

**IMPUTATION TESTS
FOR BUNDLED
SERVICES**

**A Report for the Australian
Competition and Consumer
Commission**

Prepared by NERA

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EXECUTIVE SUMMARY

Consultancy Objective

The Australian Competition and Consumer Commission (“the Commission” or “the ACCC”) engaged NERA to consider the merits of various imputation tests when assessing whether an integrated firm’s pricing practices constitute an anticompetitive vertical price squeeze. The Commission is particularly interested in imputation tests in the context of product bundling in telecommunications.

Vertical Price Squeezes

Anticompetitive behaviour is interpreted as behaviour that would be inconsistent with competitive market outcomes. Under this interpretation, behaviour that may cause harm to rivals is classified as anticompetitive only if it is inconsistent with what the firm could be expected to do under competitive conditions. Under these conditions, such behaviour will benefit consumers (eg, produce lower prices) even though particular (inefficient) competitors may be harmed.

An anticompetitive vertical price squeeze occurs when a vertically integrated firm with market power in the provision of an input essential in the production of a final product sets the margin between wholesale (or access) and retail prices such that an (equally) efficient competitor will be unable to remain viable.

There are three necessary conditions for an anticompetitive price squeeze to be a rational and viable strategy for an integrated firm:

- two markets must be vertically related and the upstream product must be a necessary input into producing the downstream product;
- at least one firm must be vertically integrated and possess market power in *both* the upstream and downstream markets; and
- the downstream market must be open to competition from rival, non-(vertically) integrated, firms.

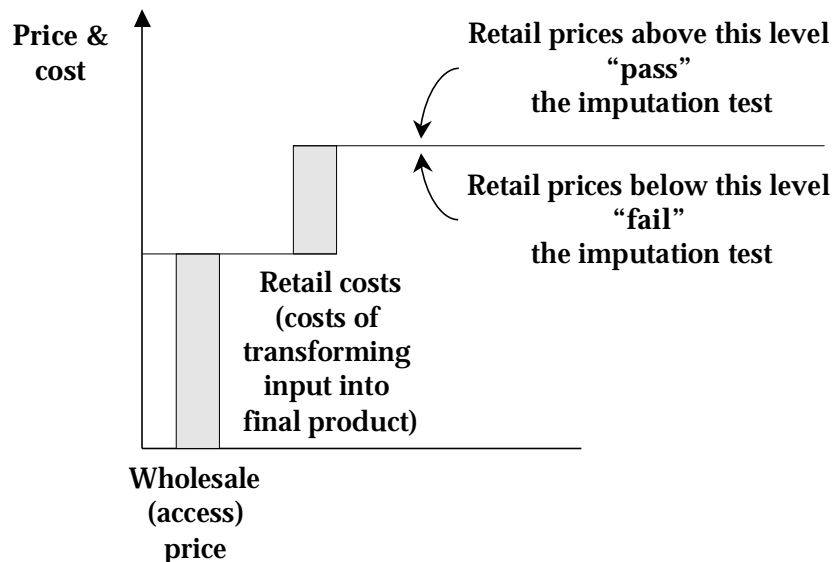
Imputation Tests

Imputation tests consider whether particular retail prices set by a vertically integrated firm are greater than the price of the relevant wholesale (access) inputs faced by its competitors, plus the costs of transforming the wholesale inputs into the retail service. Imputation tests can be interpreted in two ways:

- as assessing whether the retail price set by integrated firm is sufficiently above the wholesale (access) price charged to competitors to allow equally efficient non-integrated firms to compete; and
- as assessing whether the retail price is sufficiently above wholesale (access) prices to allow the integrated firm to be at least as profitable as a result of servicing the end market as it would be if it sold the wholesale product to rivals.

This concept of imputation tests is illustrated in the following diagram.

Figure 1
Schematic of Imputation Test



To determine whether a price squeeze is anticompetitive, imputation tests should be undertaken with reference to the market within which the alleged behaviour is taking place. A price squeeze on a subset of the market could not be considered anticompetitive if this subset is relatively insignificant and/or rival firms have the option of shifting their focus to other areas of the market that are not subject to the price squeeze, as under these conditions it is unlikely the price squeeze could be deemed to be harmful to competition.

Once the market is defined, imputation tests can be undertaken on either a *marginal* or *average total cost* basis. Tests based on marginal costs, and the corresponding marginal revenues provide a more definitive test of whether pricing practices can be considered anticompetitive. These tests are more consistent with economic theory regarding minimum prices that would be expected in a competitive market. As long as marginal revenue

exceeds marginal costs¹, sales will contribute positively to a firm's profitability and would be unlikely to encourage equally efficient rival firms to exit the market. As we describe in more detail below, in practice, the revenues and costs being considered would be for the volume of sales the firm would enjoy (or forego to its competitors), rather than the last unit sold (as is the case in the theoretical definition of marginal cost). In this way, the broader the market definition and the longer the time period over which the alleged anticompetitive behaviour took place, the higher the proportion of total costs and revenues that would be considered "marginal".

However, marginal cost based tests fail to identify some instances of anticompetitive pricing behaviour.² Tests based on average total costs have been proposed as a way to lower the threshold of imputation tests. However, there can be economically rational reasons for setting prices below these costs and measurements of average total costs may lack economic meaning when firms produce multiple products and incur common costs. For these reasons, average total cost based imputation tests are unsuitable as definitive tests of anticompetitive price squeezes. That said, unless a firm fails an (appropriately specified) average total cost based test, it cannot be said to be pricing in an anticompetitive way – indeed, such tests are often used in regulatory contexts to assess whether a firm is taking advantage of its market power by charging unreasonably high prices.

The distinction between the marginal cost and average total cost based imputation can be summarised as follows:

- failing a marginal cost based test would generally³ be a sufficient, but not necessary, condition for establishing that pricing practices are anticompetitive; and
- failing an average total cost based test is a necessary condition for establishing that pricing practices are anticompetitive (prices above that level will never be anticompetitive) but it is not, on its own, sufficient.

Imputation Tests in the Context of Bundling

An "aggregate" imputation test, which relies on the information contained in the price and cost of the bundle in total, has several advantages over a test that separates the elements of a bundle. These relate to avoiding the need to allocate any fixed costs or revenues that are shared across the component products in the bundle and avoiding the need to explicitly account for scope and scale economies, as these will be reflected in the joint costs.

¹ Refer to the discussion at section 3.2 of the appropriate unit of production in applying imputation tests.

² Refer to the discussion in section 3.2.1.

³ Although there may be particular situations where pricing fails a marginal cost based test even though the firm is not behaving anticompetitively.

A number of complications arise when bundling is involved, which means that it is unlikely an aggregate test can be applied in as straightforward a manner as a test on an individual product. This may be the case if the market definition incorporates product boundaries that differ from the products included in the bundle. This can arise in two ways. First, it is likely the relevant market will include the services provided on both a bundled and an unbundled basis. The appropriate imputation test will then include revenue and cost information relating to both joint and separate product provision. Second, the market definition for the product the Commission's concerns relate to may not include all of the products provided within the bundle. For example, while pay-TV services have been bundled with internet and telephony services they may not be in the same market. In this situation, we show that using the unbundled price(s) (or costs) of the non-relevant products effectively removes their effect from the bundle price and cost information to provide information relating to the provision of only the relevant service (when supplied as part of the bundle).

The application of the (aggregate) imputation test is further complicated when rival companies are unable to provide one of the services included in the bundle. When this service is provided on an unbundled basis such that a retail price can be observed, the appropriate imputation test could incorporate the retail price of this service along with the access costs the rival firms face. Where a retail price is not observable for a product that rival firms are unable to provide, the test could incorporate the costs the integrated firm incurs to provide that service.

1 INTRODUCTION AND OBJECTIVES

1.1 Overview

The Commission is responsible for administering the *Trade Practices Act 1974* (the TPA). The TPA sets out specific responsibilities in relation to the telecommunications industry, including anticompetitive conduct provisions. In the context of these provisions, the Commission has engaged NERA to consider the role of imputation tests in assessing whether a firm's pricing decisions amount to an anticompetitive vertical price squeeze.

An anticompetitive vertical price squeeze occurs when a vertically integrated firm with market power in the provision of an input that is essential in the production of a final product sets the margin between wholesale and retail prices such that an equally efficient competitor will be unable to remain viable. Imputation tests can be used to assess whether the retail price set by an integrated firm is sufficiently above the access (or wholesale) price charged to competitors to allow those firms to compete.

For the purpose of this report, the Commission is particularly interested in vertical price squeezes in the context of bundling. Service bundling is becoming increasingly common in telecommunications markets and, although it can be beneficial to consumers, the Commission is concerned bundling could be used as a mechanism for anticompetitive conduct.

This report examines the applicability of various imputation tests and how these might be applied to assess whether a vertically integrated firm's pricing practices, including in relation to bundling, could constitute an anticompetitive price squeeze.

1.2 Report Structure

Section 2 provides background theory on vertical price squeezes and considers the conditions under which they are a viable and rational strategy for an integrated firm.

Section 3 considers a range of imputation tests available for assessing whether a firm's pricing practices could constitute an anticompetitive vertical price squeeze. In particular, it emphasises the importance of the market definition and outlines the debate between marginal and average cost based tests. We conclude that while both marginal and average total cost based tests can be useful for assessing a firm's pricing practices, marginal cost based tests provide a more definitive assessment of whether prices can be considered anticompetitive. More specifically:

- failing a marginal cost based test would generally⁴ be a sufficient, but not necessary, condition for establishing that pricing practices are anticompetitive; and
- failing an average total cost based test is a necessary condition for establishing that pricing practices are anticompetitive (prices above that level will never constitute anticompetitive vertical price squeezes) but it is not, on its own, sufficient.

Section 4 considers imputation tests in the context of bundling.

Section 5 provides concluding comments.

⁴ Although there may be particular situations where pricing fails a marginal cost based test even though the firm is not behaving anticompetitively.

2 BACKGROUND: VERTICAL PRICE SQUEEZES

2.1 Defining Anticompetitive Behaviour

Firms can lower their prices in response to rivals for either competitive or anticompetitive reasons. Competitive reasons include reducing prices to more closely reflect costs, thereby retaining market share by competing on the basis of merit (efficiency). Anticompetitive reasons include lowering prices to the point they no longer reflect the relative efficiency of the firm but instead prevent equally efficient firms from remaining viable. The intention behind such anticompetitive behaviour must be to eliminate rivals from the market (or discipline them into adhering to an implicit price ceiling) so that, in the long run, prices can be increased to the extent that profits lost during the period of low prices are more than fully recouped. Such practices, if successful, will result in consumers being worse-off overall.

The objective of tests for anticompetitive price squeezes is to establish a line between behaviour that is “aggressively competitive”, which should be encouraged, and behaviour that is anticompetitive, which should be prohibited. However, establishing where this line falls is not straightforward and, as is discussed in section 3, at best competition authorities end up with a blurred boundary rather than a crisp threshold. Even at a theoretical level, there is debate as to the appropriate way to determine where the line should be drawn and whether this should be on the basis of protecting *competitors* or on the basis of protecting a *competitive environment*.

If anticompetitive behaviour is interpreted as including any behaviour that is harmful to rivals and could result in rivals exiting the market, floor prices could be established to protect competitors even if they are not as efficient as the firm with market power. The argument for such an approach is that the more competitors in the market the greater will be the degree of competition. This would see floor prices being established above the level that reflects the dominant firm’s cost advantages over its rivals. It is sometimes argued that such a floor is attractive because:

- even if these rivals have higher costs than the firm with market power, their presence in the market will exert price pressure and result in lower prices to consumers; and
- rivals that are relatively recent entrants into the market could be expected to move down their cost curves over time, providing such protection in the short-term could lead to long term efficiencies and advantages for consumers.

However, while such arguments may be intuitively appealing, there is a need for caution:

- there are many industries in which new entrants could expect to make an initial loss before moving down a cost curve – supporting entrants within one industry may set a dangerous precedent for expectations of protection in other industries;

- rather than encouraging entrants to move down a cost curve, establishing a higher floor price may lock-in higher prices indefinitely, ultimately leading to poorer outcomes for consumers;
- it is difficult to assess an appropriate boundary for such a floor, for example, should firms that are no more than just 5 per cent less efficient be protected or is 10 per cent less efficiency acceptable?
- a higher floor price would most likely encourage an inefficiently large amount of *non-price* competition – in an effort to retain market share the firm with market power could compete on the basis of quality, this would mean that competitors would not really benefit from the price floor and that consumers would be required to purchase services with a higher quality (for a correspondingly higher price) than they might prefer; and
- an overly generous price floor may induce inefficient entry – a problem that has been particularly acute for US local exchange services.

The alternative is to interpret anticompetitive behaviour as behaviour inconsistent with expected behaviour in a competitive market, where no single firm has substantial market power and therefore no firm could expect to benefit from anticompetitive pricing. This would allow prices to fully reflect any cost advantages a firm might have over rivals, no matter the source of such advantages. While this would be harmful to rivals that are not as efficient as the firm with market power, and may result in their exit from the market, it would encourage pressures consistent with those that could be expected in a competitive market – where inefficient firms are forced out over time. Thus the appropriate floor would be determined by reference to the lowest price that could be expected to occur within a competitive environment.⁵

In our view, it is this latter interpretation of anticompetitive behaviour that is more meaningful in the context of evaluating imputation tests, including in the context of the TPA.⁶ We do not believe the promotion of competitors (rather than competition) can be

⁵ For imputation tests to establish a floor consistent with the “lowest price that could be expected within a competitive environment” wholesale (access) prices would need to be consistent with those that might be expected if the input market were competitive. In regulated markets, this assumption seems reasonable. However, even if wholesale (access) prices are not consistent with hypothetical competitive market prices, in our view, imputation tests should still allow cost differences to be reflected in prices in the same way that they would be under competitive market conditions. We have therefore treated wholesale (access) prices as if they are consistent with competitive market outcomes throughout our discussion.

⁶ We note that under the TPA the relevant test generally includes assessing whether a firm has a substantial degree of market power and takes advantage of that power. If pricing practices are consistent with those that could be expected under competitive market conditions, it seems reasonable to infer they are unlikely to constitute a *use* of market power.

supported via economic reasoning. This view is generally supported within the economic literature, as illustrated by the following:⁷

“Vertical arrangements which allow firms to increase market share – thereby harming competitors – by offering lower prices, better products, or more closely reflecting consumers’ wants are ones which competition authorities should tolerate since these are the benefits effective competition provides. Harm to competitors should only be of concern if it is thought that competition is also harmed; by which we mean that consumers will be worse off in the long run.”

2.2 Vertical Price Squeeze – Definition and Preconditions

An anticompetitive vertical price squeeze occurs when an integrated firm with market power in the provision of an input that is required to produce an end product sets the margin between the wholesale and retail prices such that equally efficient firms will not be viable.⁸ For example, if a firm is a monopoly provider of an upstream service that is essential for the provision of downstream services, that firm can apply a vertical price squeeze by setting the margin between the price it charges rivals for the essential service and its downstream retail price at a level that is insufficient to allow efficient competition in the downstream market.

A number of market elements are required for a vertical price squeeze strategy to take place and be rational:

- two markets must be vertically related and the upstream product must be a necessary input into producing the downstream product;
- at least one firm must be vertically integrated and possess market power in **both** the upstream and downstream markets; and
- the downstream market must be open to competition from rival, non-(vertically) integrated, firms.

While the need for the first and third conditions is self-evident, it is useful to consider more carefully the importance of the integrated firm having substantial power in both markets.

⁷ Case Associates (1996)

⁸ Some authors distinguish between a general price squeeze, which reduces the margin between the retail and wholesale (access) prices, from an anticompetitive one, as defined above. See, for example, Hausman and Tardiff (1995, page 536), citing Areeda and Turner (1978).

2.3 The Importance of Market Power⁹

Substantial power in both the upstream and downstream markets is a determinant of whether a price squeeze is either a feasible or a rational strategy for the integrated firm.

Without substantial market power in the upstream market, the integrated firm will be unable to set the price of the input product significantly above the cost of providing that product. Any attempt to do so would result in the non-integrated firm sourcing the product elsewhere. If the integrated firm has substantial market power in the downstream market, it may still set the retail price at a level below which (equally efficient) rival firms can compete. However, this will require setting retail prices below some measure of combined wholesale and retail costs, in which case the anticompetitive behaviour is more closely associated with predatory pricing than a vertical price squeeze.

If a firm has substantial power in the upstream but not the downstream market, it will find it difficult and costly (if not impossible) to impact the retail prices rivals charge. The integrated firm's actions will have little impact on the profitability of other firms and, to be effective, the duration of the price squeeze would need to be extensive, making the strategy costly.¹⁰

Perhaps even more importantly, without (anticipated) market power in the downstream market, it would be impossible for the firm to expect to benefit from the price squeeze. Market power is necessary for successful elimination of the competition to lead to higher prices in the future, the ultimate objective of the price squeeze. For example, unless there are barriers to entry in the retail market, future price increases would encourage entry by new rivals, negating any benefits from the anticompetitive conduct. Under these conditions the firm would be unlikely to be able to recoup its sacrificed profits by charging higher prices after rivals had exited.

Thus power in both upstream and downstream markets is necessary for a vertical price squeeze to be a feasible and rational strategy for an integrated firm. This is only partially recognised in the TPA. Sections 151AJ and 151AK together provide that a carrier with a substantial degree of market power in a telecommunications market can not take advantage of that market power with the effect, or likely effect, of substantially lessening competition in that or any other telecommunications market. We would suggest that, at least for this

⁹ A firm has market power if it can profitably sustain prices above the level that would prevail if the market in question were competitive.

¹⁰ If a firm had upstream market power but the downstream market is competitive, the integrated firm may still increase the wholesale (access) price. However, in the situation where the upstream product truly is a bottleneck product, this would have the effect of raising the competitive price. While this would reduce the market size and thereby potentially drive out some downstream firms, this would not be the effect of a vertical price squeeze. Rather, this pricing practice would constitute *monopoly pricing*.

type of anticompetitive conduct, the carrier must have market power in both the upstream and downstream markets.

2.4 Comparison of Vertical Price Squeeze and Predatory Pricing

Although a vertical price squeeze is distinct from predatory pricing, the two strategies share a number of important characteristics. Both involve a firm with substantial market power establishing prices that make it impossible for equally efficient firms to remain financially viable. The distinction between the two conducts is that in contrast to predation a company can undertake a vertical price squeeze while still recovering its costs if the wholesale price is higher than its marginal cost of production.

These parallels suggest that tests for vertical price squeezes should be consistent with tests for predatory pricing, with the exception that they must also account for the wholesale price that the integrated firm is charging its rivals.¹¹

¹¹ When the fact that the sacrificed profits the price-squeezing firm would forgo are recognised as an *opportunity cost*, the distinction between the predation and imputation tests effectively vanishes.

3 IMPUTATION TESTS

A price squeeze involves an integrated firm sacrificing short-run profits in order to benefit in the longer run, once competition is reduced. Imputation rules can be used to test whether an integrated firm's pricing practices constitute an anticompetitive vertical price squeeze by assessing whether an equally efficient firm competing in the downstream market would be viable if it had to pay the wholesale (access) prices charged by the integrated firm for an essential input into the final product.

The fundamental comparison underlying imputation tests is whether retail prices are at least as high as the wholesale (access) price plus the integrated firm's costs of transforming the input into a final product. If retail prices are lower than this, rival firms that are equally efficient will not be viable and the integrated firm could raise its short-run profit (at the margin) either by increasing retail prices or by supplying the input to rival firms and allowing them to serve the end market. Thus these tests can also be interpreted as assessing the extent to which the integrated firm is sacrificing short-term profits. Even though the firm will not necessarily be making a loss (as would be the case under predation) a vertical price squeeze implies the integrated firm is earning less profit than it could by allowing rivals to serve the end market, given wholesale and retail prices.

The basic form of the test is summarised in the following equation:

$$P \geq A + C \quad (1)$$

where: P is the retail price of the product
 A is the wholesale (access) price the integrated carrier charges rivals
 C is the cost of converting the wholesale input into its end product (ie, retail costs)

There are a number of ways to measure retail prices and the costs associated with transforming the input into a final product. The estimation of these parameters should be undertaken in the context of the market definition upon which the allegation of anticompetitive behaviour is based and the timeframe over which the anticompetitive behaviour allegedly occurred. In addition, various commentators have differing views on the precise point at which a firm could be considered to have sacrificed its short-run profits and, as for predatory pricing, there is no universally accepted cost/price test that is appropriate under all circumstances. Rather, a number of tests have been proposed. The main debate centres around whether such tests should be based on measures of *average total cost* or *marginal cost* (which could be determined in a variety of ways, eg, average variable costs, avoidable costs, incremental costs, etc).

As discussed in section 2.1 above, we have assessed the merits of imputation tests with reference to encouraging competitive pressures most likely to be consistent with competitive

market conditions. Therefore the implicit objective is to protect competition from equally efficient competitors rather than protecting competitors who may have higher costs.

3.1 Imputation Tests and the Market Context

The most general form of the imputation test is: given (1) the product market for which the vertically integrated firm is competing and (2) the levels of access and retail prices, will the vertically integrated firm make more profits selling retail to end customers or wholesale to its competitors. If a firm is more profitable by selling wholesale rather than retail (ie, retail sales do not cover the additional costs), then the firm's prices *fail* the imputation test.

Under this form, it becomes clear that the market definition is critical to defining the appropriate imputation test. As with other allegations of anticompetitive behaviour, market definition is a key step in establishing whether competition has been adversely affected. The importance and form of market definition for anticompetitive vertical price squeezes is recognised by Case Associates:¹²

“As in most areas the assessment of a price squeeze must begin with a definition of the relevant market or market(s)...

The correct starting point is the downstream market in which the input is used...”

The approach to determining the relevant market should adhere to that used in other contexts under the TPA. The market will need to be defined in terms of its boundaries, both geographical and product (in terms of the range of products to be included). These boundaries will depend on the extent of (demand and supply) substitutability for the particular end product(s) being considered. The extent of substitutability will depend not only on the characteristics of the particular good or service, but also the characteristics of the customer group and the purposes to which they intend to put the product. Miller summarises the principles the courts tend to apply in identifying the appropriate market.¹³ He defines a market as an area of actual and potential close competition in particular goods and/or services and their substitutes and notes that when identifying the relevant market Australian courts take account of: actual and potential transactions between buyers and sellers; customer attitudes, technology, distance and cost and price incentives; and cross-elasticities of both supply and demand.

Once the market has been defined, it is sensible to consider the integrated firm's pricing practices over the market as a whole rather than over any subset of this market. If a vertical price squeeze is occurring in only part of the market, theoretically there is nothing preventing the non-integrated firms from shifting their focus to those parts of the market

¹² Case Associates (2002), page 1

¹³ Miller (2000), page 243

that are not subject to a price squeeze.¹⁴ If these other parts of the market are substantial enough that competitors are not disadvantaged, then the price squeeze cannot be said to be having an anticompetitive impact. This is consistent with the approach taken in predation cases in Canada and under the Sherman Act in the US and is also recognised by Case Associates:¹⁵

“If the ... product it supplies or intends to supply downstream had close substitutes, then the attempted foreclosure through a margin squeeze, even if possible, will have a minimal effect on competition.”

Examples in the telecommunications market may also arise when products are arguably only weak substitutes for one another, for example, peak and off-peak calling. A typical customer demands both but may not be willing to substitute one for the other. Suppose the firm with market power charged a single access price throughout the day, but different retail prices. This could result in a “squeeze” for off-peak calls, but the fact that a competitor could profitably offer peak and off-peak calls (the margin in peak would make up for the losses in off-peak calls) implies that there may be no competitive problem.¹⁶

In the context of the market as a whole, imputation tests could be based on either marginal costs or average total costs:

- a marginal cost based test would consider the marginal revenues and costs the integrated firm faces as a result of its activities in the relevant market; and
- an average total cost test would consider the marginal revenue and costs the integrated firm faces as a result of its activities in that market plus any fixed costs/revenue associated with servicing that market and an allocation of any shared costs that arise as a result of involvement in all markets the firm participates in.

3.2 Marginal Cost Based Tests

Imputation tests based on marginal cost measures are founded on the premise that a profit maximising firm will never price below marginal costs. These tests consider whether the integrated firm is better off as a result of selling the last “unit” of product at the marginal price.¹⁷ If the retail price is set below the level of the access charge plus the marginal costs

¹⁴ For a discussion of this concept in relation to price discrimination under the US’s Robinson-Patman Act, see Areeda and Turner (1975), page 726

¹⁵ Case Associates (2002), page 1

¹⁶ Alternatively, if a case can be made that (demand and supply) substitutability between peak and off peak calls is insufficient to conclude they are in the same market, the prices of each would need to pass individual imputation tests.

¹⁷ Our view is that, to make the imputation tests economically sensible, this unit must be defined in terms of the market as a whole. The last unit then becomes the provision of all relevant services provided in the market over the relevant time period and the marginal costs and revenues are defined accordingly.

associated with transforming the access product to an end-product, then the firm would be better off not supplying that product directly but selling the input to a competitor and allowing that competitor to service the end market, assuming that the cost of providing access to both firms is equivalent (the situation when the cost of supplying the input product to the rival firm is higher than the cost of supplying the input internally is considered in section 3.4). Note that the terminology used here relates to one product and one price. This is for the sake of simplicity and ease of reference. As discussed above, the appropriate market definition could imply a broader definition of the relevant “unit”.

Marginal cost based tests are consistent with economic theory regarding the minimum price that could be expected in a competitive market, since pricing at any level at or above marginal costs ensures the sale makes a positive contribution to the firm’s profits (or reduces its losses).¹⁸ Furthermore, it could be argued that prices above the access price plus the marginal cost are not anticompetitive, as they will not cause the exit of an equally efficient profit-seeking rival with the same cost structure.

There are a number of ways to measure or proxy marginal costs and when using a marginal cost based test it will be critical to be clear about the following:

- ***The relevant increment of the final product.***

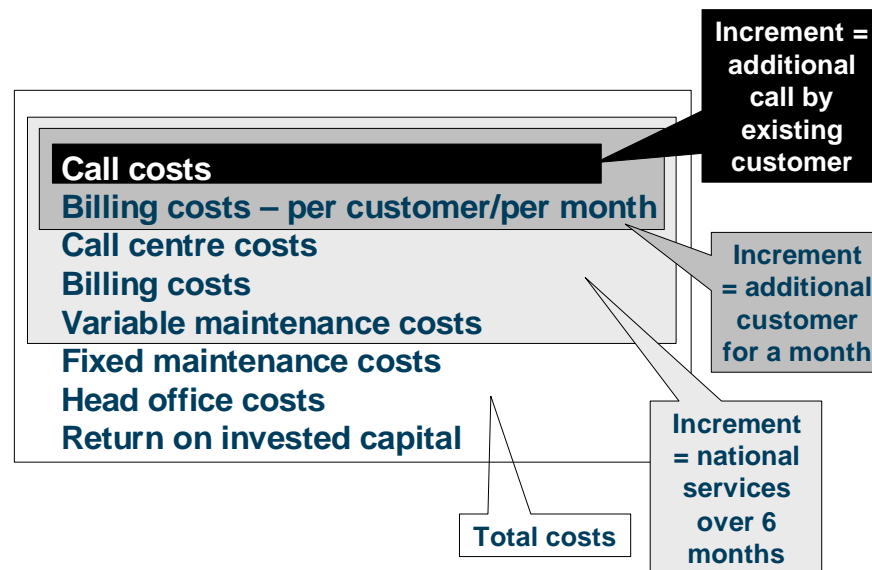
The increment under consideration will have a significant impact on the proportion of costs that are deemed “marginal”. The more significant the increment, the higher the proportion of costs that will be avoided/incurred should output be reduced/increased by this increment. For instance, in the telecommunications market, the relevant increment could be a single call by a customer, a single customer’s purchase of connection and calls, the purchase by a group of customers of monthly connection and calls, etc. The wider the scope of the increment, the lower the extent of costs that can be considered “fixed”.¹⁹

This concept is illustrated in the following diagram.

¹⁸ As noted above, for imputation tests to be economically sensible, the marginal unit must be defined in terms of the market as a whole. The last unit then becomes the provision of all relevant services provided in the market over the relevant time period and the marginal costs and revenues are defined accordingly. In this context, marginal cost is equal to the textbook definition of average variable cost.

¹⁹ That said, in industries such as telecommunications, it is possible the proportion of costs classified as “marginal” may remain relatively low, even with broad definitions of the relevant increment.

Figure 3.2
Impact of Increment Scope on Marginal Costs



It should also be noted that it is not always the case that capital-related costs (eg, return, depreciation, taxes, etc) should be viewed as fixed, even in the short run. If an increase in usage causes wear and tear and/or advances the date of future replacement (or augmentation), then these costs are part of marginal costs.²⁰

For the reasons outlined above, the increment should be based on the market definition (in terms of product, geography, customer group etc) in which the price squeeze is alleged to have occurred. Nothing prevents a rival firm from moving its goods or services to other segments of the market when a price squeeze occurs in only part of the market. Only a test based on the entire market will determine whether a price squeeze has a significant adverse impact on competition.

- **The definition of “marginal”**

Marginal costs can be measured on either an *avoidable* or an *incremental* basis (the use of the term “incremental” in this context is distinct from in the bullet point above). Whereas avoidable costs are those costs a firm can *escape* by *reducing* production, incremental cost are those costs a firm will *incur* as a result of *increasing* production. Measurability will be more difficult where marginal costs (however defined) are not constant over various output levels. One option suggested in the predation literature is to use *average variable costs* (measured on either an avoidable or incremental basis) as a proxy for marginal costs.

²⁰ See, for example, Kahn (1970) pages 70-75 for a discussion of this issue.

Baumol considered this issue in relation to predation and concluded that avoidable, rather than incremental, costs are relevant as it is these costs that determine whether a firm subjected to predation will be better off exiting the market.²¹ As long as prices are above avoidable costs an equally efficient entrant should not be encouraged to exit. Baumol also noted that (average) avoidable costs would generally be lower than (average) incremental costs because the expansion of output is likely to incur some outlays that cannot entirely be escaped or avoided except in the very long run.

- ***The timeframe over which costs are assessed.***

The longer the timeframe, the greater will be the extent of a firm's control over its costs, implying that a higher proportion will be classified as marginal. A firm has substantially greater control over its costs over a three-month timeframe than it does within a single week. The appropriate timeframe for determining which costs are marginal will be the period over which the price squeeze allegedly occurred. The matching of the period for assessing marginal costs and the duration of the timing of the alleged anticompetitive behaviour is important for assessing whether the price squeeze can be said to have harmed competition over this period, as it is consistent with determining whether (equally efficient) rivals were disadvantaged within the period of the price squeeze. Such matching of periods is consistent with the approach taken in predation cases.²²

Alternatively, the Commission may be required to assess prices in an *ex ante* rather than *ex post* situation (ie, in approving proposed prices). In such a situation it will be appropriate to consider a relatively long timeframe, as prices will be expected to prevail indefinitely. The proportion of costs that will be variable will therefore increase and the analysis may approach an average total cost imputation test (refer also to the discussion in section 3.3).

- ***An illustration***

If the Commission is concerned with the price associated with the provision of long distance calls nationwide over a specified three-month period and marginal costs are defined in terms of avoidable costs, then:

- marginal revenue will be that revenue the firm would not have earned had it not provided long distance calls to the relevant customer group over that timeframe – this could include the revenue associated with individual calls

²¹ Baumol (1996), page 58

²² For example, see Baumol (1996), page 62

plus any monthly fixed charges that would be lost if the firm stopped providing these services over this period;²³

- marginal access costs will be those costs the integrated firm would need to pay (in theory, given wholesale (access) prices) to obtain the upstream inputs required to provide the long distance calls, excluding any portion of input prices that may be fixed or sunk over the relevant timeframe but including, for example, monthly fixed costs that might be avoided if the firm stopped providing these services over the relevant period; and
- marginal retail costs will be those costs the firm incurred as a direct result of transforming the input services into long distance services over the period under consideration and would therefore avoid if it had not provided these services. They will exclude costs that are fixed or shared over this period (except to the extent that these shared costs can be shown to be variable). This may include, for example, any billing and maintenance costs that might be avoided should the firm cease to provide these services over the relevant period. It may also include capital costs, eg, costs induced by advances in future replacement or augmentation of network capacity.

3.2.1 Potential disadvantages of using a marginal cost based test

Despite the appeal of marginal cost based tests, they have been criticised by some commentators as providing an unreasonably high threshold for establishing anticompetitive behaviour. Consistent with the criticisms raised against marginal cost based tests in the context of predatory pricing, marginal cost based imputation rules have been criticised for setting too high a standard of proof. For instance, if prices are presumed legal as long as they remain above average variable cost, the test would permit price squeezes against less efficient rivals (those with higher average variable costs) even though their entry into the market may reduce prices through competitive pressures.²⁴ However, as discussed in section 2.1, there are a number of issues associated with establishing imputation tests that allow for this form of competition.

A second potential criticism is that the marginal cost based test may permit price squeezes against smaller rivals who are equally efficient in terms of average total cost but have a cost structure in which a higher percentage of total costs is variable. However, it can be seen that

²³ Differences between competitors in the balance between fixed and variable components of retail prices will by definition be taken into account in such an analysis, although we note that as the time frame under consideration increases, different retail structures will have steadily less impact on the quantum of marginal revenue so derived.

²⁴ This concern is somewhat mitigated if new entry can occur later. An alternative way of addressing this concern, proposed by Kahn (2002) and Baumol (1979), is to require a firm to retain lower prices for some period after rivals exit the market.

any increase in output by these firms would necessarily result in higher average total costs, implying that such firms would cease to be equally efficient (in terms of variable cost).²⁵

A third potential criticism relates to the extent of costs that are avoidable/incremental in network industries such as telecommunications. In the context of predatory pricing tests, Noll argues that short-run marginal cost based tests will not necessarily produce optimal results in capital-intensive industries, such as telecommunications, as these costs can be virtually zero implying that a firm cannot lose a predation case.²⁶ This concern may be somewhat alleviated by taking a broader definition of the relevant margin based on the market definition and/or timeframe.

In short, particular market environments may mean a marginal cost based test could fail to detect certain cases of anticompetitive vertical price squeezes. For this reason, a marginal cost based test could be considered to provide a *sufficient* but not always *necessary* test for establishing whether prices constitute an anticompetitive vertical price squeeze if other factors are relevant. In general, if a firm fails an appropriately specified marginal cost based imputation test, competition authorities can be reasonably confident that the firm is behaving in a way that is harmful to competition.²⁷ However, there may be some instances where a firm passes a marginal cost based test even though it has acted with anticompetitive intentions and has harmed competition. In these cases, average total cost tests (discussed in the following section) may be able to provide useful additional information, although some care needs to be taken in interpreting the results of such tests.

²⁵ For example, suppose the vertically integrated firm and the new entrant were competing for 100 units of volume. Suppose further that the former has an “average cost” of \$1 per unit, consisting of a variable cost of \$0.50 and an additional assignment of \$0.50 of fixed costs shared with other services, while the entrant has a cost of \$1 per unit consisting entirely of variable costs. Then the total additional variable costs incurred by the vertically integrated provider and the entrant would be \$50 and \$100 respectively.

²⁶ Noll (1995), page 506

²⁷ The results of marginal cost based imputation tests, however, must be interpreted in the context of any dynamic considerations in the market over the period of the alleged anticompetitive behaviour. Such considerations may lead to circumstances where an integrated firm might reasonably price below some measure of marginal cost.

For example, where a firm expects to face a lower marginal cost at some point in the future, due to either a shift downward in its marginal cost curve or a movement along its marginal cost curve, then that firm may price below its current marginal cost as long as it does not price below the marginal cost it reasonably anticipates to face in the future. Such pricing practices could be expected where a firm produces a new product that is early in its life cycle or where a firm expects to increase output substantially within a reasonable period of time. See Areeda and Turner (1975) and Baumol (1996).

An integrated firm might also reasonably price below its current marginal cost if it is less efficient than its competitors at transforming the input into an end product. Temporary losses incurred as a result of matching competitors’ retail prices may therefore be held to be a competitive rather than an anti-competitive response. In these circumstances, the integrated firm would be required either to match the efficiency of its rival or to exit the retail business.

For services provided within established segments of the telecommunications market, our *a priori* expectation, however, is that such issues are unlikely to be relevant.

3.3 Average Total Cost Imputation Tests

An alternative to marginal cost based tests is to establish the floor price on the basis of average wholesale (access) prices plus the *average total costs* of transforming the input into a final product. Unlike the marginal cost based test, this test takes into account any fixed costs and a proportion of shared costs the firm incurs. This formulation of an imputation test will provide a lower threshold for testing for anticompetitive vertical price squeezing. Under this approach, prices below the access charge plus the average total costs associated with transforming the input product to an end product may be able to be deemed to injure competition.

The use of average total cost has the advantage of being based on a longer-term measure of costs for assessing price squeezes. Firms will not be deterred from entering a market as long as the price is at least high enough to allow a reasonable return on invested capital. In other words, prices (on average) must be at least as high as the average total costs of an efficient firm for a potential entrant to come into the market. Average total cost based tests may therefore be useful for ex ante testing (where, for example, the Commission is asked to approve proposed pricing arrangements that are expected to last indefinitely).

However, the use of average total costs in an imputation test has some drawbacks and it is useful to consider the literature regarding the use of these cost measurements in tests for predation. Average total cost based tests for predation have been specifically rejected by a number of commentators and have not been recommended as an appropriate standard in a test for predation when used on their own.²⁸ The main concern with such tests is that there are many circumstances where a price below average total cost is privately rational and socially desirable (ie, consistent with competitive market behaviour). As long as prices continue to make contributions above marginal costs, the firm is able to recover some of the fixed and common costs associated with providing services. For this reason, some commentators have proposed hybrid tests for predation in which other elements, such as intent, are required when prosecutors are relying on average total cost based tests.²⁹

The Canadian Predatory Pricing Enforcement Guidelines³⁰ illustrate the debate between the use of average variable and average total costs. Under these guidelines, a price at or above average total cost is not regarded as unreasonably low. A price below average variable cost will generally be considered predatory, unless there is a clear justification (such as the need to sell perishable inventory). Prices in the *grey range* require consideration of other circumstances, such as evidence of intent. The European Court takes a similar approach.³¹ (In contrast, US courts have explicitly rejected the use of average total cost measures.)

²⁸ For example, see Areeda and Turner (1975), pages 704-709 and Baumol (1996), page 50

²⁹ Hay (1982), page 370

³⁰ Consumer and Corporate Affairs Canada (1992)

³¹ See Niels and Ten-Kate (2000), page 805

In comparison to marginal cost based tests, which generally provide sufficient grounds for determining a firm has behaved in a way that harms competition, average total cost based tests can be interpreted as providing a *necessary* but not *sufficient* test. Unless a firm fails an appropriately specified average total cost test, prices cannot be said to constitute an anticompetitive price squeeze. However, failure of an average total cost test, on its own, is not sufficient to conclude that a firm's pricing strategy is harmful to competition.

The logic behind average total cost based tests being insufficient to determine that prices are unreasonably low can be illustrated by considering the test for abuse of market power. In many instances, prices in excess of average total costs are deemed "excessive", in that the firm is earning extraordinary profits. It would therefore seem impractical to draw such a fine line between prices that are too high and prices that are too low, since on this basis a firm would almost certainly be assessed as abusing its market power one way or the other.

An additional drawback to the use of average total cost is that its measurement may be even more complex than the measurement of variable costs and it may lose meaning in the context of a multi-product firm. Multi-product firms are likely to have shared costs. If these costs are allocated according to arbitrary mechanisms (such as revenue, volume, weight, directly attributable costs, etc) then the resulting fully distributed cost measure will also be arbitrary and have little foundation in cost causality, thereby offering little substantive economic information. It is not difficult to see that average total cost based tests that rely on cost allocations will be easier to dispute in a legal context than marginal cost based tests. That being said, average total cost tests may provide useful information if prices fall below floors established on the basis of a wide range of cost allocations. However, on their own, they are unlikely to be suitable as definitive (ie, sufficient) tests as to whether or not a firm's conduct is anticompetitive.

In short, if analysis indicates that a firm fails a marginal cost based test, this should form the foundation for any allegation of anticompetitive vertical price squeezing. However, there may be situations where a firm passes a marginal cost based test but other elements of its behaviour or market conditions indicate that prices are likely to be having a harmful impact on competition. In these situations, an average total cost based test is useful, especially if the firm fails such a test by a substantial amount or over a wide range of cost allocations. Although it may not be sufficient on its own to conclude that prices are anticompetitive, failure of such a test is a necessary component of an argument based on other elements. Unless a firm fails an (appropriately specified) average total cost based test, it cannot be said to be engaging in an anticompetitive vertical price squeeze.

3.4 Extension – When the Cost of Supplying the Rival is Higher

In some situations, it can be argued that the cost to the integrated firm of supplying the input product to rivals is higher than the cost of supplying that product to itself.³² For instance, in the context of the US telecommunications market, a local exchange carrier may be able to serve itself at a lower cost than rivals if interexchange carriers need to go through a tandem switch for long-distance access to their point of presence while the local exchange carrier does not. In this case, protecting only equally efficient rivals and ensuring the test is consistent with promoting economic efficiency would require a slight modification to the marginal imputation test, to become:³³

$$P \geq A - CS + C \quad (2)$$

where:

- P is the retail price of the product
- A is the wholesale (access) price the integrated carrier charges rivals
- C is the cost of converting the wholesale input into its end product (ie, retail costs)
- CS are the cost savings from providing the input internally rather than to the rival firm

Hausman and Tardiff consider this situation under the presumption that the objective is to ensure telecommunications services are produced in the least costly manner.³⁴ They note that anticompetitive price squeezes will be avoided as long as the retail price is at least as high as the full (ie, at the wholesale and retail stages) incremental cost of providing the service plus the wholesale price charged to rivals less the incremental cost of providing this service to rivals. The distinction between this imputation rule and those outlined above is that it will allow the margin between wholesale and retail prices to be reduced to reflect any cost advantages the incumbent firm may have when providing the input product internally rather than to rival firms.³⁵

This conclusion is consistent with that reached by Weisman, that the efficient floor price is the sum of the direct cost of providing the downstream service and the opportunity cost, measured in terms of the contribution foregone from the sale of the upstream input.³⁶ It is

³² It is important to be clear that we are referring to the cost of production rather than the internal transfer price for the purposes of this analysis. If the firm is arguing for such an adjustment, it must be able to demonstrate that the cost of providing access to itself is lower than the cost of providing access to the non-integrated firms – this is not a comparison of, for instance, the internal transfer price with the access charge.

³³ It is unclear how large these cost differences may be in the Australian context and whether the benefits of determining them may or may not outweigh such costs. However, where an integrated firm is able to establish their existence, they should be taken into account in the imputation tests.

³⁴ Hausman and Tardiff (1995)

³⁵ In principle, if there are diseconomies of vertical integration, the resulting price floor would be higher, ie, the required margin between wholesale and retail would be larger.

³⁶ Weisman (2002)

also consistent with the analysis by Larson and Parsons regarding imputation rules in the context of integrated firms that are subject to price caps.³⁷

This modified imputation test aligns with the principle of allowing firms to compete on their merit, as it would allow pricing that would make less efficient firms (those whose combined upstream and downstream cost is higher) unviable by allowing the integrated firm to reduce prices to the extent that its combined incremental costs are lower. Under these circumstances, to be competitive, the rival firms would need to be more efficient than the integrated firm at transforming the input into a final product. This is consistent with what could be expected in a competitive market environment.

This modified test is also consistent with statements made by the Trade Practices Commission:³⁸

“Some price and supply “squeezes” may occur because vertically integrated corporations have lower costs due to efficiency considerations. If a corporation with substantial market power is able to sell to consumers at a lower price because of cost savings associated with vertical integration, and independent dealers are unable to compete as a result, there will be no misuse of market power.”

3.5 Summary of Conclusions

To be economically sensible, imputation tests should be defined in relation to the relevant market in which the alleged anticompetitive behaviour is taking place. Tests that are defined according to some subset of this market will not differentiate between price squeezes that are anticompetitive and those that have no significant impact on rivals' ability to compete.

Within this context, imputation tests can be established on either a marginal or an average total cost basis. Marginal cost tests are consistent with economic theory regarding the lowest price consistent with competitive market pressures. However, such tests could be criticised on the grounds that they may fail to detect anticompetitive conduct under certain circumstances, such as price squeezes aimed at equally efficient firms with different cost structures or deterring future entry. For this reason, (appropriately specified) marginal cost based tests can generally be considered sufficient for determining whether a firm's pricing practices are harmful to competition – however, passing (prices above the threshold) such a test may not categorically rule out the possibility that the firm is behaving anticompetitively.

³⁷ Larson and Parsons (1994)

³⁸ Corones (1991), page 286, which quotes from the Trade Practices Commission (1990) *Misuse of Market Power Background Paper*, Paragon Printers, Canberra at Section C, paragraphs 28-30.

Average total cost tests provide a longer-term view of the price/cost relationship and may be more useful for assessing whether pricing presents a barrier to new entry (ie, ex ante tests). However, there can be rational and economically efficient reasons for a firm to price below average total costs and for this reason such tests are unsuitable as definitive tests for assessing anticompetitive conduct. In comparison to marginal cost based tests, average total cost based tests provide a necessary, but not sufficient, test for anticompetitive behaviour. Unless a firm's prices fail an (appropriately specified) average total cost test they cannot be said to be harmful to competition but failure of such a test is not sufficient, on its own, to determine that a firm has behaved anticompetitively.

The results of any test must be assessed within the context of the market environment over the period of alleged anticompetitive behaviour. This will be especially important if a competition authority is to rely on the failure of an average total cost based test, in which case other elements (such as intent or proof of detriment to competition) must also be present to establish that prices are harmful to competition.

4 IMPUTATION TESTS UNDER BUNDLING

4.1 Market Context

As discussed above, the assessment of whether pricing practices are anticompetitive should start with consideration of the market definition. In the context of considering a bundled package of services, the appropriate market definition is unlikely to be “the market for this particular bundle of services”. There are two reasons for this. First, the relevant market is likely to include the provision of services both within the bundle and on an unbundled basis. For example, if the Commission were concerned about the price of long distance calls when these calls are supplied as part of the bundle, the relevant market would most likely also include the provision of long distance calls outside the bundle. Demand and supply substitutability would be significant and it would appear difficult to justify a market definition that includes only the services provided within the bundle. The imputation test would then consider the pricing practices and cost conditions for both bundled and unbundled long distance services. If a price squeeze was only occurring for bundled services, to be deemed anticompetitive, the bundled services would need to constitute a sufficient portion of the total market to adversely impact rivals’ ability to compete. If this were not the case, the price squeeze cannot be said to have harmed rivals. Thus the imputation test should indicate whether, over the entire market, the integrated carrier would be better off providing the input product(s) to rival firms rather than servicing the end market. This is discussed in greater detail in section 4.3.2.

Second, the products within a bundle may belong to separate markets. For example, a bundle may include long distance telephone and pay-TV services. There would appear to be few arguments for determining these products are in the same market – demand and supply substitutability between telephone services and pay-TV services are likely to be low. In this case, the imputation tests should exclude the information relating to the products the Commission is not interested in and/or which are outside the relevant market definition. Such tests are discussed in further detail in section 4.3.1 below.

That said, in some situations, it might be appropriate to define the product as a cluster of services included in the bundle, depending on consumer behaviour. This approach has been used in the US to define the market for banking services, which are not necessarily close substitutes but which consumers tend to purchase as a cluster due to cost advantages or consumer preferences.⁴⁰ US competition authorities have defined clusters as including, for example, cheque, savings and money market accounts, lines of credit, etc. The market is then defined as the market for the provision of these services in their totality, rather than identifying separate markets for each service type. Depending on consumer behaviour and the particular telecommunication services the Commission is considering, it is possible the

⁴⁰ See, for example, Amel and Starr-McCluer (2001) and Kwast, Starr-McCluer and Wolken (1997).

market could be defined in such a way. In this case, the imputation test should be applied to the entire set of products, using the principles outlined in section 4.2.

4.2 Separate versus Aggregated Imputation Tests for Bundles

In general, if the Commission is concerned about the price of a bundle of products and all those products are within the same market such that the market definition does not include the provision of products provided on an unbundled basis (so the bounds of the bundle coincide with the bounds of the imputation test), aggregated imputation tests have several advantages over tests that attempt to consider the price and cost information contained in the bundle in a disaggregated way. These advantages relate to (1) the complexity of disentangling the cost information when joint provision of services results in efficiencies and (2) the difficulties involved in determining the revenue associated with a particular service. Aggregated imputation tests:

- avoid the need to allocate on a necessarily ad hoc basis any fixed costs or revenues that are shared across the component products;
- allow economies of scope and scale to be more readily incorporated into the test; and
- when considering a marginal imputation test, may provide a more meaningful evaluation of costs and revenues by incorporating the information from a greater proportion of each.

For these reasons, we consider that an aggregated approach to evaluating the imputed margin from bundles is a more useful (and robust) approach than attempting to disentangle the information relating to particular products. An aggregate test should be able to be applied in the same way as the imputation tests outlined in section 3, with the modification that the price and cost information will include a sum of the prices and costs relating to the various products within the bundle. This is summarised in the following equation (which assumes there are two products within the bundle), which could be implemented using either a marginal or average cost approach. Note also that, in this section, we ignore the possibility there may be cost savings to the integrated firm from providing input services to itself rather than to rivals. If such savings exist they should be reflected in the imputation test as outlined in section 3.4 above):

$$P_{xy} \geq A_x + A_y + C_x + C_y \quad (3)$$

where:

- P_{xy} is the retail price of the bundle (x,y)
- A_x and A_y are the wholesale (access) prices the integrated carrier charges rivals for the inputs to x and y
- C_x and C_y are the costs of converting the wholesale input into its end product (ie, retail costs)

The form of this equation implicitly assumes there are no scope economies from providing the two products within the bundle (as the mathematical representation of the access prices and retail costs are specified for each product rather than specified for the joint provision of products). It is likely such economies exist, for example, billing and customer-servicing costs may be reduced. Under these circumstances, the test can be modified to:

$$P_{xy} \geq A_{xy} + C_{xy} \quad (4)$$

where: P_{xy} is the retail price of the bundle (x,y)
 A_{xy} are the wholesale (access) prices rival firms must pay to obtain the inputs into the bundle (x,y)
 C_{xy} are the costs of converting the wholesale inputs into the bundle (x,y)

4.3 Extensions to the Aggregate Test

There are a number of situations that may mean it is either not feasible or not appropriate to apply the aggregate imputation test as outlined above. We consider three such situations:

- when the Commission is concerned with the pricing of only some elements of the bundle;
- when the Commission is concerned with the price of products both within the bundle and on an unbundled basis; and
- when rivals are unable to supply all the products within the bundle.

4.3.1 The relevant products comprise a subset of the bundle

It may be the case that the Commission is interested in the pricing practices that relate to only some elements of a particular bundle or that the products are in distinct markets. For example, while pay-TV services may be bundled with telephony and internet services they may not be in the same market.

In this situation, the information relating to the non-relevant product(s) should be removed from the bundle price and cost information to provide information relating to the provision of only the relevant service (when supplied as part of the bundle). This can be done by subtracting the unbundled retail price of the non-relevant products from the retail price of the bundle. The imputation test in this case would become (where the imputation test is aimed at assessing the pricing for x, and costs and prices can be estimated using either a marginal or average basis):⁴¹

⁴¹ Some care will be required in applying tests to bundled products to ensure that common costs are not double counted. Cost measures will need to be carefully specified, particularly if an average total cost based test is used.

$$P_{xy} - P_y \geq A_{x|y} + C_{x|y} \quad (5)$$

where: P_{xy} is the retail price of the bundle (x,y)
 P_y is the retail price of y when provided on an unbundled basis
 $A_{x|y}$ is the wholesale (access) price charged for x, given the company is also providing y and may therefore be purchasing inputs y
 $C_{x|y}$ are the costs of converting the wholesale input x into its end product, given that it is supplied in a bundle with y

However, in doing this it must be recognised that this implicitly assumes there is no discount on these non-relevant products (y) when they are supplied in the bundle. Whether this assumption has a significant impact will depend on such factors as how competitive the market for these products are. Under some circumstances, it may be appropriate to allow for a discount when taking account of the price of y in the bundle.

An alternative is to subtract the cost of providing y from the retail price of the bundle. This implicitly assumes that the firm discounts the price to equate with (some measure of) cost when it is provided in a bundle. It may also be feasible if product y is not provided on an unbundled basis and there is therefore no observable price for y. However, the information required to undertake this imputation test may be more difficult to obtain. The imputation test in this instance can be written as:

$$P_{xy} - C_y \geq A_{x|y} + C_{x|y} \quad (6)$$

where: P_{xy} is the retail price of the bundle (x,y)
 C_y is the cost of producing y (including both wholesale (access) prices, if applicable, and retail costs) when provided on an unbundled basis
 $A_{x|y}$ is the wholesale (access) price charged for x, given the company is also providing y
 $C_{x|y}$ are the costs of converting the wholesale input x into its end product, given that it is supplied in a bundle with y

These modified tests treat the unbundled price or cost of the irrelevant products as part of the access price to rivals (the equations can be rearranged so that these components contribute positively to the cost rather than negatively to the price). This will protect rivals from vertical price squeezes, as long as they are at least as efficient in the provision of the relevant product (x) as the integrated firm.

The above test accounts for any efficiencies gained from providing x and y within a bundle rather than individually, for example, the combined provision is likely to reduce billing costs. This adheres to the principle that the imputation test should allow prices that are as low as the lowest prices that could be expected in a competitive market, such efficiencies should be incorporated into the cost estimates.

As an illustration, suppose the market definition, is “product x when provided in the bundle (x,y), to customers over a (specified) six month period,” then a marginal imputation test would compare the following (similar adjustments can be made to arrive at an appropriate average total cost based test):

- **marginal revenue** – the additional revenue earned as a result of providing the bundle (x,y) over that timeframe to those customers *less* the unbundled price times the volume of sales *or* the total cost of y;
- **marginal access costs** – the costs the integrated firm would need to (theoretically) pay itself to obtain the necessary upstream inputs for x, given wholesale (access) prices; and
- **marginal retail costs** – the costs incurred as a result of transforming the input services into the product x given that it is being provided within the bundle (x,y) and that the costs associated with providing y have already been included (either as part of the price or cost of y) and should not be double counted.

This test effectively removes the influence on the bundle price and cost of the product(s) the Commission is not interested in and/or which fall outside the market definition.

4.3.2 The market definition is wider than the bundle

The market definition is likely to incorporate the relevant product(s) when provided on both a bundled and an unbundled basis. For example, the extent of demand and supply substitutability between internet services provided on an unbundled basis and those same services provided within a bundle would almost certainly be sufficiently strong to conclude they are within the same market. As discussed in section 3.1 above, to assess whether pricing practices are harmful to rivals it is necessary to consider prices and costs across the entire market rather than within only a subset of the market.

Where the market includes products that are supplied in different ways (ie bundled and unbundled) the appropriate comparison of retail prices and costs with the access charge would imply a weighted average approach. Thus the appropriate retail price would be a weighted average of the price for unbundled and bundled services, and similarly the retail cost and the access price would be weighted averages of those for the bundled and unbundled services. In this way the “average” price for the product would be compared with the “average” retail cost plus access charge – where “average” in this sense refers to either an “average” marginal or “average” average total cost analysis. This means that the depth of any price squeeze (or the extent to which it is determined to be harming rivals) will depend on the proportion of services the integrated carrier sells as a bundle relative to on an unbundled basis.

In practice, such averaging is likely to be avoided by considering total revenue and cost information (on either a marginal or average basis) over the timeframe and market of relevance. Using this to simplify the equation, the imputation test in this case would be:

$$R_x + R_y + R_{xy} \geq \tilde{A}_x + \tilde{A}_y + \tilde{A}_{xy} + \hat{C}_x + \hat{C}_y + \hat{C}_{xy} \quad (7)$$

where: R_x and R_y are the revenue from x and y when provided on an unbundled basis
 R_{xy} is the revenue from the bundle (x,y)
 \tilde{A}_x and \tilde{A}_y are the wholesale (access) charges for inputs to the x and y supplied on an unbundled basis
 \tilde{A}_{xy} are the wholesale (access) charges for inputs to the bundle (x,y)
 \hat{C}_x and \hat{C}_y are the total retail costs of x and y when provided on an unbundled basis
 \hat{C}_{xy} are the total costs of converting the wholesale inputs into the bundle (x,y)

For instance, if the market definition is “products x and y on both an unbundled basis and in the form of the bundle (x,y), to customers, over a (specified) six month period,” then a marginal cost based imputation test would compare the following:

- **marginal revenue** – the additional revenue earned as a result of providing x, y and the bundle (x,y) over that timeframe to those customers;
- **marginal access costs** – the costs the integrated firm would need to (theoretically) pay itself to obtain the necessary upstream inputs, given wholesale (access) prices; and
- **marginal retail costs** – the costs incurred as a result of transforming the input services into the products x and y and the bundle (x,y).

A similar comparison can be arrived at for an average total cost based imputation test, where an allocation of fixed and/or common costs is added to the relevant elements of the test.

It may be the case that the Commission is interested in only one product within the bundle, but that the market includes this product both within and outside the bundle. In this situation, the implications from the previous section would also need to be incorporated into the imputation test and the imputation test would become as follows (alternatively, the cost of y could be used rather than the price, in which case the equation would need to be suitably modified as outlined above):

$$\alpha P_x + (1-\alpha)P_{xy} - (1-\alpha)P_y \geq \alpha A_x + (1-\alpha)A_{x|y} + \alpha C_x + (1-\alpha)C_{x|y} \quad (8)$$

where: α is the proportion of x supplied on an unbundled basis, therefore (1- α) is that supplied on an bundled basis
 P_x is the retail price of x when provided on an unbundled basis
 P_{xy} is the retail price of the bundle (x,y)
 P_y is the retail price of y when provided on an unbundled basis
 A_x is the wholesale (access) price rival firms must pay to obtain the inputs into x

$A_{x|y}$ is the wholesale (access) price charged for x, given the company is also providing y (it is therefore the access price for x relevant to the x sold in bundled form)

C_x are the costs of converting the wholesale input x into its end product

$C_{x|y}$ are the costs of converting the wholesale input x into its end product, given that it is supplied in a bundle with y

Extending the above illustration, suppose the market definition, is “product x when provided on an unbundled basis and in the bundle (x,y), to customers over a (specified) six month period,” then a marginal cost based imputation test would compare the following (similar adjustments can be made to arrive at an appropriate average total cost based test):

- **marginal revenue** – the additional revenue earned as a result of providing x and the bundle (x,y) over that timeframe to those customers *less* the revenue (or costs) the integrated firm would have obtained (or incurred) had y been provided on an unbundled basis;
- **marginal access costs** – the costs the integrated firm would need to (theoretically) pay to obtain the necessary upstream inputs to produce x, given wholesale (access) prices on both a bundled and unbundled basis; and
- **marginal retail costs** – the costs incurred as a result of transforming the input services into the product x and the bundle (x,y) (excluding any common costs of providing the bundle, as these will already be incorporated into the revenue or cost information for y).

4.3.3 When rivals can't supply all products within the bundle

It may be the case that rival companies are unable to supply all the products an integrated firm includes in its bundle.⁴² In this situation, it will be the price of the product that all firms are able to supply (call it 'x') that will be of concern to the Commission, the price of the other good ('y') will essentially be irrelevant, at least in the context of imputation tests. In order to compete with the integrated firm, rivals must set the retail price of x so that customers face the same price whether they purchase unbundled products from rivals and the integrated firm or the bundle (x,y) from the integrated firm.⁴³ Another way of saying this is that the retail price set by the integrated firm for the bundle (x,y) must be high enough to cover the

⁴² In such circumstances, the market is likely to include the unbundled as well as the bundled products so that the implications outlined in section 4.3.2 will need to be taken into account. However, for the sake of simplicity and clarity we abstract from that issue in this section.

⁴³ Note that this assumes customers wish to purchase both products the integrated firm includes in the bundle. It may be the case that the proportion of consumers willing to purchase both products is small, implying that the percentage of the market influenced by the availability of the bundle is small. In such situations, rivals may not be unduly harmed by the provision of such a bundle, even when it is provided at a discount. It is for this reason that imputation tests should be carried out over the relevant market.

costs an equally efficient rival would incur in providing (x) and the price consumers face for purchasing y on an unbundled basis.

This can be written as:

$$P_{xy} \geq A_x + C_x + P_y \quad (9)$$

where: P_{xy} is the retail price of the bundle (x,y)
 P_y is the retail price of y when provided on an unbundled basis
 A_x is the wholesale (access) price charged for x
 C_x are the costs of converting the wholesale input x into its end product

If economies of scope arise from providing the bundle of products to customers, it would be consistent with competitive market pressures to allow such savings to be passed on in prices. For example, billing and customer servicing costs may be avoided by providing the products in bundled form. To allow such savings to be passed on to customers, equation (5) would need to be modified to:

$$P_{xy} \geq A_x + C_{x|y} + P_y \quad (10)$$

where: P_{xy} is the retail price of the bundle (x,y)
 P_y is the retail price of y when provided on an unbundled basis
 A_x is the wholesale (access) price charged for x
 $C_{x|y}$ are the costs of converting the wholesale input x into its end product, given that it is being provided in the bundle. This will therefore incorporate any economies of scope.

In some circumstances, y may not be provided on an unbundled basis and an unbundled price may not be observable. An alternative in this case would be to substitute the cost of y for the price in equations (9) and (10). This would mean that the retail price for the bundle (x,y) must differ enough from the imputed cost of x to cover the costs of providing y.

5 CONCLUDING REMARKS

When considering the merits of various imputation tests for assessing whether a firm's prices could be considered harmful to competition, anticompetitive behaviour is interpreted as behaviour that would be inconsistent with competitive market outcomes. Under this interpretation, prices are only considered too low if they are inconsistent with the lowest prices that could be expected within a competitive market environment.

As with other allegations of anticompetitive behaviour, defining the market will be a key step in establishing whether competition has been adversely affected. The integrated firm's pricing practices should be assessed on a market-wide basis rather than on the basis of a subset of the market. A vertical price squeeze occurring in only part of the market will not necessarily disadvantage rivals if they are able to shift their focus to other parts of the market not subject to a price squeeze. Unless the price squeeze is occurring over a significant part of the market, it is unlikely to have an anticompetitive impact.

Within the context of the market definition, imputation tests could be based on either marginal or average total costs. Both types of tests will provide useful information, but reliance on marginal cost based tests is preferable for a number of reasons:

- marginal cost based tests are more consistent with economic theory regarding the lowest prices that would be expected in a competitive market, since any sale above marginal cost⁴⁴ will make a positive contribution to profits (or reduce losses);
- it can therefore be argued that prices above marginal cost will not discourage equally efficient firms (with a similar cost structure) from remaining in the market;
- although average total cost based tests provide a lower threshold and may pick up a wider range of anticompetitive behaviours, such tests are less consistent with theories of economic efficiency, there may be efficient and legitimate business reasons for setting prices below average total cost (ie, costs consistent with behaviour under competitive market pressures); and
- marginal cost based tests are likely to be less contentious, especially if the firm produces multiple products and incurs shared costs which would need to be allocated on an arbitrary basis to arrive at a measure of average total costs.

If the Commission needs to rely on an average total cost based test (to establish that prices *may* constitute an anticompetitive price squeeze), then other elements will also be required to determine that the integrated firm has harmed competition.

⁴⁴ As noted in section 3.2, for imputation tests to be economically sensible, the marginal unit must be defined in terms of the market as a whole. The last unit then becomes the provision of all relevant services provided in the market over the relevant time period and the marginal costs and revenues are defined accordingly. In this context, marginal cost is equal to the textbook definition of average variable cost.

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