical evidence to underpin the view that antitrust policy wasn't successful in the past in terms of maximising consumer welfare. Their study, however, was heavily criticised - partly for its selective choice of empirical studies - by antitrust experts such as Connor<sup>24</sup> (2004), Kwoka (2003) and Werden (2004).

Bittlingmayer (2001) investigates the detrimental effects of antitrust enforcement on investment behaviour and industry structure. He uses antitrust case filings as a measure of regulatory uncertainty aiming at explaining some of the variation in industry investment by appealing to political or regulatory uncertainty. His results imply that the low investment level of the late 1950s and early 1960s in the United States was due at least in part to a resurgence of aggressive antitrust and related initiatives. He concludes that "whatever the ability of antitrust to lower prices and increase output in theory or in isolated circumstances, one actual effect of antitrust in practice may have been to curtail investment" (Bittlingmayer, 2001: 322).

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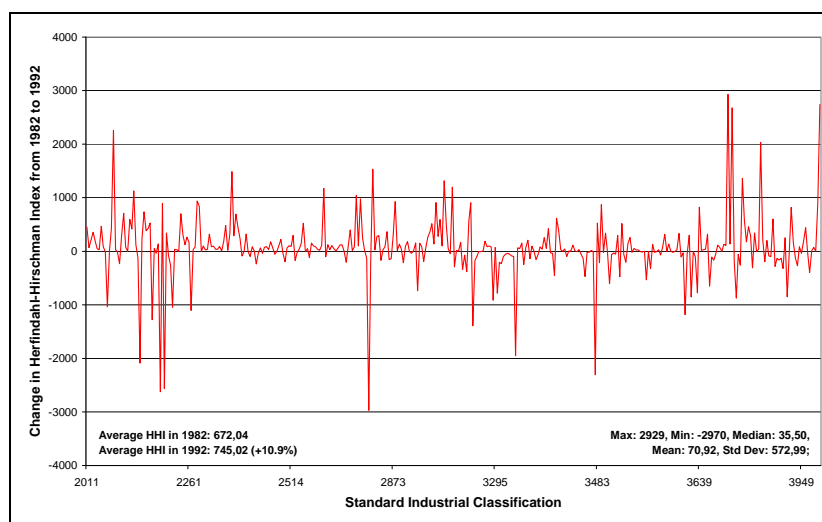
**Box 2.** Did lax antitrust enforcement in the 1980s increase concentration?

In the United States, the 1980s were characterised by a lax antitrust enforcement, partly due to the influence of the Chicago School of Antitrust. In such a state, one would expect an increase in concentration due to anticompetitive mergers and successful monopolisation strategies. Based on a data set of concentration measures for 360 US manufacturing industries, the graph below shows the changes in the Herfindahl-Hirschman index from 1982 (the beginning of the lax period) to 1992 (after the end of the lax period).

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<sup>24</sup> Connor (2004: 1), for instance, writes: "This paper is an oddly slap-dash product far below the usual standards of the Journal of Economic Perspectives."

**Fig. 2.** Change in Herfindahl-Hirschman Index from 1982 to 1992



Source: Own calculations based on data from US Census of Manufactures, Concentration ratios in manufacturing 1982 and 1992 ([www.census.gov/epcd/www/concentration.html](http://www.census.gov/epcd/www/concentration.html)). Herfindahl-Hirschman index changes may partly be influenced by changes in the SIC structure from 1982 to 1992

The graph as well as the calculated averages show that industrial concentration indeed increased in these ten years by about 10% on average. Although causality between this development and lax antitrust enforcement cannot be substantiated with the data at hand, it is especially interesting to see that the concentration in several industries increased dramatically, while others experienced a deconcentration process. This indicates that studying industry averages alone might say little about concentration effects of lax antitrust enforcement. Additionally, it has to be kept in mind that the graphs only show manufacturing industries and therefore miss important industries (such as the airline industry) in which concentration effects due to lax antitrust enforcement can be expected to be substantial (see Baker, 2003: 38).

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Shleifer and Vishny (1991) argue that while lax enforcement may lead to monopoly, tough enforcement could lead to an even worse industry structure: namely one dominated by conglomerates (see Box 3 below). Therefore, the authors vote for a lax merger enforcement standard.

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### **Box 3.** Monopolies or conglomerates?

Shleifer and Vishny (1991) review evidence on takeover waves in the 1960s and 1980s in the United States and discuss the implications of this evidence for corporate strategy, agency theory, capital market efficiency and antitrust policy. With respect to

antitrust policy they generally find that it played an important role in the two takeover waves. “The extremely strict antitrust enforcement in the ‘60s made most related acquisitions infeasible, or at least costly, and so forced firms determined to make acquisitions to diversify” (Shleifer and Vishny, 1991: 58; see Matsusaka, 1996, for antithetic evidence). In other words, antitrust policy was at least partly responsible for the diversification wave at that time. In direct comparison to that, the authors argue that even if one sees some problems with the takeover wave (made possible due to lax antitrust enforcement) in the 1980s, it is hard to believe that they will turn out as bad as diversification in the 1960s. Consequently, Shleifer and Vishny (1991: 58) conclude that “[i]n a first best world, aggressive antitrust may be a good idea. But, in the world where corporations are committed to growth through acquisitions, antitrust policy of the ‘60s ... had inadvertent effects much more damaging than the benefits it created. ... There’s no question that ... lax [antitrust] policy has led to some anticompetitive mergers, such as those in the airline industry, but it is better to have a few monopolies than a lot of conglomerates.”

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In a nutshell, it was shown that mainstream theoretical analysis - as well as the majority of empirical studies - comes to the conclusion that competition needs protection and - more importantly - that evidence has shown that competition policy actually helped to improve market performance, industry performance and the performance of the whole economy. However, it is important not to disregard the sceptical views on antitrust but to interpret them as a cornerstone of the continuous improvement of antitrust enforcement. Antitrust interventions have to be aware of enforcement’s significant influence on manager’s decisions, market behaviour and industry structure. In order to minimise uncertainty caused by antitrust enforcement, it must be the aim to develop, as clearly as possible, rules which are based on sound economic theories but understandable and applicable for people with academic backgrounds other than economics.

#### **4 Competition policy is worth it**

Even after concluding that competition is worth protecting and also (regularly) needs protection, the case for antitrust enforcement is still not closed. In a third step it has to be shown that the benefits of antitrust enforcement likely exceed its costs. In the words of Geroski (2004), the question Is competition policy worth it? has to be answered.

In general, there are two ways to approach such a question. On an *aggregate level*, it can be assessed whether competition policy as a whole brings more benefits to society than it costs society.<sup>25</sup> On a *disaggregate level*, it can be

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<sup>25</sup> As argued by Kee and Hoekman (2003), the benefit of competition policy needs to be compared with the potential benefit of other policy options which could foster competition. Based on an empirical study of an international data set consisting of 28 industries in 42 developed and developing countries from 1981 to 1998, the authors indeed conclude that reducing trade barriers and government regulations (as two major restrictions of domestic competition by impeding entry and exit of firms) would likely generate a higher rate of return than the adoption and enforcement of

investigated whether and to what extent certain sub-activities of the antitrust authorities - such as cartel or merger enforcement - contribute to the overall benefits of antitrust policy.

#### **4.1 Aggregate level**

In the following sections, the aggregated costs and benefits of antitrust enforcement for two countries are investigated further: the United States and the Netherlands. These two countries were basically chosen for two reasons. On the one hand, both countries are quite distinctive with respect to size: the United States had a GDP of about \$12.970 billion in 2004 (at current prices), and the Netherlands had a GDP of about \$629.900 million in 2004 (at current prices).<sup>26</sup> On the other hand, both countries are quite distinctive with respect to their history of antitrust law: the United States enacted their first antitrust law in 1890, and the Netherlands did not reform their rudimentary competition law (from 1956) until January 1998 (see Konings et al., 2001: 845).

##### **4.1.1 Costs and benefits of antitrust enforcement in the United States**

On an aggregate level, some of the cost-side components of antitrust enforcement can be quantified relatively easily. The direct governmental costs in the United States are basically given by the budgets of the two enforcement agencies: the Federal Trade Commission (FTC) and the Antitrust Division (AD) of the US Department of Justice (DOJ). The FTC (2004) splits its 2005 budget into two fractions: “consumer protection”, with roughly \$118 million, and “maintaining competition”, with roughly \$87 million. Only the latter is interpreted as part of the governmental costs of antitrust enforcement. The Antitrust Division (2006) is solely working on maintaining competition and had an annual budget in 2006 of roughly \$139 million, leading to total governmental enforcement costs of about \$226 million.

In addition to the direct governmental costs, firms also generate costs caused by antitrust enforcement. These can be subdivided into basically two fractions: “costs by responding to government investigations” and “costs of private antitrust litigation”. Baker (2003) estimates that the former cost block sums up to roughly \$500 million annually. He derives this estimate by using an average value of an antitrust case of \$2,5 million (covering filing fees, lawyers and economic consultants; see Global Competition Review, 2003, as well as Box 4 for comparable evidence from the Airtours case in the European Union) and multiplying it by the number of second-request cases (roughly 200) in 2002 in the

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competition law. However, the increased significance of especially international cartels, despite shrinking trade barriers, suggests that reductions in trade barriers and government regulations are complements rather than substitutes to competition policy norms. In other words, although trade liberalisation and reductions of government regulations are typically worth promoting from an economic perspective, they do not make competition policy norms obsolete.

<sup>26</sup> Source: IMF World Economic Outlook, 2004 GDP data in current prices.

United States. The estimate for private antitrust litigation is taken from Salop and White (1986), adjusted for inflation, and adds up to about \$400 million annually. Overall, the direct costs of antitrust enforcement add up to about \$1.126 million.<sup>27</sup>

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**Box 4.** Legal and economic fees in Airtours case (1999)

Neven (2005: 10) discusses evidence on the relative importance of economic and legal fees gathered from the records of the Airtours case (1999). Airtours attempted to acquire First Choice; however, the European Commission banned the proposed acquisition. Nevertheless, Airtours succeeded in its appeal in the Court of First Instance (CFI). As a consequence, the Commission was ordered to pay the cost that Airtours had incurred in the procedure. These costs are shown in Table 3 below.

As shown in Table 3, the fees claimed by Airtours add up to more than €2,2 million overall with about 80% of these fees referring to the work of lawyers and the remaining 20% to the work of economists. Interestingly, the Commission refused to pay the amounts Airtours requested, claiming that they were exaggerated. In the end, the CFI had to rule on the amount, and the Commission was ordered to repay about 32% of the costs claimed by Airtours.

**Table 3.** Legal and economic fees in Airtours case (1999)

	Claimed by AT		Accepted by CFI		
	in €	in %	in €	in %	in % of claimed
Barrister	424.105	19%	258.068	36%	61%
Solicitors	1.290.342	58%	379.512	53%	29%
Solicitors (expenses)	29.616	1%	0	0%	0%
Economic consultancy	426.650	19%	45.541	6%	11%
Academic economists	51.440	2%	29.579	4%	58%
Legal fees in Luxembourg	941	0%	0	0%	0%
<b>Total</b>	<b>2.223.094</b>	<b>100%</b>	<b>712.702</b>	<b>100%</b>	<b>32%</b>

Underlying £-€ exchange rate: 1,52 (1999 average)

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<sup>27</sup> In a survey, PriceWaterhouseCoopers (2003) investigated whether the time and costs of business devoted to multi-jurisdictional merger reviews has the effect of a factual tax on mergers. The study finds that, although such a tax exists, it is on average clearly below 1% of the overall value of the merger deals. The study further finds that the typical multi-jurisdictional merger deal requires 8 completed or considered filings and generates on average €3,3 million in external merger review costs; 65% of these costs are legal fees, 19% are filing fees and 14% are fees for other advisers. The survey shows further that a few major deals with at least one in-depth review by an antitrust authority incurred costs of more than €10 million. Taking internal and external costs together, deals involving an in-depth review are eight to ten times more expensive than those subject only to an initial review (see PriceWaterhouseCoopers, 2003: 4f.).

In addition to the direct costs of antitrust enforcement, indirect costs, which are somewhat more difficult to delineate and estimate, must be taken into account. Baker (2003) considers the opportunity cost of management time devoted to antitrust compliance and litigation as well as any lost efficiencies if beneficial activities are deterred by the prospect of antitrust enforcement<sup>28</sup> (see also Crandall and Winston, 2003: 5f.).<sup>29</sup> Baker (2003) assumes that the indirect costs are roughly equal to the direct costs, leading to total annual costs of antitrust enforcement in the United States of about \$2.126 million (see Table 4 below).

**Table 4.** Direct and indirect costs of US antitrust enforcement

		million US-\$
<b>DIRECT COSTS</b>		<b>1.126</b>
Direct governmental costs	Federal Trade Commission	87
	Antitrust Division	139
Direct private costs	Costs responding to government investigations	500
	Costs of private litigation	400
<b>INDIRECT COSTS</b>		<b>1.000</b>
Opportunity costs of management time (Compliance and litigation)		n.a.
Deterrence of beneficial activities by antitrust rules		n.a.
<b>OVERALL COSTS</b>		<b>2.126</b>

Sources: FTC, 2004; DOJ-AD, 2005; Baker, 2003; GCR, 2003; Salop and White, 1986

<sup>28</sup> Generally, the magnitude of especially the indirect costs of deterring beneficial activities by the design and enforcement of suboptimal antitrust rules is disputed among antitrust scholars. While some argue that Baker's estimate could be a realistic ballpark figure, others are of the opinion that these costs are substantially larger and typically dwarf any other costs of antitrust enforcement discussed above. I would like to thank Michael Waldman for pointing this out to me.

<sup>29</sup> Bittlingmayer and Hazlett (2000) analyse whether antitrust actions against Microsoft have created value in the computer industry. They hypothesise that a large number of computer firms which have products that are tied to the success of the allegedly monopolised Microsoft product (Disk Operating Systems) should prosper if actions are taken (by Microsoft or the DOJ) to make these operating systems costless, function better, or provide a more convenient platform for popular products. Policy actions that are expected to constrain Microsoft's market power effectively should simultaneously increase efficiency and improve profitability of firms throughout the sector. Bittlingmayer and Hazlett examine share price reactions for both Microsoft and a portfolio of 159 other computer firms around 54 antitrust enforcement announcements involving Microsoft over the seven years from 1991 to 1997. They find that antitrust action against Microsoft appears to inflict capital losses on the computer sector as a whole. Each enforcement action lowered Microsoft's stock by 1,2%, roughly \$3 billion at May 1998 share prices. Furthermore, each enforcement action decreased a broad index of other computer stocks by 0,7%, equivalent to an additional loss of \$5 billion in May 1998.

On the benefits side of antitrust enforcement, the first quantification efforts were estimations of the sizes of the deadweight loss triangles discussed in section 2 above. Applying the basic equation for the deadweight loss (see Equation 1 above), it is indeed straightforward to derive a first back-of-the-envelope estimate of the (potential) benefits of antitrust enforcement: Suppose that 10% of a country's national output is produced in monopolised industries, that the average price-cost margin is 0,2 and that the average market demand elasticity is 1,5 (see Leibenstein, 1966, and Rowley and Rathbone, 2004, for comparable calculations.) Using Equation 1 above then leads to a deadweight loss of 1,5% of the total GDP. Using the actual GDP figure for the United States in 2004 (about \$12.970 billion), Figure 3 plots the corresponding deadweight losses for varying elasticities and price-cost margins.

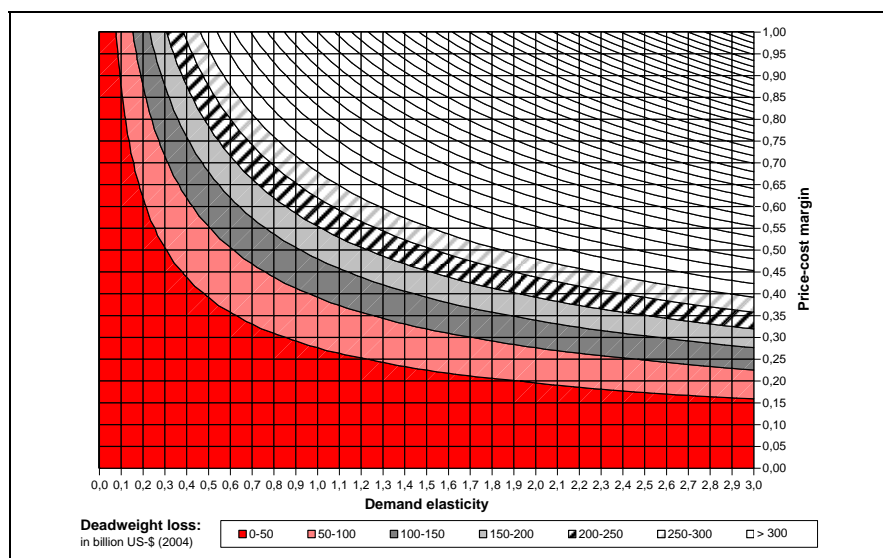
As shown in Figure 3, with an average market demand elasticity of 1,5 and an average price-cost margin of 0,4, the corresponding deadweight loss lies in the range of \$150-200 billion (the exact value is \$156 billion). Even with a substantially smaller price-cost margin of 0,1 and an average market demand elasticity of 1,0, the deadweight loss would still be around \$6 billion and therefore about three times larger than the estimated costs of antitrust enforcement.

Although the benefits of antitrust enforcement shown in Figure 3 typically dwarf the generated costs, it is obvious that these estimates are very rough. In addition to the general criticism of deadweight loss studies (largely based on their assumptions and data-sets used; see section 2 above), Posner (2001: 17ff.) argues that neither of these studies can properly be used to measure the gains from having antitrust laws. "They measure the costs of monopoly given the existence of those laws, not the costs of monopoly that could be expected in the absence of such laws. In a sense they measure the degree to which the antitrust rules have failed"<sup>30</sup> (Posner, 2001: 17).

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<sup>30</sup> Baker (2003: 45) agrees with Posner's argument, adding, however, that such a "minimum estimate of the potential gains from additional antitrust enforcement provides a benchmark for assessing the benefits of current enforcement activity, under the plausible assumption that the efficiency gains achieved by preventing anticompetitive conduct - the deterrence benefits of antitrust - are at least as large as the potential gains from additional enforcement, which the Harberger framework measures".

**Fig. 3.** Deadweight loss (in billion US-\$) against demand elasticity and price-cost margin (10% of US industry monopolised)



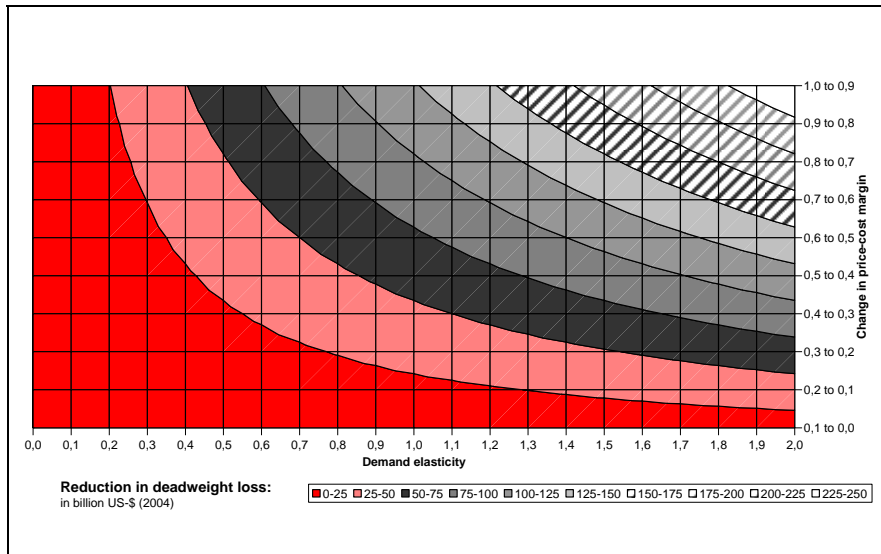
An alternative way to measure the benefits of antitrust enforcement is to argue that antitrust interventions eventually lead to a decline in the price-cost margin. The benefits of antitrust policy can then be expressed by the deadweight loss differential between the before-enforcement and after-enforcement values of the (average) price-cost margin.<sup>31</sup> Figure 4 below shows these differentials (i.e., the

<sup>31</sup> In a recent paper, Boone (2006) argues why the price-cost margin is not a measure of success for competition policy for an antitrust authority that aims at maximising consumer welfare. Warzynski (2001) tests whether antitrust policy had an impact on the price-cost margins in the US manufacturing industry. His results indicate the presence of market power in many industries but also substantial heterogeneity of behaviour, across both time and industries. However, he concludes that price-cost margins were significantly lower when the antitrust policy was very tough. Konings et al. (2001) investigate the impact of competition policy on the level and the dynamics of firm price-cost margins in the Belgian and Dutch manufacturing industries. Belgium significantly strengthened their competition law in 1993, while the Netherlands followed a more lenient approach until the very end of the last century. The empirical results show that the reform of competition policy in Belgium did not have any significant effect on the price-cost margins in Belgium. However, a comparison between Belgium and the Netherlands revealed that price-cost margins in the Netherlands were significantly higher than those in Belgium. Additionally, Kee and Hoekman (2003) found for an international data set consisting of 28 industries in 42 developed and developing countries from 1981 to 1998 that the direct effect of antitrust law on industry price-cost margins is not significant for a sample consisting of all countries. However, the effect of antitrust law on industry price-cost margins



reductions in deadweight loss) for the United States (again based on 2004 GDP data) against the demand elasticity and the changes of the price-cost margin (in 0,1 steps).

**Fig. 4.** Reduction in deadweight loss (in billion US-\$) against demand elasticity and changes in price-cost margin (10% of US industry monopolised)



As shown in Figure 4, a reduction in the price-cost margin from 0,4 to 0,3 at an average demand elasticity of 1,5 would lead to reductions in the deadweight loss in a range of \$50-\$75 billion (the exact value is \$68 billion). For a demand elasticity of 1,0, the reduction of the deadweight loss would still be in the range of \$25-50 billion (the exact value is \$45 billion). In both cases, the benefits of antitrust enforcement still dwarf the cost estimate derived above.

In addition to the analysis so far, there are basically two major reasons why the true benefits of antitrust enforcement are substantially larger than stated so far: additional losses of monopoly and the deterrence effect of existing antitrust laws. With respect to the former, section 2 already showed that rent-seeking activities and productive inefficiencies can be interpreted as such additional losses of monopoly. If conservative estimates of these losses are also taken into account (DWL: 0,1%, RSA: 1,0%, PI: 1,0% of GDP) and applied to the GDP figure of \$12.970 billion for the United States in the year 2004, the (potential) benefits of antitrust enforcement add up to roughly \$272,4 billion (\$13,0 billion DWL+\$129,7 billion RSA + \$129,7 billion PI).

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increases with the size of the economy, indicating that antitrust policy may be more important for larger countries.

The second argument which speaks for a too-low estimate (in Fig. 3) is the deterrence effect of antitrust rules. *Deterrence* basically means that existing antitrust rules (and their enforcement) encourage firms not to behave in anticompetitive ways which would have led to negative welfare effects in the absence of such rules. This “encouragement” can be based either on a general attitude to respect the law and/or on the fear of antitrust investigations and fines. Although the existence of such a deterrence effect is beyond controversy, its quantification is surely a very challenging task.<sup>32</sup> Baker (2003: 40) and Geroski (2004: 8) simply have the feeling that the deterrence effect very likely delivers more benefits alone than all the other benefits (discussed above) together.

In a nutshell, although several benefits and cost components are hard or almost impossible to estimate, it is likely that on an aggregate level for the United States, antitrust policy as a whole brings more benefits than costs to society.

#### **4.1.2 Costs and benefits of antitrust enforcement in the Netherlands**

In a study on behalf of the Dutch Ministry of Economic Affairs, Oxera (2004a; 2004b) develops a conceptual framework to assess the costs and benefits of market regulators (Oxera, 2004a) and applies it in the second part of the report to the respective institutions in the Netherlands.<sup>33</sup> The conceptual framework distinguishes between two possible counterfactuals to the present antitrust enforcement regime: 1.) no competition law and no Dutch competition authority (Nederlandse Mededingingsautoriteit, hereafter referred to as NMa) and 2.) private enforcement of competition law<sup>34</sup> and no NMa. While the first counterfactual would lead to an analysis of the costs and benefits of both competition law and competition policy, the second alternative would allow a comparison of the costs and benefits of having the NMa as an institution (see Oxera, 2004a: 7). Oxera concentrates their study on the latter counterfactual. Their (qualitative) results are summed up below in Table 5.

As Table 5 shows, the cost side of antitrust enforcement by the NMa (compared to the counterfactual of private litigation under existing competition law) is structured into four sections: the direct costs of the running the NMa, the direct

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<sup>32</sup> At first sight, the results of Masson and Shannan (1984), presented in section 2, might answer this question. However, although Masson and Shannan estimate that the gains from competition are 8.7%, this value cannot be interpreted as a gain of antitrust policy, as even in the absence of any kind of antitrust law competition would likely prevail in most industries.

<sup>33</sup> The market regulators in the Netherlands are the Competition Authority (NMa), the Post and Telecommunications Authority (OPTA), the Financial Markets Authority (FMA), the Office of Energy Regulation (DTe), the Transport Chamber and the Healthcare Authority (NZA) (see Oxera, 2004a: 1).

<sup>34</sup> *Private antitrust enforcement* basically means that existing competition laws are not enforced by an antitrust authority but rather through private litigation by especially competitors, suppliers and customers. In the United States, for instance, around 90% of all federal antitrust cases originate from private cases. See Jones (1999) and Oxera (2004a: 22ff.) for further discussions.

costs of the regulated firms, economic costs to the investigated markets (e.g., by making enforcement mistakes) and indirect regulatory costs created by regulatory uncertainty among firms. On the benefits side, Oxera identifies economic benefits to the markets in question (essentially by increasing allocative, productive and dynamic efficiency) as well as indirect regulatory benefits, such as deterrence effects of existing antitrust laws (and their enforcement).

Based on the arguments shown in Table 5, Oxera (2004b: 1ff.) continues in the second part of the report with the quantification of especially the cost part of their conceptual framework. The direct governmental costs are given by the budget of the NMa, which was about €22 million in 2003. In terms of administrative costs of firms in relation to Dutch competition law (e.g., filling in notification forms, dealing with information requests), Oxera uses a measure derived by a survey from the Dutch Ministry of Economic Affairs (MEA), which estimates these costs at €2,38 million per year (in 2002). However, these administrative costs are likely to underestimate the true costs for the firms, especially if in-depth analyses of merger cases are considered. A survey by PriceWaterhouseCoopers (2003: 4) found that a typical multi-jurisdictional merger deal generates on average €3,3 million in external merger review costs. However, the survey shows further that a few major deals with at least one in-depth review by an antitrust authority incurred costs of more than €10 million.

**Table 5.** Costs and benefits of the NMa against the counterfactual of private litigation under existing competition law

Costs	Benefits
<i>Direct costs of the NMa</i>	
– Total administrative costs of the NMa	
– Minus administrative costs of the judiciary system dealing with private litigation	
<i>Direct costs of regulated firms</i>	
– Total costs incurred by firms to comply with competition law and in relation to specific competition law proceedings	
– Minus costs incurred in private litigation cases	
<i>Economic costs to the markets in question</i>	<i>Economic benefits to the markets in question</i>
– Allocative, productive and dynamic inefficiency may result from unintended mistakes by NMa (e.g., excessive intervention or prohibition of efficient (and hence welfare-enhancing) practices)	– Allocative, productive and dynamic efficiency achieved through prevention of cartel and other anticompetitive behaviour that would not be challenged under private litigation
– Minus any such costs caused by	– Enhanced product/service quality and

decisions of judiciary system	innovation achieved through promotion of a competitive market environment
<i>Indirect regulatory costs</i>	<i>Indirect regulatory benefits</i>
<ul style="list-style-type: none"> <li>– Regulatory uncertainty among firms due to open-ended nature of competition law prohibitions (may be mitigated through clear guidance by the NMa and case law over time)</li> <li>– Minus any such uncertainty caused under private litigation</li> </ul>	<ul style="list-style-type: none"> <li>– Active enforcement of prohibition in competition law has deterrent effects on cartels and other anticompetitive behaviour that would not be challenged under private litigation</li> <li>– Active stance of the NMa contributes to overall government objective of achieving a competitive culture, away from previous “cartel paradise” culture in the Dutch economy</li> </ul>

Source: Oxera, 2004a: 28.

Based on the PWC survey results, Oxera (2004b: 2) estimates the typical costs of a firm in a single EU jurisdiction. The internal costs of a first-stage merger were estimated to fall into a range of €20.000-€40.000 and €80.000-€120.000 for an in-depth merger review. In terms of external cost to firms, Oxera estimates a range from €110.000 to €160.000 for a first-stage merger and €600.000 to €900.000 for an in-depth merger review. Taking a subset of the average number of cases the NMa has dealt with in each year, the following rough approximation of the cost of firms due to antitrust enforcement can be obtained.

**Table 6.** Annual costs to firms due to a subset antitrust enforcement by the NMa

Type of case	Number of cases dealt with by NMa (average per year over period 2001-03)	Estimated cost per case (€)	Total costs (€ million)
Notifications of agreements	84	130.000 - 200.000	10,9 - 16,8
Notifications of mergers	95	130.000 - 200.000	12,4 - 19,0
Reports based on reasonable suspicion of contravention of competition law (in-depth)	9	680.000 - 1.120.000	6,1 - 10,1
In-depth merger reviews	2	680.000 - 1.120.000	1,4 - 2,2
<b>Total</b>			<b>30,8 - 48,1</b>

Source: Oxera, 2004b: 2

The estimates presented in Table 6 do not take costs of other proceedings (e.g., complaints or appeals) or general compliance costs incurred by firms into account. Overall, the costs of the private sector together with the direct governmental cost of about €22 million lead to a cost estimate between €52 million to €70 million (Oxera, 2004b: 22). Oxera undertakes no attempt to quantify the aggregate benefits of antitrust enforcement in the Netherlands; however, they estimate the welfare effects of three antitrust cases in more detail. One of these cases is presented in the discussion of the disaggregate level in the following section.

#### 4.2 Disaggregate level

The analysis of the costs and benefits on an aggregate level basically give an indication that the sign of the net welfare effect of antitrust policy is likely to be positive. Although this is surely important information, it only presents half of the story, because it masks the partial contributions of the different areas of antitrust enforcement to the overall success of antitrust enforcement. In the words of Rowley and Rathbone (2004: 17), “economists cannot confidently rely on dead-weight cost arguments to justify on efficiency grounds a per-se policy of antitrust intervention ... In principle, it is clear that a very detailed case-by-case study is required to determine whether or not specific instances of monopoly, whether induced by conspiracy, by merger or by internal expansion, is justified in terms of economic criteria.”

It is beyond the scope of this section to try to derive or collect separate estimates for the contribution of every area of antitrust policy. However, what can be done is analysing single cases of antitrust enforcement and show whether their contribution to the benefits of antitrust enforcement alone was significant compared to the overall enforcement costs derived above. Geroski (2004) followed such an approach for selected cases in the United Kingdom and from his viewpoint as the chairman of the Competition Commission (who regularly has to justify the budgets for his authority). Following Geroski’s approach, two case studies are presented in the Annexes 6.1 and 6.2: the *lysine cartel case*, focusing on cartel enforcement in the United States, and the *Nuon-Reliant merger case*, focusing on merger enforcement in the Netherlands. Both case studies allow a quantification of the benefits of antitrust enforcement.

The quantitative results of the two case studies on cartels and mergers both show substantial contributions to the benefits of antitrust enforcement. In the US lysine cartel case, it is found that the overcharge (excluding the price war) adds up to about \$113 million in total, which can be translated into an average overcharge of 22,82% of sales (in a range from 13,48% to 36,92%). The deadweight loss was assumed to be at 10% of the overcharge and therefore is about \$11 million for the whole cartel period.<sup>35</sup> In the Dutch Nuon-Reliant merger case, the redistribution

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<sup>35</sup> One possibility to underpin this allegation is to argue that without successful cartel enforcement, the respective cartel would have continued to exist, causing welfare losses. In other words, the direct benefits of detecting a cartel can be approximated by the net present value of the yearly benefits in the future. See Annex 6.1 for a more

effect (per year) appears to be substantial across the board (between 5,57%, or about €280 million, and 11,72%, or about €612 million, of post-merger sales), while the deadweight losses are, because of the typically low demand elasticity in electricity markets, relatively small (between 0,60%, or about €1,7 million, and 1,36%, or about €8,2 million, of the redistribution effect). To a certain extent, the results of the two case studies confirm the results of the aggregate approach: The redistribution effects of increases in market power seem to be significantly larger than the actual deadweight loss – which is the primary aim of an efficiency-oriented competition policy.

An underpinning of this finding can be achieved by casting an eye on studies which try to aggregate the (costs and) benefits of cartel and merger enforcement. Connor and Helmers (2006), for instance, present a study in which they analysed a large dataset of 283 private international cartels that existed between 1990 and 2005. They provide estimates of the overcharges for all of these cartels for the United States, Canada, the European Union and other regions. Furthermore, they estimate that the deadweight loss adds between 10% and 30% of the overcharges to receive an estimate of the overall customer losses (see Connor and Helmers, 2006: 21). Using 10% as a defensive estimate of the deadweight loss and 30% as an aggressive estimate, it is possible to estimate the overall customer losses of 283 private international cartels between 1990 and 2005. The results are presented in Table 7 below (see Tables 49 to 52 in Annex 6.7 for the full data tables and the spreadsheet calculations).

**Table 7.** Customer losses due to 283 cartels operating between 1990 and 2005

	Overcharges	Defensive DWL estimate (10%)	Aggressive DWL estimate (30%)	Total customer losses (defensive estimate)
<i>Overall</i>				
<i>Million Real 2005 US Dollars</i>				
United States	54.001	5.400	16.200	59.402
Canada	975	97	292	1.072
European Union	99.459	9.946	29.838	109.405
Other regions	21.137	2.114	6.341	23.251
All countries	175.573	17.557	52.672	193.130
<i>Yearly average</i>				
<i>Million Real 2005 US Dollars</i>				
United States	3.375	338	1.013	3.713
Canada	61	6	18	67
European Union	6.216	622	1.865	6.838
Other regions	1.321	132	396	1.453

Source: Calculations are based on data from Connor and Helmers, 2006: 49ff.

detailed discussion on the occasion of the assessment of the customer losses caused by the lysine cartel in the United States.

As shown in Table 7, aggregate cartel overcharges for the four regions add up to more than \$175 billion for the period from 1990 to 2005. A defensive estimate of the deadweight loss of 10% of the overcharges adds almost \$18 billion to the overall customer losses caused by these cartels of more than \$193 billion. Focusing only on the data for the United States shows overcharges of \$54 billion and a defensive estimate of the deadweight loss of \$5,4 billion for the period from 1990 to 2005.

In terms of the overall benefits of merger enforcement in the United States, the Government Performance and Result Act requires agencies to monitor their performance. In order to meet these requirements, the FTC and the AD of the DOJ quantify “the dollar savings for consumers resulting from agencies’ actions stopping anticompetitive merger activity” and “non-merger activity” as part of their annual performance measures. For the fiscal year 2001, for instance, the FTC calculated consumer savings of \$2,5 billion resulting from merger activities and further \$157 million savings for consumers resulting from non-merger activities.<sup>36</sup> The DOJ reported to Congress that the AD merger enforcement efforts saved consumers at least \$4,094 billion in the fiscal year 1998 and \$2,551 billion in the fiscal year 1999 (see Nelson and Sun, 2001: 927).

In terms of methodology used to come to these estimates, both agencies use a consumer savings estimate constructed by multiplying an estimate of the price increase that would have occurred by the volume of commerce in the respective relevant market affected. For the derivation of the price increase estimates, two different approaches are used. For homogenous product markets the following formula derived from a standard Cournot model is used:

$$\frac{\Delta p}{p} = \frac{\Delta HHI}{\varepsilon_D^m - HHI_{postmerger}} \quad (7)$$

with  $(\Delta p/p)$  representing the percentage increase in price that would have resulted if the merger had been allowed to proceed,  $\Delta HHI$  representing the change in the  $HHI$  that would have resulted and  $HHI_{postmerger}$  representing the corresponding post-merger  $HHI$ . Following the example of Nelson and Sun (2001: 929f.), if an industry has five firms that each have a market share of 20 percent pre-merger and the market demand elasticity is equal to 1,0, a two-firm merger would lead to an increase in the  $HHI$  of 0,08 and the equation above would therefore predict a 11,1% increase in price.

The second approach to estimate the price increase that would have resulted if the antitrust authorities hadn’t stopped the merger is used for mergers which involve differentiated products. In such cases, merger simulations are run to estimate the percentage change in price. As explained by Nelson and Sun (2001: 931), the simulation models are based on the Bertrand assumption that a firm

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<sup>36</sup> The values for FY 2002/FY 2003 were \$726 million/\$292 million (merger) and \$86 million/\$211 million ((non-merger); see FTC (2006: 20). Starting with the fiscal year 2004, the FTC discontinued the savings measure and replaced it by an estimate of the dollar volume of commerce in markets in which FTC took action to prevent anticompetitive mergers and other competitive conduct (see FTC, 2006: 20).

chooses a profit-maximising price assuming that competitors will maintain their current prices. For both approaches, Nelson and Sun (2001) extensively discuss the underlying assumptions and therefore the limitations of the significance of consumer savings figures which are derived by these techniques.<sup>37</sup>

For the Netherlands, Postema et al. (2006) try to measure the costs and benefits of merger control by using merger simulation tools. The authors compare the hypothetical situation in which all mergers would have been approved ('the counterfactual') to the actual situation of merger control in which mergers with clear anticompetitive effects were prohibited or remedied by the NMa. For the period between 1998 and 2002, eleven rejected mergers were identified; however, data availability and data confidentiality issues finally allow the authors to study four mergers in more detail. With these four mergers/markets, four sensitivity analyses were run using four different demand models suitable for merger simulation.<sup>38</sup> It turned out that only the linear and log-linear demand functions produced sensible results which were then used to estimate the 'prevented price increases due to merger control'. The results show that - for the four markets - price increases between 4,0% and 21,7% would have resulted in the absence of merger control leading to a weighted average price increase of about 14%. Applying this figure to the nine relevant cases<sup>39</sup> in which a merger was prohibited (or later allowed subject to 'healing' remedies) led to a welfare gain of merger enforcement in the Netherlands between 1998 and 2002 of roughly €770 million. On the cost side, Postema et al. (2006) basically uses the estimates derived in the Oxera study presented above which led to an estimate for the overall costs of antitrust enforcement of at most €120 million. The net welfare effect of merger control can therefore be quantified at about €100 million per year.

## 5 Conclusions

The aim of the paper was an assessment of the costs and benefits of antitrust enforcement. The analysis showed, first, that competition is typically desirable.

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<sup>37</sup> For the homogenous goods approach the somewhat critical assumptions are: (1) the products are homogenous, (2) all firms have constant marginal costs, (3) the merger does not change the cost structure of the firm, (4) the merger does not change the behaviour of the firms, (5) the post-merger market share of the firms is equal to the sum of their pre-merger market shares, (6) the elasticity of demand is constant over the relevant range of sales levels and (7) there is no entry. For the differentiated goods approach, especially the assumptions about the underlying demand system are added to the general problems named for the homogenous goods approach (see generally Nelson and Sun, 2001: 935ff.).

<sup>38</sup> The four basic approaches to model the demand side in a merger simulation are linear demand, log-linear demand, logit demand and the almost ideal demand system.

<sup>39</sup> From the total of eleven cases, the authors exclude two cases in the electricity industry because these markets are typically characterised best by Cournot competition and therefore conflict with the author's modelling assumption of Bertrand competition (see Postema et al., 2006: 94).



Second, it was found that without antitrust policy, firms could and would (permanently) exercise market power to the detriment of overall welfare as well as consumer welfare. Although this finding may justify the introduction of antitrust policy norms, it was also found that antitrust enforcement has to be used cautiously in order to avoid business distortions causing more harm than good. Subsequently, an estimation of the costs and benefits of antitrust enforcement suggested - at least for the United States and the Netherlands - that the realised benefits overtop the realised costs by far as long as overcharges/redistribution effects *and* deadweight losses are considered as welfare loss. However, under a total welfare approach, only the avoidance of deadweight losses can be considered as benefit of antitrust policy and then, the benefits estimated for cartel and merger enforcement under a disaggregate approach weren't able to cover the derived cost estimate for the United States and the Netherlands.<sup>40</sup> However, it should be kept in mind that the deterrence effect as an important benefit of antitrust laws and enforcement didn't enter the quantification. Generally, it has to be reminded that some cost and benefit components can hardly be measured with satisfactory accuracy.

## **6 Annex**

### **6.1 Estimating customer losses due to cartelisation - Evidence from the lysine cartel in the United States**

One prominent contributor to the overall benefits of antitrust enforcement is cartel enforcement. Although the largest benefits probably come from the deterrence effect of cartel laws (which can hardly be measured in its scope), an analysis of customer losses due to actual cartelisation reveals important insights into the desirability of cartel enforcement from a consumer welfare perspective. One possibility to underpin this allegation is to argue that without successful cartel

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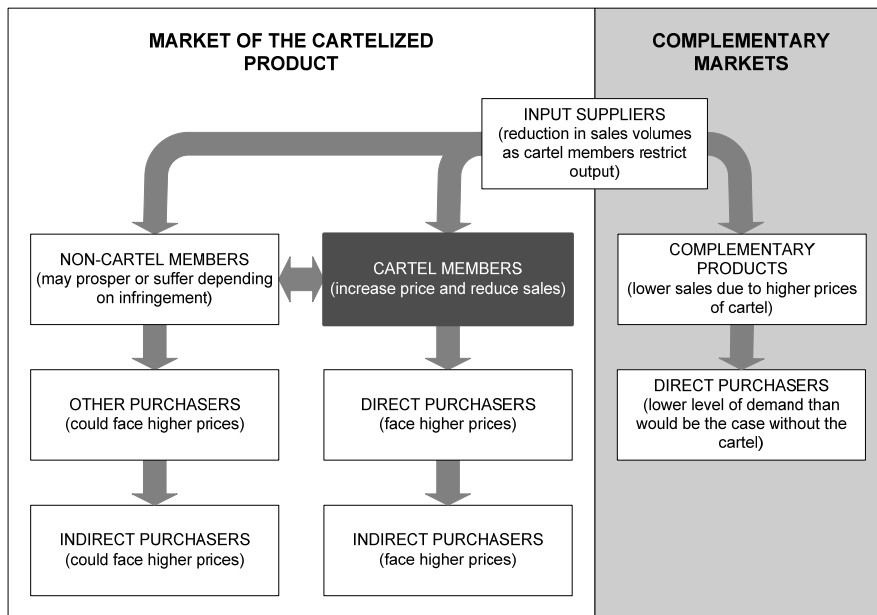
<sup>40</sup> For the United States, costs of about \$2,1 billion p.a. were estimated. While the aggregate approach resulted in a benefits estimate of about \$6,0 billion p.a., the disaggregate approach result in savings of about \$3,38 billion p.a. (overcharges) and about \$0,34 billion p.a. (deadweight loss) on average for cartel enforcement. The lysine case study showed an overall overcharge of about \$113 million over the whole cartel period of 23 months, however, only a deadweight loss saving of about \$11,3 million over the whole cartel period. It can be seen that the deadweight loss 'savings' alone cannot cover the overall costs of antitrust enforcement. The same conclusion is basically true for the Netherlands where the cost estimate was about €61,5 million p.a. The benefits estimate of Postema et al. (2006) led to an estimate of about €154 million p.a. from merger enforcement alone (focusing on deadweight losses and redistribution effects). The case study of the Nuon-Reliant case again showed that the redistribution loss of about €280 million p.a. could cover the enforcement costs for the whole Dutch antitrust system. However, again, the deadweight losses alone are relatively small (about €1,7 million p.a.) and cannot cover the costs of antitrust enforcement.

enforcement, the respective cartel would have continued to exist causing welfare losses. In other words, the direct benefits of detecting a cartel can be approximated by the net present value of the yearly benefits for society in the future.

Notwithstanding the desirability of such an analysis, it is important to note that not all customer losses are relevant for an antitrust policy that strictly follows a total welfare standard. Especially the consumers that just pay more for their products are not reflected in the total welfare loss as their loss in surplus is just redistributed to the producers. The total welfare loss of a cartel agreement is created by the customers who would have bought the product at the competitive price but refrain from buying the product at the elevated cartel price. This total welfare loss is reflected in the so-called deadweight loss.

The detection of a cartel typically leads to two types of antitrust suits: a criminal suit and a private suit. In the criminal suit, the state basically punishes the cartel members for their misdemeanour or felony with fines and probably even incarceration of the individuals responsible for the cartel agreement, while in the so-called private antitrust suits, potentially damaged private parties can sue the cartel members for compensation of their damages. In US antitrust law, for example, up to treble damages are possible as compensation creating an additional fine for cartelisation as well as an incentive to bring suits for the potentially damaged parties. The follow-up question of which parties are considered as 'potentially damaged' is given in Figure 5 below.

**Fig. 5.** Potentially damaged parties due to cartel members increasing prices



Source: Inspired by a comparable Figure in Clark et al., 2004: 13

As Figure 5 shows, on the upstream level, input suppliers of the cartel members might be damaged due to the reduction in sales volume caused by the cartel. Furthermore, the reduction in sales might lead to diseconomies of scale in the production process of the input suppliers and correspondingly might lead to an increase in its average total cost. As a consequence, every firm using the input product is eventually harmed by the cartel agreement due to elevated input prices.

<sup>41</sup>

On the level of the cartel agreement, it is possible that non-cartel members have suffered due to the cartel agreement. However, as theoretical research has shown, it can very well be the case that non-cartel members manage to take advantage of the cartel (i.e. raised their prices and profits compared to the competitive counterfactual) without actually joining the cartel (see generally Philips, 1995: 23ff.). Additionally, producers of complementary products to the cartelised product might have been damaged due to lower sales caused by the cartel agreement. To give a practical example, if a shoe cartel is formed and the production and sales of shoes is reduced, it is imaginable that the producers of shoe polish (the complementary product) experience a decline in demand and consequently might also be damaged by the cartel agreement.

On the downstream level, the so-called 'direct' effect of the cartel is the damage caused by charging elevated prices to the direct purchasers of the cartel product. Typically, this damage is calculated by multiplying the difference between the price charged by the cartel and the price that would have existed in the absence of the cartel (the so-called 'but for' price) with the respective sales volumes. Although the basic calculation concept is straightforward, its practical implementation is often challenging; especially the fixing of the 'but-for' price is a difficult exercise as the resulting damage amount is typically sensitive to changes in the 'but-for' price. In the following, such a calculation of damages (and deadweight losses) is exemplified with data from the (global) lysine cartel which

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<sup>41</sup> The question if and to what extent such cost increases are passed on downstream basically depends on the so-called 'pass-on rate' which is (in a competitive industry) given by  $\psi = \frac{1}{1 + \varepsilon_D^m \cdot \varepsilon_S^m}$ .  $\varepsilon_D^m$  represents the market demand elasticity and  $\varepsilon_S^m$  stands for the market supply elasticity, i.e. the percentage increase in marginal costs when the output rises by one percent. Supposing a demand elasticity of 0,5 and a market supply elasticity of 1,0, the pass-on rate can be calculated to  $(1/(1+(0,5*1)))=0,67$ . See van Dijk and Verboven (2005) as well as Kosicki and Cahill (2006) for longer treatments of pass-on rates - and indirect purchaser analysis generally - in cartel damage cases. The authors also provide an assessment of the chances of the potentially damaged parties (on different downstream levels) to prevail in court with their damage claims. In general, no restitution is granted to parties who weren't customers of the cartel but argue that they would have bought the cartel product at competitive prices. In other words, the deadweight loss caused by the cartel is not part of the damages estimate derived in court. As argued by Møllgaard (2006), the public fines - which are imposed as part of public enforcement - could be interpreted as restitution to society for the deadweight losses caused by the cartel (see generally Leslie (2006) for an in-depth assessment of the relationship between antitrust damages and deadweight losses).

operated from August 1992 until June 1995. However, due to data limitations, only the losses to customers in the United States can be estimated in the following.

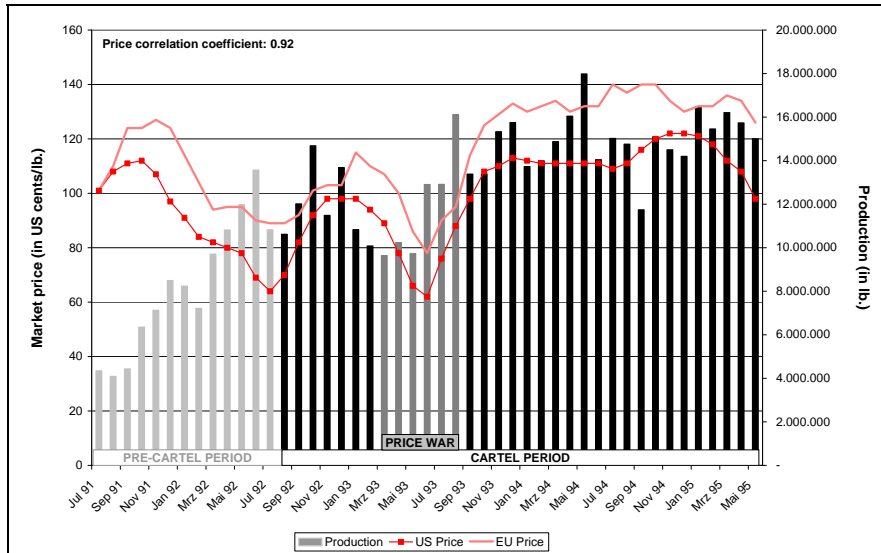
Lysine is an essential amino acid which helps (via its influence on proteins) to speed the development of muscle tissue in humans and animals.<sup>42</sup> From the beginning of lysine production in the 1960s until the early 1980s, the world demand of lysine was basically produced by two firms - basically 'acting as one' - based in Japan. In 1980, a South Korean firm successfully entered the market on a smaller scale, followed by two additional newcomers in the early 1990's: Archer-Daniels-Midland (ADM) in the US and Cheil Sugar Co. in South Korea. The industry consequences of especially the large-scale entry of ADM were quite substantial as described by Connor ((2002), p. 10): "Within 18 months, ADM's plant had expanded global production capacity by 25% above year-end 1990 levels; by 1993, ADM's single plant accounted for one-third of global capacity (780 million pounds). ADM's strategic objective was to acquire a global market share equal to the industry leader, Ajinomoto. Ruthless price cutting by ADM and the sudden appearance of large excess capacity caused lysine prices to plunge 45% in the first 18 months of the Decatur plant's operation".

Given the somewhat 'destructive' competition in the industry, the two Asian incumbents and ADM decided to form a 'lysine trade association' which was later joined by two other major lysine producers. The cartel investigations later assumed that 'the association' began its 'operations' in August 1992 and ceased to exist with the FBI raids in June 1995. During the cartel period, in early 1993, a brief price war occurred, basically because the cartel members couldn't agree on global market shares. However, the dispute was somehow solved after a couple of months and the cartel was reinstated. Figure 6 below shows the lysine market prices for the United States and the European Union as well as the monthly production of ADM between July 1991 and May 1995.

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<sup>42</sup> The section on the lysine cartel history follows Connor (2002: 8ff. and 2001: 6ff.).

**Fig. 6.** Average monthly lysine prices and ADM’s lysine production between July 1991 and June 1995



Source: The raw data stems from Connor (2002).

Firstly, Figure 6 shows that market prices between the United States and the European Union are highly correlated - already in the pre-cartel period - indicating that both regions are in the same relevant (probably global) market. Secondly, the figure shows the substantial decline in market price prior to the cartel (at least partly caused by the substantial increase in ADM’s lysine production) as well as the substantial market price increases (up to a level of \$0,98 per lb. from November 1992 to January 1993) following the cartel agreements. It shows as well the substantial price decline during the price war in early 1993 (down to a level of \$0,62 in June 1993). However, after the price war, the cartel managed to raise (and stabilise) prices around \$1.20 until the FBI cracked the cartel in June 2005.

The availability of data on production, prices and average total cost of ADM between July 1991 and June 1995 (i.e. the pre-cartel period as well as the whole cartel period) allows a simple ‘back of the envelope’ quantification of the additional profits ADM was able to collect due to the cartel agreement. The calculations are conducted in Table 8 below.<sup>43</sup>

<sup>43</sup> It is straightforward to see that the simple spreadsheet approach to quantify the excess profits of ADM followed in Table 32 below is very rough and would certainly not be considered as ‘acceptable’ in an actual damages trial. However, the aim here is not the exact calculation of damages but the derivation of a ballpark figure on the economic effects of a cartel agreement. Veljanovski (2007b: 11f.) identifies the

Columns (1) and (2) show the US (respective EU) market prices for lysine. Only the US price is used for the estimation. Column (3) shows the average total cost of lysine production of ADM as estimated by Connor (2002: 34). Column (4) in the calculation spreadsheet above adds an average return on investment of 6% of sales (see Connor (2002: 25) to the ATC to get a cost-based ‘but-for’ price which would have existed in the absence of the cartel. Column (5) shows the monthly lysine production of ADM. As detailed sales data is unavailable, the calculations have to assume that the whole monthly production is sold to the US market price in the United States in the same month. Columns (6), (7) and (8) calculate total costs, revenues and profit of ADM during the cartel as well as in the pre-cartel period. Columns (9) and (10) provide the numbers on revenues and profits ADM would have made if they faced the competitive ‘but-for’ price. Column (11) finally calculates the excess profit collected by ADM during the cartel. To get this value, the ‘but-for’ profit in column (10) simply has to be subtracted from the total profit estimate in column (8). The last column (12) provides an estimate of the deadweight loss caused by ADM’s participation in the cartel. Due to the unavailability of marginal cost data as well as (market) elasticity data, it is not possible to apply the general formula for the deadweight loss derived in section 2 above. Instead, a defensive general estimate of the deadweight loss of 10% of the total overcharge is used, based on Connor and Helmers (2006: 21) who typically experience the deadweight loss between 10% and 30% of the total overcharge.

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following ten steps which would be necessary to quantify the aggregate overcharge damages in a damages trial:

1. Determine or estimate the actual cartel prices for each period;
2. Determine or estimate the quantity purchased by each claimant,
3. Estimate the price for each period in the absence of the illegal cartel (known as the ‘but-for’ price);
4. Calculate the overcharge in each year by subtracting the estimated ‘but-for’ price from the actual price for each year period;
5. Estimate the proportion of the overcharge absorbed by upstream supplier;
6. Estimate any downstream pass-on of the overcharge;
7. Multiply the net annual overcharge absorbed by the claimant by quantity purchased in each year to arrive at the annual net overcharge absorbed by the claimant;
8. Apply the statutory simple pre-judgment interest rate;
9. Take account of other factors required by law, such as taxation; and
10. Aggregate annual net losses to arrive at a compensable amount.

**Table 8.** Estimating excess profits of ADM collected during the lysine cartel (1992-1995)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Month/ Year	US Price	EU Price	ATC	ATC + ROI	Production	Total costs	Total revenue	Total profit	But-for revenue	But-for profit	Excess Profit	DWL Estimate
	Cents /lb.	Cents/ lb.	Cents /lb.	6% of sales	lb.	US Dollar	US Dollar	US Dollar	US Dollar	US Dollar	US Dollar	10% of (11)
Jul 91	101	101	144,80	150,86	4.345.749	6.292.645	4.389.206	-1.903.438	6.555.997	263.352	-2.166.790	-216.679
Aug 91	108	110	146,90	153,38	4.091.849	6.010.926	4.419.197	-1.591.729	6.276.078	265.152	-1.856.881	-185.688
Sep 91	111	124	136,70	143,36	4.438.936	6.068.026	4.927.219	-1.140.807	6.363.659	295.633	-1.436.440	-143.644
Oct 91	112	124	112,80	119,52	6.351.685	7.164.701	7.113.887	-50.813	7.591.534	426.833	-477.647	-47.765
Nov 91	107	127	99,40	105,82	7.125.868	7.083.113	7.624.679	541.566	7.540.594	457.481	84.085	8.409
Dec 91	97	124	84,80	90,62	8.494.708	7.203.512	8.239.867	1.036.354	7.697.904	494.392	541.962	54.196
Jan 92	91	114	82,10	87,56	8.238.434	6.763.754	7.496.975	733.221	7.213.573	449.818	283.402	28.340
Feb 92	84	104	103,90	108,94	7.212.517	7.493.805	6.058.514	-1.435.291	7.857.316	363.511	-1.798.802	-179.880
Mar 92	82	94	81,90	86,82	9.705.598	7.948.885	7.958.590	9.706	8.426.400	477.515	-467.810	-46.781
Apr 92	80	95	75,10	79,90	10.817.071	8.123.620	8.653.657	530.036	8.642.840	519.219	10.817	1.082
May 92	78	95	68,50	73,18	11.976.225	8.203.714	9.341.456	1.137.741	8.764.201	560.487	577.254	57.725
Jun 92	69	90	68,30	72,44	13.562.577	9.263.240	9.358.178	94.938	9.824.731	561.491	-466.553	-46.655
Jul 92	64	89	69,60	73,44	10.827.913	7.536.227	6.929.864	-606.363	7.952.019	415.792	-1.022.155	-102.215
Aug 92	70	89	72,60	76,80	10.623.797	7.712.877	7.436.658	-276.219	8.159.076	446.199	-722.418	-72.242
Sep 92	82	92	68,40	73,32	12.015.189	8.218.389	9.852.455	1.634.066	8.809.537	591.147	1.042.918	104.292
Oct 92	92	101	62,20	67,72	14.684.324	9.133.650	13.509.578	4.375.929	9.944.224	810.575	3.565.354	356.535
Nov 92	98	103	66,50	72,38	11.489.102	7.640.253	11.259.320	3.619.067	8.315.812	675.559	2.943.508	294.351
Dec 92	98	103	64,80	70,68	13.688.529	8.870.167	13.414.758	4.544.592	9.675.052	804.886	3.739.706	373.971

Jan 93	98	115	71,00	76,88	10.831.684	7.690.496	10.615.050	2.924.555	8.327.399	636.903	2.287.652	228.765
Feb 93	94	110	73,90	79,54	10.081.811	7.450.458	9.476.902	2.026.444	8.019.072	568.614	1.457.830	145.783
Mar 93	89	107	81,40	86,74	9.642.060	7.848.637	8.581.433	732.797	8.363.523	514.886	217.911	21.791
Apr 93	78	100	79,80	84,48	10.240.442	8.171.873	7.987.545	-184.328	8.651.125	479.253	-663.581	-66.358
May 93	66	86	82,10	86,06	9.728.883	7.987.413	6.421.063	-1.566.350	8.372.677	385.264	-1.951.614	-195.161
Jun 93	62	78	69,00	72,72	12.901.675	8.902.156	7.999.039	-903.117	9.382.098	479.942	-1.383.060	-138.306
Jul 93	76	90	75,40	79,96	12.910.910	9.734.826	9.812.292	77.465	10.323.564	588.737	-511.272	-51.127
Aug 93	88	95	66,10	71,38	16.120.703	10.655.785	14.186.219	3.530.434	11.506.958	851.173	2.679.261	267.926
Sep 93	98	114	70,40	76,28	13.386.541	9.424.125	13.118.810	3.694.685	10.211.253	787.129	2.907.557	290.756
Oct 93	108	125	74,10	80,58	13.391.778	9.923.307	14.463.120	4.539.813	10.791.095	867.787	3.672.026	367.203
Nov 93	110	129	73,10	79,70	15.332.011	11.207.700	16.865.212	5.657.512	12.219.613	1.011.913	4.645.599	464.560
Dec 93	113	133	74,20	80,98	15.754.486	11.689.829	17.802.569	6.112.741	12.757.983	1.068.154	5.044.586	504.459
Jan 94	112	130	83,20	89,92	13.728.572	11.422.172	15.376.001	3.953.829	12.344.732	922.560	3.031.269	303.127
Feb 94	111	132	76,30	82,96	13.991.012	10.675.142	15.530.023	4.854.881	11.606.944	931.801	3.923.080	392.308
Mar 94	111	134	78,00	84,66	14.877.289	11.604.285	16.513.791	4.909.505	12.595.113	990.827	3.918.678	391.868
Apr 94	111	130	71,90	78,56	16.046.847	11.537.683	17.812.000	6.274.317	12.606.403	1.068.720	5.205.597	520.560
May 94	111	132	72,10	78,76	17.989.196	12.970.210	19.968.008	6.997.797	14.168.291	1.198.080	5.799.717	579.972
Jun 94	111	132	89,40	96,06	14.046.932	12.557.957	15.592.095	3.034.137	13.493.483	935.526	2.098.612	209.861
Jul 94	109	140	69,00	75,54	15.018.568	10.362.812	16.370.239	6.007.427	11.345.026	982.214	5.025.213	502.521
Aug 94	111	137	69,70	76,36	14.754.791	10.284.089	16.377.818	6.093.729	11.266.758	982.669	5.111.060	511.106
Sep 94	116	140	76,90	83,86	11.746.095	9.032.747	13.625.470	4.592.723	9.850.275	817.528	3.775.195	377.519
Oct 94	120	140	68,50	75,70	15.089.369	10.336.218	18.107.243	7.771.025	11.422.652	1.086.435	6.684.590	668.459
Nov 94	122	134	72,90	80,22	14.502.449	10.572.285	17.692.988	7.120.702	11.633.865	1.061.579	6.059.123	605.912
Dec 94	122	130	77,60	84,92	14.199.351	11.018.696	17.323.208	6.304.512	12.058.089	1.039.392	5.265.119	526.512
Jan 95	121	132	72,60	79,86	16.467.133	11.955.139	19.925.231	7.970.092	13.150.652	1.195.514	6.774.579	677.458



Feb 95	118	132	72,90	79,98	15.454.384	11.266.246	18.236.173	6.969.927	12.360.416	1.094.170	5.875.757	587.576
Mar 95	112	136	75,30	82,02	16.206.394	12.203.415	18.151.161	5.947.747	13.292.484	1.089.070	4.858.677	485.868
Apr 95	108	134	66,30	72,78	15.733.764	10.431.486	16.992.465	6.560.980	11.451.033	1.019.548	5.541.432	554.143
May 95	98	126	74,40	80,28	15.004.248	11.163.161	14.704.163	3.541.003	12.045.410	882.250	2.658.753	265.875
Jun 95	96	0	73,70	79,46	14.754.945	10.874.394	14.164.747	3.290.353	11.724.279	849.885	2.440.468	244.047
	101	115	73,31	79,37	482.435.264	352.530.077	495.264.847	142.734.771	382.245.967	29.715.891	113.018.880	11.301.888

Source: Own calculations based on data from Connor (2002); Connor's ATC estimates and US market prices used for calculations; Monthly production = Monthly sales assumed.

The results of the calculations in Table 8 show that the overall excess profit for ADM alone was about \$113 million (or \$3,229 million per month on average) during the cartel period from August 1992 to June 1995. The deadweight loss caused by ADM in the same period was about \$11 million (or \$0,322 million per month on average). The table further shows that the derived average ‘but-for’ price of \$0,7937 is relatively close to the ‘but-for’ price of \$0,8000 which was derived (by a different technique) during the trial (see Connor, 2006a: 18). The spreadsheet calculations further allow deriving the ‘incremental’ reduction in damages if the ‘but-for’ price is reduced by one cent. The result of \$4,82 million damage reduction per cent generally shows the sensitivity of the damage calculations to the ‘but-for’ price mentioned above. From a practical perspective, it shows why it usually pays for the defendant to hire economic experts: They might be able to reduce the ‘but-for’ price by a few cents and so might save the defendant millions and millions of dollars in damages.<sup>44</sup>

From a conceptual perspective, it is important to mention that apart from the ‘cost-based method’ applied above, several alternative methods to derive the ‘but-for’ price exist (see generally van Dijk and Verboven (2005) as well as Clark et al (2004) for recent surveys). The ‘before-and-after’ method basically undertakes price comparisons before and after the infringement, while the so-called ‘yardstick method’ analyses similar (ideally competitive) product markets to derive a ‘but-for’ price for the cartelised market. One additional possibility is the application of economic models aiming at simulating competition and deriving an estimate for the ‘but-for’ price. For example, in a simple Cournot model with homogenous goods, the market price  $P$  can be estimated by using the following expression ( $\varepsilon_D^m$  is the market demand elasticity,  $c$  are marginal cost and HHI is the Herfindahl-Hirschman Index):

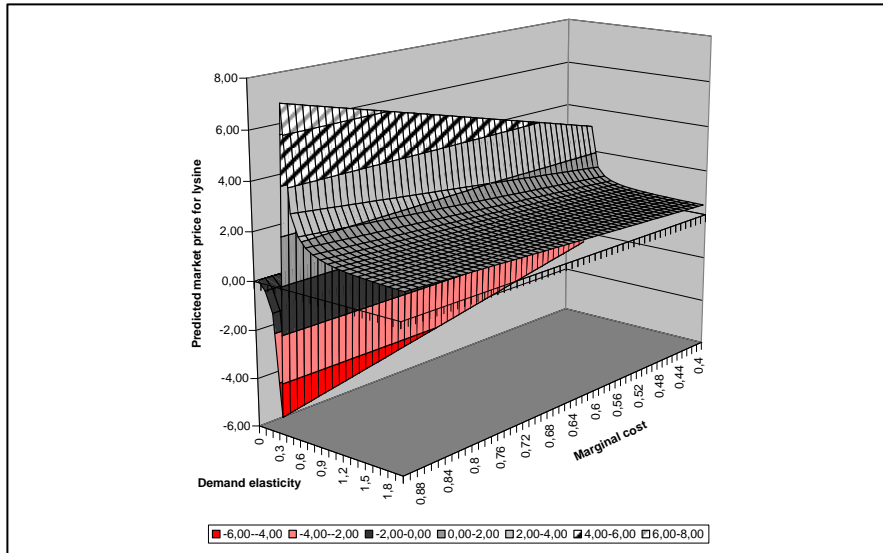
$$P = \frac{\varepsilon_D^m \cdot c}{\left(\varepsilon_D^m - HHI\right)}. \quad (8)$$

Equation (8) basically shows that the predicted ‘but-for’ price decreases with the number of firms in the market. In a competitive industry, the ‘but-for’ price would be equal to marginal costs. As reported by Connor (2000: 66f.), economists defending ADM actually used price estimates derived by a similar Cournot model to calculate (lower) damages. One basic problem which such estimates turned out to be its sensitivity to small changes in the underlying assumptions on market demand elasticity and marginal cost. This can be exemplified by plotting the above equation for different marginal costs of lysine (range from \$0,40-\$0,90 per lb.) as well as different absolute demand elasticities (range from 0,0-2,0; see Figure 7 below).

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<sup>44</sup> The exact values for different ‘but-for’ prices are as follows: \$157.560.162 for a ‘but-for’ price of \$0,70, \$133.438.399 for a ‘but-for’ price of \$0,75, \$109.316.636 for a ‘but-for’ price of \$0,80, \$85.194.873 for a ‘but-for’ price of \$0,85, \$61.073.110 for a ‘but-for’ price \$0,90, \$36.951.346 for a ‘but-for’ price of \$0,95 and still \$12.829.583 for a ‘but-for’ price of \$1,00.

**Fig. 7.** Predicted lysine ‘but-for’ prices applying a basic Cournot model with homogenous goods (HHI=3.500)



As shown in Figure 7 (as well as in the corresponding Table 66 in Annex 6.7), the price predictions of the Cournot model can indeed be sensitive to slight changes of the marginal costs as well as the underlying demand elasticity. Especially in case of relatively inelastic demand (which was assumed to be the case for lysine), the predicted Cournot prices can even be negative or up to 800% higher than marginal cost. It is obvious that such model specifics make it difficult to use the respective results (successfully) in the courtroom - first of all because such results are easy to attack by the plaintiff.

However, it shouldn't be concealed that economics provide much more sophisticated methods to simulate ‘but-for’ prices. Given a sufficient data basis, it would be possible to conduct a simulation analysis which combines a demand model, a firm model as well as a model of competitive interaction to receive ‘simulated’ market outcomes for different scenarios. De Roos (2006), for instance, construct and applies such a more sophisticated collusion model in order to understand the lysine market and to derive ‘meaningful’ ‘but-for’ prices.

Finally, it is worth mentioning that the criminal lysine price fixing conspiracy trials led to five corporate fines and seven personal fines. The US corporate fines add up to \$92,5 million, compared to \$97,9 million in the EU and \$11,5 million in Canada. In 1999, three persons were sentenced to a total of 99 months in prison (with a maximum per individual of 36 months). The private antitrust suits ended with agreements that the cartel members pay damages of (in sum) about \$85 million (only in the United States) which was roughly the loss of the lysine buyers in the United States. US antitrust law would have allowed up to treble damages.

## 6.2 Estimating the potential welfare effects of a merger - Evidence from the Nuon-Reliant case in the Netherlands

Merger enforcement is another area which is believed to contribute substantially to the overall benefits of antitrust enforcement - basically by banning anticompetitive mergers which likely would have resulted in either an increase in market power and therefore would have caused higher prices (the so-called unilateral effects) and/or a market environment which would have been more favourable to collusion and - through this channel - would have caused higher prices (the so-called coordinated effects). In the following, evidence from the Nuon-Reliant case in the Dutch electricity market is analysed with respect to its (hypothetical) contribution to the benefits of antitrust enforcement in the Netherlands.

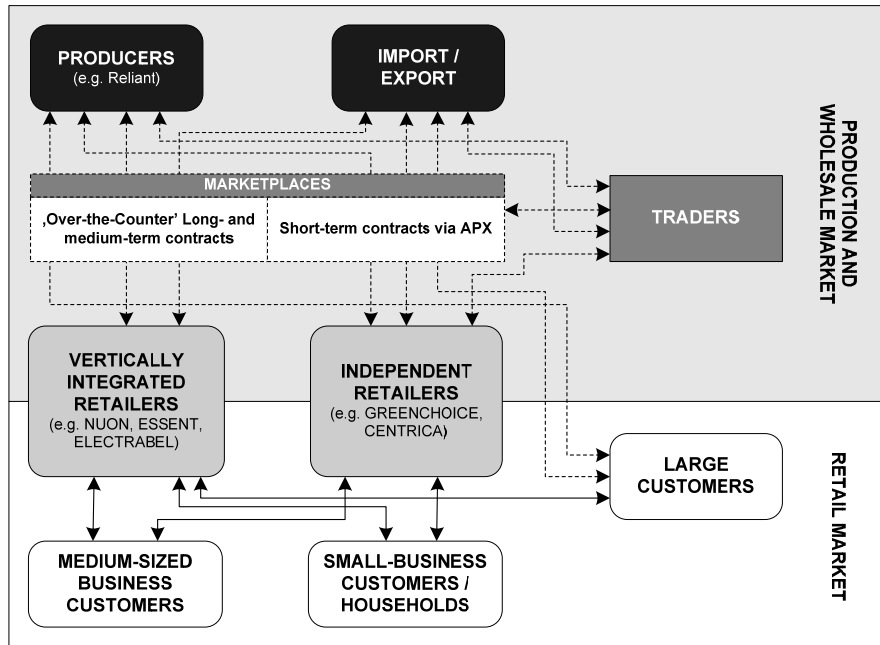
Nuon is a Dutch energy utility which operates - amongst other activities - in the electricity wholesale and retail markets in the Netherlands. At the beginning of 2003, it also owned some generation capacity (about 900 MW decentralised capacity) and had a long-term contract (about 800 MW) with an independent Intergeren power plant. In 2003, Reliant Energy Europe ('Reliant'), one of the major electricity generators in the Netherlands (about 3.500 MW capacity), planned to withdraw its activities in the Netherlands and Nuon saw the acquisition<sup>45</sup> of Reliant's assets as an opportunity to promote its plans to further vertically integrate on the upstream (generation) level. The general market structure of the Dutch electricity market in 2003 is depicted in Figure 8 below.

As shown in Figure 8, on the upstream level, the producers of electricity (in the Netherlands as well as in the neighbouring countries) can basically use two different marketplaces to trade their product. The largest part of the expected demand is traded via long- and medium term contracts (the so-called 'over the counter' contracts) from several years to months prior to supply. Short-term contracts come into play when actual demand can be estimated more precisely. These contracts are then traded at the Amsterdam Power Exchange (APX) - the Dutch spot market for electricity. Traders generally buy and sell electricity aiming at using price differences to make a profit. On the downstream level, vertically integrated retailers (i.e. firms with own generation capacity) as well as independent retailers supply business customers as well as households with electricity. Large customers tend to secure their electricity needs by signing long-term contracts directly with the producers.

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<sup>45</sup> Although Nuon-Reliant is de-facto an acquisition, it is referred to as a 'merger' in the following. This procedure is in line with antitrust literature which typically does not use constructs such as 'acquisition control' or 'merger and acquisition control'.

Fig. 8. The Dutch electricity market in 2003



Source: inspired by a comparable Figure in NMa (2006: 19).

On 2<sup>nd</sup> April 2003 Nuon notified to the Dutch Competition Authority (NMa) that it wishes to acquire the Dutch electricity generation assets of Reliant. The NMa conducted an in-depth investigation of the case and came to the conclusion that the combination of the two firms' generation assets would create or strengthen a dominant position in the electricity generation and wholesale markets in the Netherlands. It therefore only cleared the merger (after several negotiations) subject to the remedy that Nuon has to undertake a series of virtual power plant auctions for 900 MW of capacity per year over a period of five years (see NMa decision, Case 2286 Nuon/Reliant Energy Europe, 8 December 2003). The other major players in the Dutch market - Essent (about 4.300 MW generation capacity) and Electrabel (about 4.000 MW generation capacity) - are not allowed to participate in these auctions. Although Nuon started the required auctions by the end of 2004, it also appealed the NMa's decision at the District Court of Rotterdam. The court undertook a detailed review of the economic analysis of the NMa and annulled the decision of the NMa in June 2005 (Court of Rotterdam, Nuon vs. NMa, LJN: AT6440, 31 May 2005). The economic analysis as well as the critics of the court is outlined in the following.

The investigation of the NMa was based on a relevant market as that for generation and wholesale supply of electricity. For generation, the pre-merger HHI was estimated to 1.754 and the post-merger HHI to 1.974 (see Oxera, 2004: 19) - a range in which competitive concerns are possible. In terms of market

shares, the merger would have led to a combined share between 20 and 30 percent, similar to that of the other major players in the market (Essent and Electrabel). Given these structural characteristics, the NMa basically argued that the proposed acquisition would create or strengthen a dominant position because of increased incentives of ‘generators at the margin’ to behave strategically in peak-times and therefore to cause higher post-merger prices.<sup>46</sup> In order to underpin this argument, the authority appointed two consultancies to build simulation models of the Dutch electricity market which allow studying how the market would likely operate before and after the merger. The first model was designed and applied by the Energieonderzoek Centrum Nederland (ECN) while the second stem from the UK-based economic consultancy Frontier Economics (FE).

The ECN model ‘COMPETES’ is a Cournot model that contains information on marginal costs about production units as well as the electricity network in Benelux, Germany and France. Following the description of van Damme (2005: 163), the model is conceptually based on a linear demand curve and distinguishes 12 different demand curves for three different seasons (summer, winter, fall/spring) and for each of these super-peak, peak, shoulder and off-peak periods. For each of these periods, one point on the demand curve is determined from historical data while at that point an elasticity of -0,2 (Scenario 1) or -0,1 (Scenario 2) is assumed. Information on marginal costs and demand allows computing the Nash equilibria of the Cournot game pre-merger and post-merger.

The SPARK model applied by Frontier Economics determines, inter alia, the Nash equilibrium bidding strategies for all generators under ‘realistic’ market conditions including, for example, generator operating characteristics, transmission losses and constraints or demand fluctuations (see Steinke et al. (2005: 5ff.) as well as Frontier Economics (2000) for the following description as well as a simple example). The model can be operated to find the least cost

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<sup>46</sup> As explained in more detail in Oxera (2004b: 18f.), the scope of market power for a particular electricity generator depends on its position in the merit order of generators. At the lower end of the merit order, generators - such as nuclear power or coal-fired plants - are located with low marginal cost but also a low flexibility to adjust production following demand changes. These plants provide the base load. If demand increases (often from one minute to the other), generators with higher marginal cost but also a higher flexibility - such as gas- or oil-fired plants - will start producing electricity. Generators with very high marginal costs only operate in peak-demand periods. The last generator which is needed to meet existing demand sets the market price for electricity. This opens possibilities for the owners of generators to behave strategically aiming at increasing the market price in peak hours (under the assumption that import capacity is constrained and already fully utilised at peak demand). As a consequence, the market-power effects of a merger between two base-load generators can be substantially lower than a merger between two peak-load generators even if the increase in the Herfindahl-Hirschman Index for the former merger would be substantially larger. In other words, the HHI alone does not provide a full picture of the competitive forces and the likelihood of price increases due to a merger in the electricity industry (see Stoft (2002: 357ff.) and NMa (2006) for detailed descriptions).

operation of the system (i.e. the economic dispatch), or it can be operated to find the most profitable (=sustainable) operation of the market (that is the equilibrium price). In this type of model the optimal bid will change, as it does in a real market, according to the changing market conditions - for example, operation of transmission constraints, plant failures or new investments. Many commentators such as NERA (2005) or van Damme (2005: 163) connect the Frontier model to the 'supply function equilibrium' approach formulated by Klemperer and Meyer (1989) as a third way to model competitive interaction in electricity markets next to Cournot and Bertrand models. However, FE itself did not explain which model of competitive interaction comes closest to their simulation approach.

Based on their respective simulation approaches, ECN and FE both estimated the pre-merger price level and compared it with the post-merger price level. The ECN model shows a merger-induced price increase of 5,9% for an underlying demand elasticity of -0,2 and about 10,4% for an underlying demand elasticity of -0,1. Given the pre-merger quantity (approximated by the Dutch electricity production in 2001 (around 90.000 MWh) plus the import-export difference in 2001 (around +17.000 MWh)), it is straightforward to derive the post-merger quantity via the usual elasticity expression. It is then possible to estimate the redistribution effect (per year) from consumers to producers as well as the deadweight loss (per year) caused by the proposed acquisition. The results are presented in Table 9 below.

**Table 9.** Welfare effects of the attempted prohibition of the merger between Nuon and Reliant in the Netherlands

	ECN Simulation Model I	ECN Simulation Model II	FE Simulation Model I	FE Simulation Model II
	Price increase of 5,9%	Price increase of 10,4%	Price increase of 13,3%	Price increase of 13,3%
Pre-merger price (€/MWh)	44,9	44,9	43,7	43,7
Post-merger price (€/MWh)	47,5	49,6	49,5	49,5
Demand elasticity	-0,2	-0,1	-0,2	-0,1
Pre-merger quantity (MWh)	107.000.000	107.000.000	107.000.000	107.000.000
Post-merger quantity (MWh)	105.737.400	105.887.200	104.160.220	105.580.110
Redistribution effect (€/year)	280.108.946	494.450.869	604.024.074	612.258.002
Redistribution effect (% of sales)	5,57	9,42	11,72	11,72
Deadweight loss (€/year)	1.672.377	2.598.165	8.233.928	4.116.964
Deadweight loss (% of redistr.)	0,60	0,53	1,36	0,67

Source: Own calculations based on Oxera (2004b), p. 21

As Table 9 shows, the four simulation results lead to relatively different redistribution effects as well as deadweight losses. However, the redistribution effect appears to be substantial ‘across the board’ (between 5,57% and 11,72% of post-merger sales) while the deadweight losses are - due to the low demand elasticity - relatively small (between 0,60% and 1,36% of the redistribution effect). Aside from the fact that the quantitative results differ quite substantially, their ‘signs’ are identical for all four models. In other words, all four models predict substantial price increases following an acquisition of Reliant by Nuon. However, it has to be kept in mind that the whole analysis is static and therefore does not consider potentially important dynamic effects of merger enforcement on innovation intensity and productive efficiency in the Dutch electricity market.

As already seen in the cartel case study above, simulation results tend to be quite sensitive to small changes in parameters such as demand elasticities or - as here - the underlying price increase that is believed to be caused by the merger.<sup>47</sup> In order to see the sensitivity of the results in this case, Figure 9 shows different deadweight loss- as well as redistribution effect-ranges dependent on a range of the assumed % increase in price due to the merger and a range of the assumed market demand elasticity.

In Figure 9, (1) marks the value of ECN’s simulation result I, (2) the value of ECN’s simulation result II, (3) marks the value of Frontier Economics’ simulation result I and (4) the value of Frontier Economics’ simulation result II. In general, the figure shows that the quantitative results are again quite sensitive to small parameter changes. These specifics were one cornerstone in the (successful) attempt of Nuon to convince the Court of Amsterdam that the simulations of ECN and FE are not sufficient to prove anticompetitive effects as a consequence of the merger (following Dutch competition law).

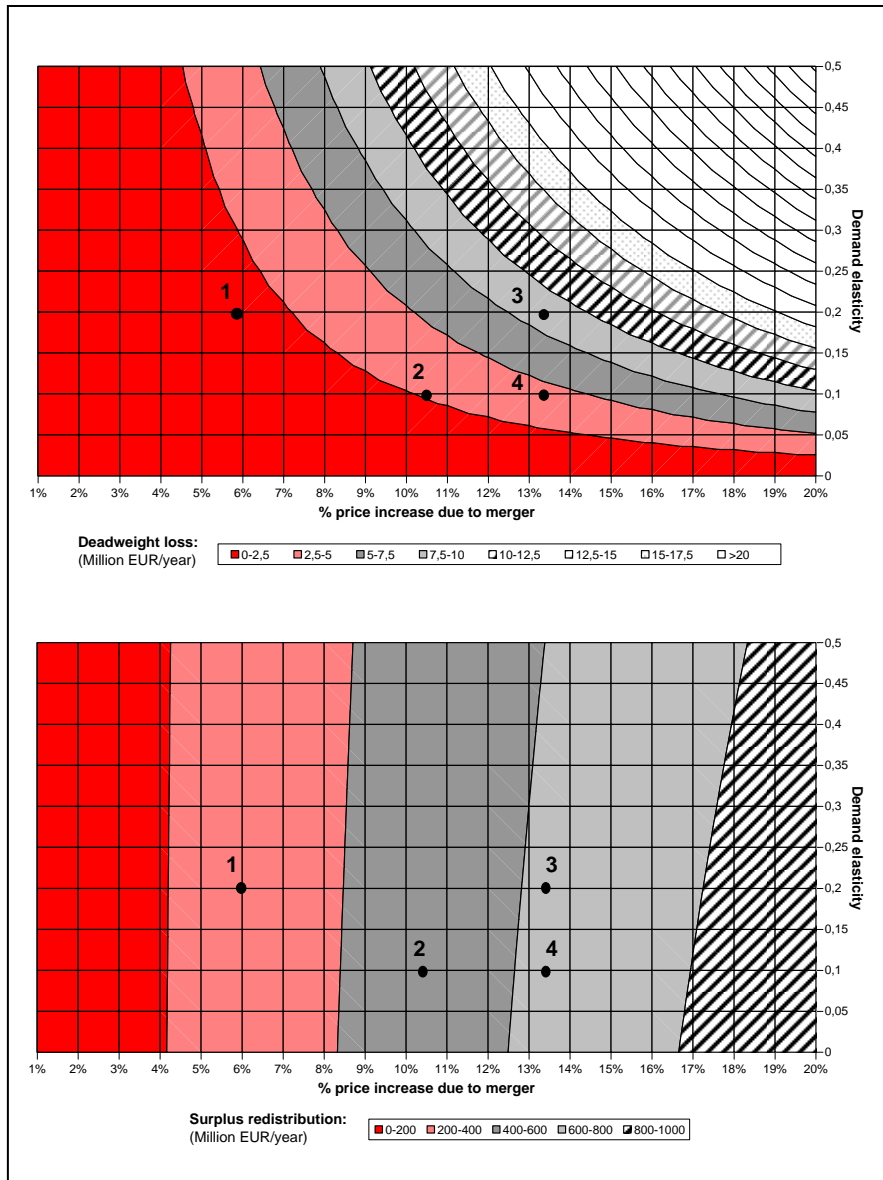
In the evaluation of the two models, several large economic consultancies were involved. Oxera was hired for an independent external evaluation of the models. NERA and RBB Economics supported Nuon (see van Bergeijk (2005), Oxera (2004), NERA (2005) and RBB Economics (2005) for their respective views of the case). As discussed in van Damme (2005: 163f.), the basic arguments against the significance of the merger simulations (and in particular the FE model) were that the pre-merger price distribution is not in line with the one actually observed, inelastic demand is unrealistic, demand side bidding is neglected, the Nash equilibria are not sustainable (NERA, 2005), the multiple equilibria problem is (inappropriately) dealt with by the construction of price ranges and averages, no empirical evidence is given that strategic behaviour is a problem in the Dutch market pre-merger (see RBB Economics, 2005), the modelling of the interconnector is inappropriate, the specification of the strategy space is arbitrary and may influence the results, and the model assumes complete information. As mentioned above, the Court of Rotterdam decided that the NMa had not provided sufficient evidence to support its case. The NMa has appealed the judgement.

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<sup>47</sup> See Froeb et al. (2004) for a general discussion of advantages and shortfalls of merger simulations.



**Fig. 9.** Different estimates of the deadweight loss and surplus redistribution per year in the Netherlands due to the proposed Nuon-Reliant merger



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