

A practical guide to computing cartel damages in private actions

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Theon van Dijk (Lexonomics) and Frank Verboven (Catholic University Leuven)¹

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1 Introduction

- 1 We set out economic principles for computing cartel damages. The parties affected by the cartel may in general be both the direct purchasers and the indirect purchasers, including the end-consumers.
- 2 We start from the legal principle in the European Union that private enforcement is based on compensating all parties affected by the cartel, i.e. both direct and indirect purchasers. This implies direct purchasers should not receive compensation for damages they could pass on, and indirect purchasers should receive compensation for passing-on by the direct purchasers. These principles contrast with the U.S. approach, where direct purchasers may be entitled to receive compensation even for damages they could pass on, and where indirect purchasers may not have legal standing for claiming damages.
- 3 We focus the discussion on how to incorporate passing-on in the damages to the various parties. For simplicity we set out the principles based on only two layers: direct purchasers and end-consumers, buying from the direct purchasers. We show at the end that these principles extend to more than two layers.

2 General principles

- 4 The commonly accepted basis for computing cartel damages is the **price overcharge**, the price actually charged during the cartel minus the price that would be charged if no cartel had been formed.

¹ We thank Rainer Becker, Raphael De Coninck and Christian Vollrath for useful comments.

- 5 The price overcharge is one main component of the damage to the direct purchaser. However, it is not the only component because of two related indirect effects: **the pass-on and lost sales effects.**
- 6 First, the direct purchaser may be able to pass-on part of the overcharge to his own customers, the end-consumers. The extent of pass-on should therefore be subtracted from the price overcharge when computing the damage to the direct purchaser. But at the same time the extent of pass-on also constitutes a damage to the end-consumer, who should therefore be eligible to be compensated for this pass-on.
- 7 Second, if the direct purchaser passes on part of the overcharge, consumers will typically respond by purchasing less. This is because consumer demand generally decreases when the price goes up. Hence, whenever there is pass-on there is also a lost sales effect. The profit losses from this lost sales effect should be added to the price overcharge when computing the damage to the direct purchaser.
- 8 Table 1 summarizes the cartel's effects on direct purchasers, end-consumers and total harm.

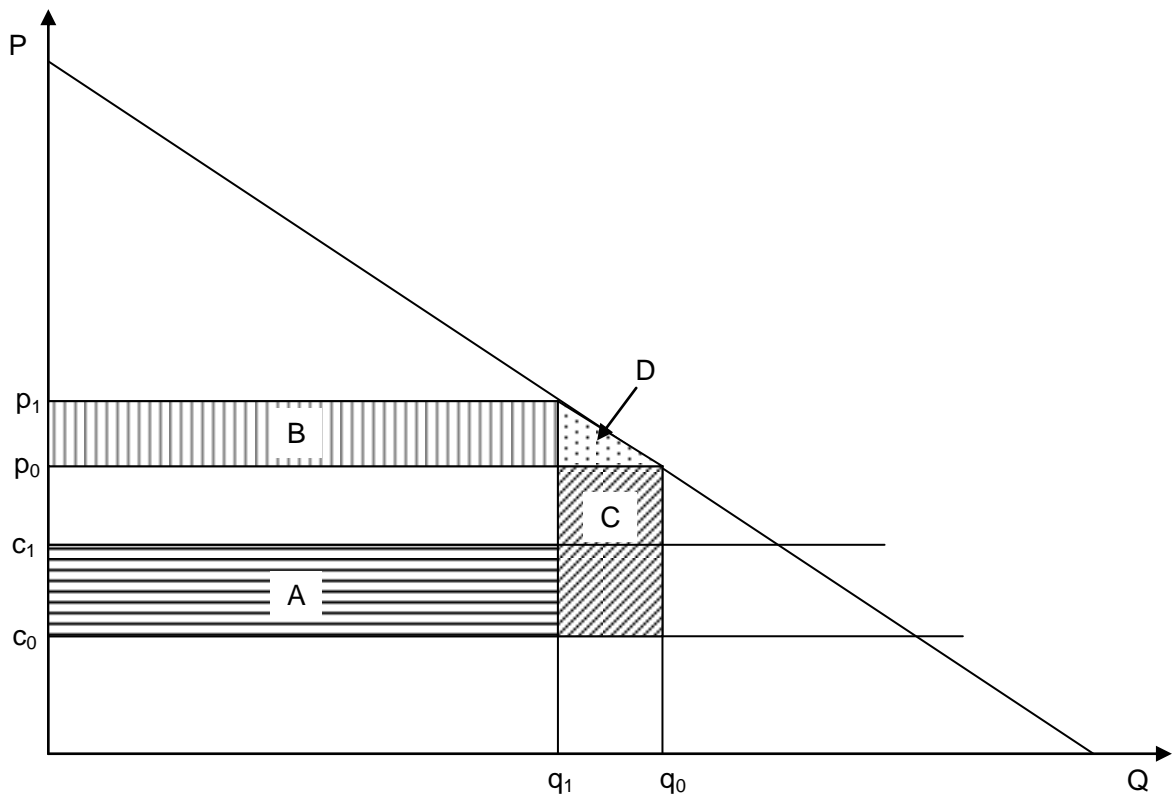
Table 1. Damages accounting with two layers of downstream purchasers

	Overcharge	Pass-on	Lost sales
Direct purchasers	A	-B	C
End-consumers	0	B	0
Total harm	A	0	C

- The direct purchasers' damages are equal to the price overcharge amount (A) MINUS the pass-on of the overcharge (B) PLUS the damage from the lost sales that results from the pass-on (C).
 - The end-consumers' damages are equal to the pass-on of the overcharge (B).
 - Total harm (to direct purchasers and end-consumers) is equal to the price overcharge PLUS the lost sales. Pass-on is just a transfer and therefore does not matter for total harm.
- 9 Figure 1 (on the next page) illustrates the accounting of cartel damages with two layers of downstream purchasers. The downward-sloping curve is the demand curve for the product by end-consumers, and the horizontal lines show the direct purchasers costs and prices. In the absence of a cartel of input suppliers, the direct purchasers would pay a cost of c_0 for their input. But because of the cartel the direct purchasers cost rises to c_1 . Hence, the cartel overcharge is $c_1 - c_0$, and the damages from the overcharge are given by the rectangle A. Furthermore, in the absence of a cartel, the direct purchasers would charge a price to end-consumers of p_0 , but because of the cartel they charge a price p_1 . Hence the extent of pass-on is $p_1 - p_0$, and the direct purchasers' gain from this pass-on is given by the rectangle B. This gain B is a loss for the end-consumers. Finally, because the cartel induces the final price to increase from p_0 to p_1 , the industry sales decrease from q_0 to q_1 . The value of lost sales is given by the rectangle C, i.e. the lost sales multiplied by the profit margin $p_0 - c_0$.

- 10 Note that rectangle C in Figure 1 can be viewed as a “deadweight loss”, i.e. a net harm to society. There is another part of deadweight loss, given by the triangle D. It constitutes a damage for end-consumers (in addition to their damage B), namely those end-consumers that do not buy but that would have bought without the cartel. Under some conditions, area D may be considered as a second-order effect, less important than the main source of the deadweight loss C. This would be the case if the price overcharge and the implied pass-on is not too large relative to the direct purchasers’ profit margin $p_0 - c_0$. Under these circumstances, it can be a reasonable approximation to ignore area D, since this area is more difficult to quantify than the other terms (as it depends on the shape of the demand curve, here linear).

Figure 1. Cartel damages with two layers of downstream purchasers



- 11 While Figure 1 clarifies the various components of damages to the direct purchaser and end-consumer, it does not give much guidance regarding their relative importance. Specifically, one may wonder how the direct purchasers’ losses from the overcharge compare with their pass-on gains and lost sales. Is the price overcharge generally an upper bound to the direct purchasers’ losses (because of the passing-on), so that a discount to the price overcharge is generally appropriate? Or can direct purchasers’ damages be even larger than the price overcharge because of the lost sales? We turn to these questions next.

3 Damages to direct purchasers when all competitors are affected

- 12 If all firms in the downstream industry, where the direct purchasers compete, are symmetric and face the same price overcharge due to the cartel, it is possible to formulate simple rules of thumb regarding the damages to the direct purchasers. As shown in Verboven and van Dijk (2009), the overcharge is a suitable point of departure for computing the direct purchasers' damages, but it should be discounted to account for the net result of the pass-on and lost sales effect.²
- 13 The price overcharge can be estimated by comparing the actual prices and the prices under a non-cartel benchmark, using well-known methods such as the before-and-after method or the yardstick method. We do not elaborate further on these here.
- 14 The discount to the price overcharge is equal to the industry pass-on rate, i.e. pass-on of a common cost increase to all individual firms, adjusted downwards to account for the lost sales effect. We first discuss the industry pass-on rate, and then the lost sales adjustment factor.

3.1 Industry pass-on rate

- 15 The industry pass-on rate (τ) is the extent to which a price overcharge of say 1€, common to all firms in the downstream industry, is passed on to end-consumers. For example, if 1€ of price overcharge leads to a consumer price increase of 0.6€, then the pass-on rate τ is 0.6 or 60%.
- 16 The industry pass-on rate is generally positive, except under extreme circumstances where demand is perfectly elastic or supply is perfectly inelastic (see below). If the industry pass-on rate is between 0 and 1, it is said that there is incomplete pass-on. If the pass-on rate is equal to 1, there is complete pass-on. If it is greater than 1 (a situation which cannot necessarily be ruled out), there is more than complete pass-on.
- 17 The actual magnitude of the industry pass-on rate depends on three key factors: demand, cost and competition conditions.³
- 18 First, the industry pass-on rate depends on the elasticity of marginal costs, or "supply elasticity". This is the sensitivity of marginal costs to changes in output. If supply is very elastic (no or limited capacity constraints), firms tend to pass on a large part of the price overcharge because their reduced output remains equally costly to produce (as in Figure 1). Conversely, if supply is inelastic

² Verboven, F. and T. van Dijk, 2009, Cartel Damages Claims and the Passing-on Defense, *Journal of Industrial Economics*, 57, 457-491.

³ In section 4 we will introduce a fourth factor affecting pass-on, namely the number of affected competitors. However, in this section we focus on the industry pass-on rate, where all competitors are affected.

(strong capacity constraints), firms tend to pass on only a small part, because their reduced output becomes cheaper to produce. (This can also be verified from a standard supply and demand diagram.)

- 19 Second, the industry pass-on rate depends on the price elasticity of demand. If consumer demand is very inelastic (price-insensitive consumers), firms tend to pass on a larger part of the price overcharge because few consumers stop buying after a price increase. Conversely, if demand is very elastic (price-sensitive consumers), firms tend to pass on a small part of the price overcharge. (This can again be verified from a standard supply and demand diagram.)
- 20 Third, the industry pass-on rate depends the degree of competition. In a competitive downstream market with many firms, profit margins tend to be small so that firms tend to pass-on most of their cost savings. In a downstream market with little competition or few firms, markups tend to be high: firms can then potentially pass on less of the overcharge, since they may partly absorb the overcharge by lowering their markups to maintain demand. The extent to which firms would be willing to absorb the overcharge depends on the “curvature” of demand. For example, firms would be willing to lower their percentage markups if consumers become more price elastic when price increases (as with linear demand). But firms would keep their percentage markups constant if consumers remain equally price elastic regardless of the price level (as with constant elasticity demand).⁴
- 21 One might also think of a fourth obvious factor of the industry pass-on rate: the importance of the cartelized input in overall (marginal) costs of the direct purchaser. However, the pass-on rate of the cartelized input should be seen as relative to the cost share. A direct purchaser can therefore not argue that it passed on a negligible amount when the cartelized input is a small fraction of its costs.⁵
- 22 A naïve approach would discount the price overcharge by the extent of the industry pass-on. For example, suppose the price overcharge results in damages of 10M €. With a pass-on rate of 0.6, the discount to these damages in this naïve approach would be 60% or 6M €, so that the actual damages to be paid to the direct purchaser would amount to only 4M €. This discount is generally too high because it fails to take into account the lost sales effect following pass-on, as we discuss next.

⁴ In practice, it may not be easy to estimate the curvature of demand, but one can alternatively directly estimate the pass-on rate.

⁵ When the cartelized input is a small fraction of the cost, it may however become more difficult to detect passing-on of the overcharge. In this case it is appropriate to measure the extent of pass-on by looking at other cost components of the direct purchaser that are more important.

3.2 Lost sales adjustment factor

- 23 The discount to the price overcharge is not just equal to the full pass-on rate (as in the naïve approach), but it should be adjusted downward by an adjustment factor (λ), a number between 0 and 1. This downward adjustment factor is necessary to take into account the lost sales effect following pass-on, so we call it the lost sales adjustment factor. The discount to the price overcharge is therefore not simply equal to the pass-on rate τ , but it is equal to τ minus $\lambda \tau$. For example, suppose the pass-on rate τ is 0.6 as before, and the lost sales adjustment factor λ is 0.2. Then the discount to the overcharge is not simply 60% (since this would ignore the lost sales effect), but rather 60% minus 12% (0.2 times 0.6), i.e. 48%. If the price overcharge results in damages of 10M €, the discount becomes 4.8 M€ (rather than 6M €).
- 24 The lost sales adjustment factor (λ) is a number between 0 and 1, and it measures the degree of competition in the downstream industry.
- 25 At the one extreme, in a perfectly competitive downstream industry the lost sales adjustment factor is 0: because the profit margin of the direct purchasers' lost sales is zero, no downward adjustment to the pass-on rate is needed.⁶ In this extreme case, the pass-on rate (unadjusted for the lost sales effect) is an appropriate measure of the discount to the price overcharge. Only in this case is the naïve approach justified.
- 26 At the other extreme, in a monopoly or cartelized downstream industry the lost sales adjustment factor is 1: because the profit margin of the lost sales is high, the lost sales from pass-on exactly offset the gains from the pass-on, so that the pass-on rate is adjusted downward completely to zero.⁷ In this extreme case, the overcharge is a correct measure of the damage and it is not appropriate to apply a discount. In this exceptional case a passing-on defense by the cartel members is not justified. However, for a direct purchaser to make this argument, it should be willing to admit that its own downstream industry is a monopoly or cartelized.
- 27 In imperfectly competitive markets the adjustment factor is a number between 0 and 1. For example, in a symmetric Cournot industry with homogenous products the adjustment factor is equal to 1 divided by the number of competitors: with 5 competitors, the adjustment factor is equal to 1/5. As another example, in a symmetric Bertrand industry the adjustment factor is equal to the aggregate diversion ratio, i.e. the fraction of a firm's lost sales that flows back to its competitors after a hypothetical unilateral price increase by the firm. The aggregate diversion ratio would be low (so that a low adjustment factor applies), if products in the downstream market are relatively homogeneous; it would be high, if products are strongly differentiated. In sum, the number of firms and the aggregate diversion ratio (degree of product differentiation) can serve as simple rules of

⁶ In a perfectly competitive downstream industry the profit margin of the last or marginal sold unit is equal to zero, but there can still be a profit margin on the infra-marginal units (if marginal costs are upward sloping).

⁷ This is approximately true, if the price overcharge is not too large.

thumb to approximate the degree of competition in the downstream market: the higher the degree of competition, the lower is the lost sales adjustment factor (and vice versa).

- 28 Alternatively, one can estimate the adjustment factor as the percentage industry profit margin, multiplied by the price elasticity of market demand. For example, suppose the percentage margin is 10% and the price elasticity of market demand is 2, then the adjustment factor is 20%. Intuitively, the inverse of the elasticity of market demand is a measure of maximum market power of a monopoly, so the adjustment factor captures the actual market power relative to potential market power.
- 29 These rules of thumb can be used as a starting point. Parties can collect additional information and perform a more sophisticated analysis. This may give more accurate measures of the degree of pass-on and the degree of competition that improve on the simple rules of thumb. But the main economic principles remain the same.

4 Damages to direct purchasers when some competitors are not affected

- 30 There may be circumstances where only a group of direct purchasers is affected by the cartel price overcharge, and where the other competitors are not affected. First, in international cartels some downstream companies may be able to obtain their inputs from firms not in the cartel. Second, some of the cartel members may be vertically integrated and charge no price overcharge to their own downstream subsidiaries. Especially the latter may happen in several cases, although it should then also be established that (1) the cartel had an incentive to favor its own downstream subsidiaries (which is not necessarily the case) and (2) the cartel would be stable when some downstream subsidiaries are not subject to the overcharge.
- 31 The basic economic principles for computing cartel damages to direct purchasers remain the same: the price overcharge remains the point of departure, and a discount should be implemented to account for the pass-on and lost sales following pass-on. The magnitude of the discount will however now also depend on the number of competitors affected by the cartel, and in some (exceptional) circumstances even a premium to the price overcharge may be necessary.
- 32 If the number of firms affected by the cartel is sufficiently large, a discount to the price overcharge generally remains appropriate, reflecting pass-on after applying a lost sales adjustment factor.
- 33 As the number of competitors affected by the cartel decreases, the required discount to the price overcharge decreases for two reasons. First, the extent of pass-on tends to decrease when fewer firms are affected (since the affected downstream firms have to compete with unaffected rivals and are therefore less inclined to pass on higher input prices). Second, the lost sales effects tends to

increase when fewer firms are affected (if the affected downstream firms pass on higher input prices, this results in more lost sales the more unaffected rivals it faces).

- 34 If the number of competitors affected by the cartel is very small, the lost sales effect may become so large that it actually outweighs the pass-on effect. In this case a premium rather than a discount to the price overcharge is required to compensate for the direct purchasers' damages. However, such a premium only applies under exceptional circumstances and it depends on the nature of strategic interaction in the downstream industry.
- 35 To illustrate, we consider two commonly used models of competition. Under Bertrand competition, prices are the strategic decision variable. The toughness of competition then depends on the degree of product differentiation. Under Cournot competition, quantities or "capacities" are the strategic decision variable.
- 36 Under Bertrand competition, a discount to the price overcharge remains appropriate, so a premium on top of the price overcharge is never appropriate, not even if only a single firm in the downstream industry is affected by the cartel. So in such markets an (adjusted) passing-on defense is generally justified. The intuition for the passing-on defense is not that the plaintiff can pass-on part of the overcharge, but rather that its competitors respond to the plaintiff's price increase, by partially raising their own prices.
- 37 Under Cournot competition, a discount to the price overcharge is appropriate if a sufficient number of companies is affected by the cartel, but not necessarily if a small number of companies is affected. More concretely, a premium instead of a discount to the price overcharge applies if there is only one affected firm with an above average market share in the downstream industry. The intuition is that under such conditions competitors respond expansively in response to the affected party's passing-on, which then loses substantial market share.
- 38 In general, a discount to the price overcharge is justified, unless the affected parties can demonstrate that most competitors in the downstream market were not affected by the cartel and that the nature of strategic interaction was such that it substantially reduced market share.

5 Damages to end-consumers

- 39 The damages to the end-consumers are equal to the extent of pass-on by the direct purchasers, multiplied by their sales.⁸
- 40 One may follow two approaches to compute these damages. First, one may follow an approach analogous to estimating the price overcharge, i.e. compare final consumer prices with a non-cartel

⁸ This ignores a deadweight loss, which would be a second-order effect if the passing-on is not very large.

benchmark (using for example the before-and-after or yardstick approach). Second, one may start from the estimated price overcharge incurred by the direct purchasers, and then compute the extent of pass-on of this overcharge. The second approach has the advantage that it can be based on information already available from the investigation into the damages claim for the direct purchaser, provided that a passing-on defense was used.

6 Three or more layers of downstream purchasers

- 41 So far the discussion has focused on a situation with two layers of downstream purchasers: direct purchasers and end-consumers. The principles extend to more complicated situations with three or more layers. Table 2 summarizes the damages accounting with an extra layer of indirect purchasers.

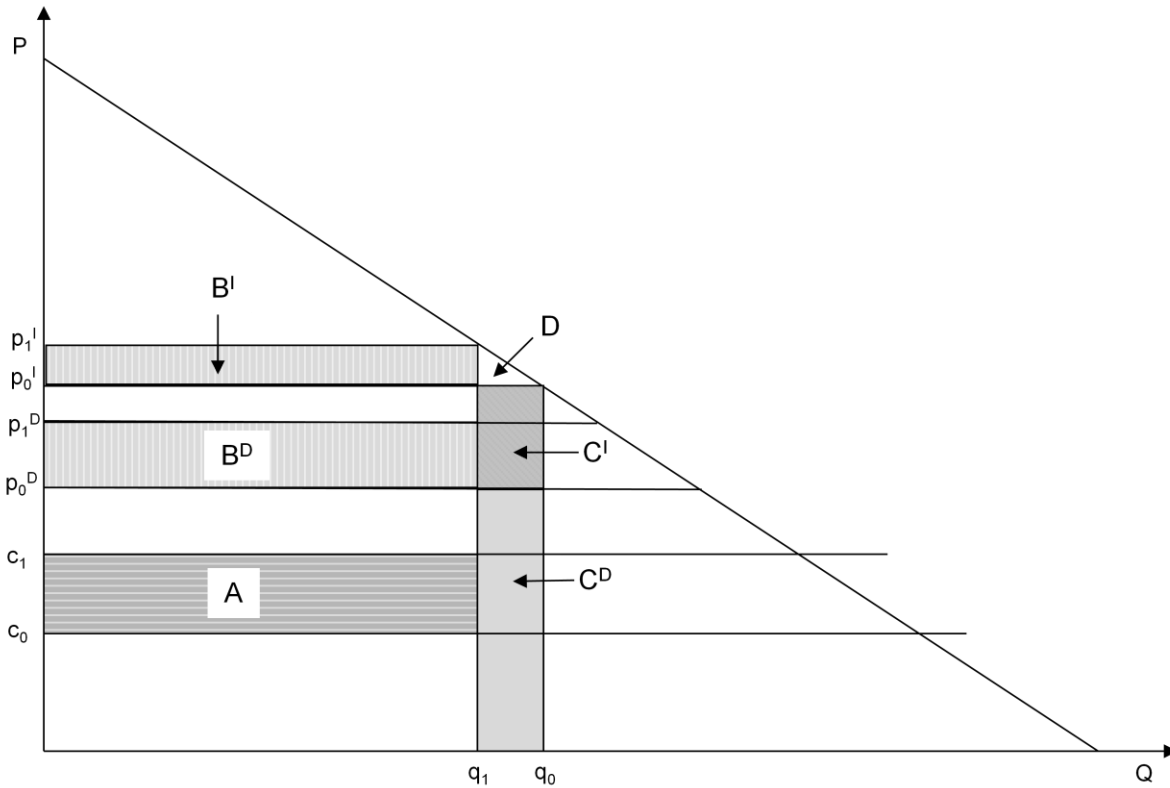
Table 2. Damages accounting with three layers of downstream purchasers

	Overcharge	Direct pass-on	Indirect pass-on	Lost sales
Direct purchasers	A	$-B^D$	0	C^D
Indirect purchasers	0	B^D	$-B^I$	C^I
End-consumers	0	0	B^I	0
Total harm	A	0	0	$C^D + C^I$

As in the case with a single downstream layer, only the overcharge amount (A) and the lost sales effect ($C^D + C^I$) matter for total harm. Pass-on affects the individual parties, but since it is just a transfer it does not affect total harm.

- 42 Figure 2 (on the next page) extends Figure 1 to this extra layer of indirect purchasers. As before the downward-sloping curve is the demand curve of the product by end-consumers. The price overcharge by the cartel, faced by direct purchasers, is equal to $c_1 - c_0$. The direct purchasers pass on $p_1^D - p_0^D$ to the indirect purchasers, who in this case are not the end-consumers. Next, the indirect purchasers pass on $p_1^I - p_0^I$ to the end-consumers. As a result of this pass-on, industry sales decrease from q_0 to q_1 . Damages by the direct purchasers are given by the overcharge A, minus the amount they pass-on to indirect purchasers B^D , plus the lost sales as a result of the pass-on, C^D . Damages by indirect purchasers are made up of the amount that is passed on to them by direct purchasers (B^D), minus the amount which they in turn pass-on to end-consumers (B^I), plus the reduction in sales which results from this (lost sales amount C^I).
- 43 The direct purchasers are again entitled to a damage compensation equal to the price overcharge from which a discount can be subtracted. The discount reflects the pass-on to the indirect purchasers, after accounting for the lost sales adjustment factor.

Figure 2. Cartel damages with three layers of downstream purchasers



- 44 The indirect purchasers are entitled to a damage compensation equal to the pass-on by the direct purchasers from which a discount should also be subtracted. The discount now reflects the pass-on by the indirect purchasers to the end-consumers, after accounting for the lost sales adjustment factor.
- 45 Compared with the situation with two layers, it is now necessary to assess the pass-on rate at two levels, but the intuition regarding the determinants of the pass-on rates remains the same as discussed under section 3.1.
- 46 The lost sales adjustment factor now refers to the overall competitiveness of the two downstream markets, i.e. both the direct purchasers' and the indirect purchasers' downstream markets. The adjustment factor may therefore be high even if only the direct or only the indirect purchasers are operating in a non-competitive market.