

# **Impact of Bundling of Telecommunications Services on Consumers, Industry and Competition**

**Franco Papandrea, Natalie Stoeckl and Anne Daly**

**Communication and Media Policy Institute  
University of Canberra  
Working Paper  
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# **Impact of Bundling of Telecommunications Services on Consumers, Industry and Competition**

## **Executive Summary**

This paper reviews the theory of bundling — the practice of selling two or more commodities as a package — and its application in the Australian telecommunications services market. Bundling can be thought of as a form of price discrimination that allows sellers to charge different prices to different consumers reflecting their different valuations for the commodities. Bundling also includes the practice of tying the sale of one commodity with another. There are two broad bundling strategies; pure bundling where the products are sold only as a package and mixed bundling where the products are sold both as a package and individually.

The focus of the paper is on the implications of bundling for social welfare. The welfare effects of bundling have received considerable attention in the literature since the practice was first highlighted by Stigler in 1963. The literature on monopoly bundling suggests that it is likely to raise the monopolist's profits but the impact on consumer surplus and aggregate welfare is unclear. It will depend on the distribution of the consumers' reservation prices for the bundled commodities, and on the commodities' price elasticity of demand and marginal production costs. Where demand is highly price elastic, bundling may encourage a substantial 'over-consumption' of the commodities and, if the marginal cost of production is high, it is likely to generate a welfare loss.

Conclusions of the effect of bundling on social welfare are even less clear in an oligopoly situation. It will depend on a wide range of factors including the type of oligopoly in place. Results differ depending on the assumption of a Cournot, Stackleberg or Bertrand oligopoly model. Under certain assumptions, the adoption of bundling may not even increase profits at the expense of the consumer. A prisoner's dilemma situation may arise where competition between oligopolists reduces profits and consumers are better off. The conditions which are conducive to increasing consumer surplus from bundling are the presence of high fixed costs and low marginal costs.

Another strand of the literature considers bundling as a tool for extending market power to additional markets. The results suggest that bundling will not help a monopolist extend monopoly power into a perfectly competitive market but it may be important if the other market is an oligopoly. In a prisoner's dilemma situation, if bundling lowers profits it may discourage new entrants to the market. Bundling may also have important long run implications for the industry. The welfare effects of bundling on leverage into another industry depend on the structure of the market and the interaction between firms in a dynamic context.

There are a number of ways in which bundling may generate cost savings. These may be through economies of scale and scope and also through economies of distribution. But, even when costs are reduced by bundling, the net effect on social welfare will depend on other features of the market. Where bundling reduces search costs to consumers, it may have

beneficial effects on social welfare. However, it may increase search costs significantly where bundling takes the form of complex menus.

Bundling has become an important feature of the Australian telecommunications market accompanying the increase in competition. There are two main types of bundling used in this market. The first is the standard packaging of two or more goods for sale; for example local and STD phone calls, local phone calls and Internet connection. The second is the discounting of aggregate expenditure when a consumer buys two or more goods from the supplier.

An assumption of much of the literature on bundling is that the incumbent firm has the major incentive to introduce bundling. However, the evidence from the Australian telecommunications industry suggests that new entrants have often initiated bundling partly as a way of differentiating their services from those of the incumbent. Telstra has responded to these initiatives by further bundling as might be expected in a prisoner's dilemma model. The proposition that Telstra is responding to bundling by its new competitors is further supported by the fact that there are reasons connected to the regulatory constraints on Telstra which may make bundling an undesirable strategy and discourage the company from initiating the practice. New entrants, on the other hand, have an incentive to offer bundles as a way of competing with the bundle of services offered by the former monopolist.

The extensive use of bundling in the form of complex menus is likely to increase search costs for consumers and to generate deadweight losses. In the long run, in response to consumer demands, these complex menus are likely to be simplified and the search costs reduced.

While the current use of bundling in the Australian telecommunications industry may have imposed costs on consumers, they do not seem sufficient to justify any substantial regulatory intervention. Some low-level precautionary surveillance, however, may be desirable to monitor developments. There may also be a case for some minor intervention to ensure consumers are provided with sufficient information to enable them to make efficient choices based on effective comparisons of bundles of services.

Overall, it is extremely difficult to assess the effects of bundling on social welfare and reach generalised conclusions. The net effect on social welfare depends on a number of factors including the structure of the market, the price elasticity of demand, the presence of high fixed costs and low marginal costs. The relative influence of these factors can only be determined on the basis of empirical analysis, and consequently, the welfare effects need to be assessed in each individual situation.

# Impact of Bundling of Telecommunications Services on Consumers, Industry and Competition

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# Impact of Bundling of Telecommunications Services on Consumers, Industry and Competition

## 1. Introduction

The practice of bundling — offering two or more products for sale as a single package for a single price — is a pricing strategy used in many industries that has become a common feature of the supply of many telecommunication services. There are two generic types of bundling depending on whether the individual items are available for purchase separately to the bundle:

1. *Pure bundling*, where the products are sold only as a package: and
2. *Mixed bundling*, where the products are sold as a package as well as individually.

Bundling includes other practices such as tying and ‘full line forcing’ where the supply of one product is conditional upon the purchase of another. Examples include pay television subscriptions with several channels being bundled together in a basic package and the requirement to subscribe to a basic package to gain access to premium channels. Another variant of bundling is the use of discounts linked to expenditure on two or more products as used by telecommunications carriers (for example, discounts on total annual expenditure on local, long distance and international calls)..

As a pricing strategy, bundling has a variety of implications for consumers, producers and competition in an industry. Where economies of scale or scope are present, for example, bundling may result in cost savings with potential benefits to consumers. On the other hand, the selling of goods as a bundle can be used as a price discrimination device that allows dominant firms to increase profits by extracting more consumer surplus. Bundling may also have anti-competitive effects. Through bundling, a firm with market power in one product may attempt to extend that power to products it sells in competitive markets. Similarly, it may be used to deter entry in a contestable market by bundling the contestable product with one in which a firm has market power.

The effects of bundling on social welfare are difficult to predict. Whether social welfare increases or decreases depends on the circumstances in which bundling is used. The effects on consumer and producer surplus are often simultaneous and with opposing impacts. Furthermore, analysis of the potential anti-competitive effects of bundling needs to take into account not only the economic benefits but also the technical and economic feasibility of unbundling and any exclusionary effects. Overall, welfare gains (losses) have to be evaluated against longer term benefits (losses) that may accrue from increased (reduced) dynamic efficiency from more (less) competition.

This paper examines the theory of bundling and its application in the Australian telecommunications services market. It uses the standard measure of efficient pricing — that anyone willing to pay the marginal cost of production should not be excluded from consumption — as the basis for evaluation. The analysis begins with a brief overview of efficient pricing principles to provide a framework for the evaluation of the efficiency of bundling. An extensive literature review is presented detailing the findings of past research

in this field and highlighting the welfare implications of bundling in different circumstances. A set of potential indicators of the likely efficiency of bundling is deduced from the literature review. The widespread use of the bundling practices in the Australian telecommunications services market is then examined. Finally, the paper provides a discussion of related policy implications.



## 2. Efficient Pricing

In a competitive market, with full capacity utilisation and the potential for continuous marginal increases in capacity, the setting of prices equal to short-run marginal cost (SRMC) of production is efficient because no one prepared to pay the marginal production cost of the commodity is excluded from consuming it. However, in industries where large economies of scale are present SRMC pricing can be problematic because it may be incapable of generating sufficient revenue to recover the total cost of production. In such industries, departure from SRMC pricing is necessary for the recovery of fixed costs and for continued investment.

The production of public utility services, including telecommunications, typically involves large fixed capital investment. The theory of efficient pricing in such industries has a long history and has attracted considerable attention in the economic literature. The standard principles trace their development to Ramsey (1927), Hotelling (1938), Coase (1946) and Boiteux (1956). Because of the problems of SRMC pricing in such industries, the primary focus of theorists was the development of second-best solutions with the aim of promoting efficiency and achieving full cost recovery.

Ramsey-Boiteux emerged as a favourable compromise enabling the revenue shortfall to be made up by raising prices above SRMC in a manner that minimises resultant deadweight losses. Two-part (or multi-part) pricing is another widely accepted scheme for the concurrent minimisation (and, possibly elimination) of deadweight losses and achievement of a specific revenue target. Kahn and Shew (1989) and Albon, Hardin and Dee (1997) advocate use of such pricing principles where possible. Albon, Hardin and Dee also provide a comprehensive review of the related literature.

A multi-part tariff can simultaneously achieve cost recovery and marginal cost pricing. In a multi-part tariff an up-front fee (such as a rental charge) is imposed for the right to consume units at marginal cost or an initial block (or blocks) of units is charged above marginal cost and the rest at marginal cost. That is, the tariff involves a charge for access to a service irrespective of consumption, and a separate charge for each unit of the service that is consumed. The access charge is intended to recover the fixed costs, while the usage charge reflects the marginal cost of providing the service.

To maximise efficiency, such tariffs would need to ensure the up-front charges are sufficient to cover the gap between revenue generated by marginal cost pricing and the total cost of providing the service. At the same time, those valuing the service at or above marginal cost should not face an up-front charge greater than the value of the consumer surplus they would derive from consumption of the service.

Since consumer surpluses vary widely among individuals an unconstrained pursuit of economic efficiency would require tailor-made charges for each consumer. While theoretically possible, setting a different price for each consumer would be highly impractical. A practical approach is to set different rates for different classes of consumers (e.g., business, domestic, pensioners). Such tariffs are quite common in the pricing of telecommunications services and other utilities. Price bundling, also, can be used as a means of charging differential prices to different consumers.

### 3. Price Differentiation Between Consumers

As indicated above, bundling can have effects similar to price differentiation. The choice between charging one price for all consumers or different prices for different groups can have important implications for social welfare. Provided no group is charged less than the marginal cost of supplying the service to them, differential pricing can improve efficiency.

Differential pricing may occur in three different ways:

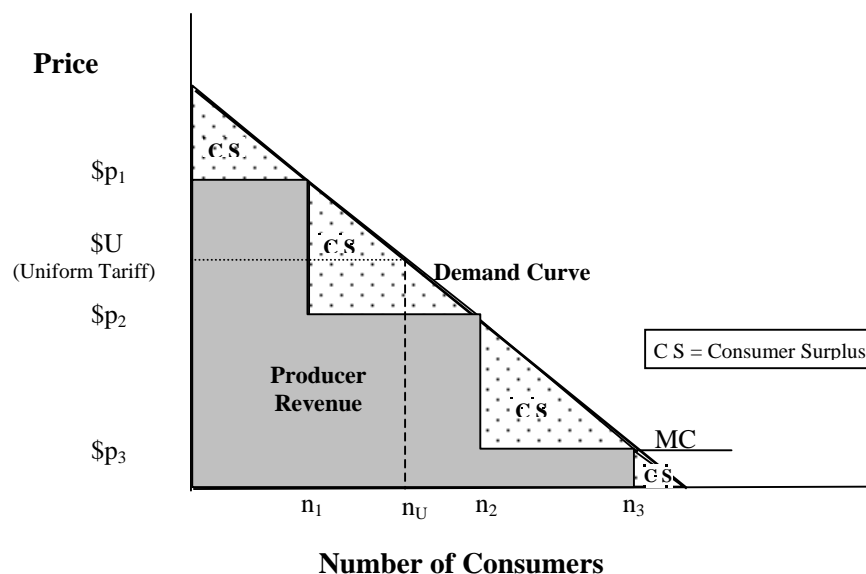
- each unit of output is sold at a different price to the person that values it most (known as first-degree or perfect price discrimination);
- non linear pricing where the price per unit varies with the amount of output purchased (second-degree price discrimination); and
- output is sold to different groups of people for different prices (third-degree price discrimination).

Perfect price discrimination is difficult to implement in practice because it would require a producer to know the willingness to pay of each and every one of its customers. It would also require a producer being able to stop those buying at low prices from reselling to those paying higher prices.

Non-linear pricing is common in many industries. The per unit cost of bulk supplies of most commodities decreases as more of the commodity is bought. The variety of price packages available for mobile telephony and Internet access are a good example of non-linear pricing.

Third-degree price discrimination is widely used and depends on a producer's ability to identify different groups with different willingness to pay for a service. Examples include pensioner, student or children concessions; business rates, domestic rates; etc. (the different rates charged for business and domestic telephony services are a good example). The effects of price discrimination are illustrated in figure 1.

**Figure 1: Differential Pricing**



As illustrated in Figure 1, with a single uniform tariff  $\$U$  to all users, all those with a willingness to pay less than  $\$U$ , even though it may be above the marginal cost of supply, would be excluded from consuming the service. The revenue generated by a single tariff equal to  $\$n_U U$  (the rectangular area enclosed by the axes and the two dashed lines). By charging a different rate to each of the groups with a willingness to pay above marginal cost, more users would be served, and more revenue would be raised. The total revenue is equal to  $\$(n_1 p_1 + n_2 p_2 + n_3 p_3)$ .

## 4. Bundling Practices

Bundling can take a variety of forms and has become a popular selling strategy for many telecommunications and information products. Perhaps the oldest form of bundling, still practiced today, is the tying of one good with that of a complementary good. An often quoted example of this form of bundling was IBM's practice of renting its computing equipment with an ongoing obligation to purchase punch cards for use with the equipment. A present day example is the practice used by some security firms of providing a substantial discount on the purchase and installation of security alarm systems with an ongoing obligation to purchase their remote monitoring services of the premises in which the system is installed. Another example is the practice of selling highly discounted mobile telephones with a contractual obligation to subscribe to a particular level of service for a minimum period of time.

Bundling may involve several products that can be purchased separately or as a bundle. In such situations, a consumer would typically face a bundle price lower than the sum of the prices of the individual components. Some insurance companies, for example, give discounts for multiple insurance policies held by a client. Similarly, telecommunications companies have recently started to engage in a similar practice of giving discounts to customers purchasing a bundle of different services (e.g., telephony, Internet access, long distance calls). The way bundling works is illustrated with the aid of figures 2 and 3.

**Figure 2: Buying Decisions With Unbundled Goods**

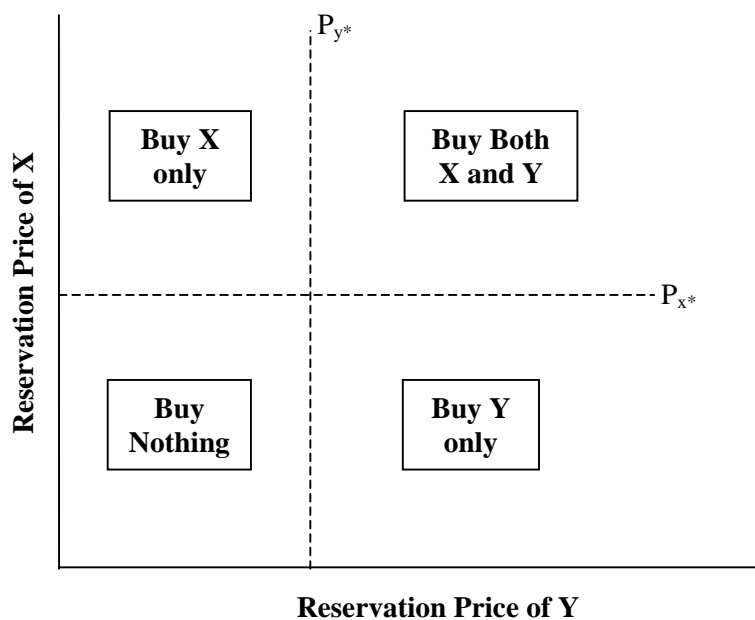
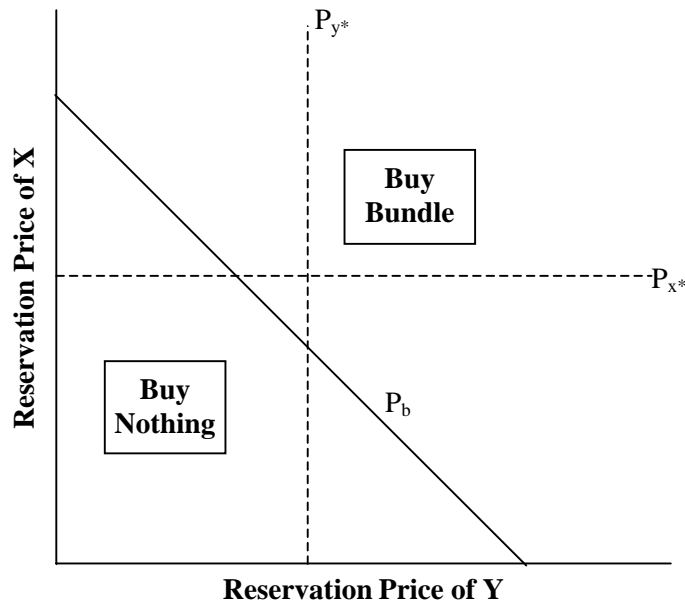


Figure 2 illustrates the consumer choice space for two goods X and Y. The axes represent the consumers' reservation prices for the two goods.  $P_{x^*}$  and  $P_{y^*}$  represent the price at which the goods are offered for sale. All consumers with a reservation price greater than the offer price for a good buy that good. As illustrated, the consumers, therefore, can be classed into one of

four groups depending on the relationship between their reservation prices and the offer prices for the goods.

Figure 3, illustrates the consumer choice space when the two goods are sold only as a bundle (pure bundling) relative to the situation when the goods are sold separately. In the figure, the bundled price  $P_b$  is smaller than the sum of the two individual offer prices (evident from the location of the  $P_b$  line below the point of intersection of the  $P_{x^*}$  and  $P_{y^*}$  lines), but need not be so. The relative position of the line  $P_b$  to the intersection of the lines  $P_{x^*}$  and  $P_{y^*}$  indicates the level of ‘discount’ or ‘premium’ inherent in the bundle offer price. The line  $P_b$  represents all feasible combinations of the reservation prices for the two goods adding up to the bundle offer price ( $P_b \leq P_x + P_y$ ). All reservation price combinations in the space above  $P_b$  exceed the bundle offer price and all consumers in that space buy the bundle. Consumers with reservation prices located in the space below  $P_b$  do not purchase the bundle. Note that some of these consumers previously purchased one of the components.

**Figure 3: Buying Decisions With Pure Bundling**



In mixed bundling, the goods are sold as a bundle as well as individually. The consumer choice space for mixed bundling is illustrated in figure 4. The bundle offer price is assumed to be less than the sum of the offer prices for the individual goods ( $P_b = P_{x^*} + P_{y^*} - d$ ), but need not be so. Once again the consumer space divides into four groups. Unlike the pure bundling case, a reservation price for the bundle greater than or equal to the bundle offer price will not be a sufficient condition for the purchase the bundle. A consumer will purchase the only if the following three conditions are satisfied:

- (1). Reservation price for the bundle  $\geq P_b$ ;
- (2). Reservation price for good X  $\geq P_{x^*} - d$ ; and
- (3). Reservation price for good Y  $\geq P_{y^*} - d$ .

This can be demonstrated very simply as follows:

Let  $R_x$ ,  $R_y$  and  $R_b$  be a consumer's reservation prices for the two goods and the bundle respectively.

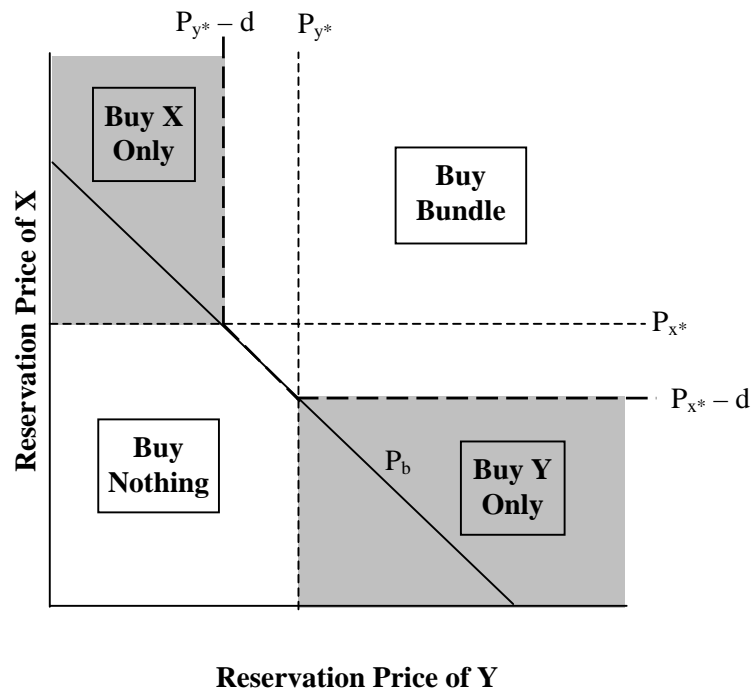
By definition  $R_b = R_x + R_y$

At the margin,  $R_b = P_b$

Thus  $R_x + R_y \geq P_{x^*} + P_{y^*} - d$

Assuming that  $R_x \geq P_{x^*}$  and substituting for this in the above equation, leads to the condition that  $R_y \geq P_{y^*} - d$ . The condition that  $R_x \geq P_{x^*} - d$  can be derived in a similar manner.

**Figure 4: Buying Decisions With Mixed Bundling**



Companies engage in bundling for several reasons. They include:

- Securing benefits from economies of scope;
- Increasing sales;
- Locking-in customers;
- Product differentiation;
- Leveraging;
- Price discrimination; and
- Increased competitive advantage.

The extent to which companies can engage in bundling for these reasons is largely determined by the structure of the industry in which they operate. The effects of these motives and the capacity of companies to implement them is discussed below.

Serious analysis of bundling as a selling strategy traces its origins to the 1960s. In what appears to be the first reported assessment of bundling practices, Stigler (1963) examined the block booking arrangements of the movie distribution industry. The general practice was for film studios to offer cinemas packages rather than individual movies for screening<sup>1</sup>. Naturally, cinema operators placed a considerably higher value on ‘blockbusters’ than on other movies. Stigler was the first economist to recognise that when buyers have substantially different valuations for products, as was the case for movies, a seller may be able to exercise a form of price discrimination and increase profits by selling the products as a bundle rather than separately. Stigler’s analysis was subsequently extended by Adams and Yellen (1976) to show that a multi-product monopolist could further increase profits by offering buyers the choice of purchasing either the bundle or one or more, but not all of the components separately.

Although bundling selling strategies are popular, it is not always clear that they will be used to the advantage of sellers and the detriment of consumers. If economies of scale or scope can be achieved in the production of the bundled products and the benefits are passed on to consumers, it does not necessarily follow that bundling will make consumers worse off. Adams and Yellen (1976), for example, note that bundling *may* result in smaller deadweight losses than pure monopoly pricing. Also, while a monopolist may practice bundling to its own advantage, the use of bundling in an increasingly competitive market may produce advantages for both buyers and sellers. The problem is non-trivial, because:

- (1) It requires assessment of welfare/distributional consequences of bundling against second best (as opposed to first-best) criteria; and
- (2) bundling can have a wide variety of welfare impacts.

Theoretically it can be readily demonstrated that, in a first-best world, pure-bundling is less efficient than pure-unbundling. This is because bundling has the effect of ‘confusing’ the price signals to consumers and leads to over-supply of some goods (Schmalensee, 1982; Kahn and Shew, 1987). This can be illustrated with a simple example.

Assume that two products have marginal costs of  $MC_1$  and  $MC_2$  respectively and are sold *only* as a bundle for a price of  $P_B = MC_1 + MC_2$ . With marginal valuations (reservation prices) of the two products of  $R_1$  and  $R_2$  respectively, the consumer will purchase the bundle as long as:

$$R_1 + R_2 \geq P_B = MC_1 + MC_2.$$

If  $R_1 > MC_1$  then we can say that  $MC_1 = R_1 - \delta$  where  $\delta > 0$ .

By substitution

$$R_1 + R_2 \geq R_1 - \delta + MC_2$$

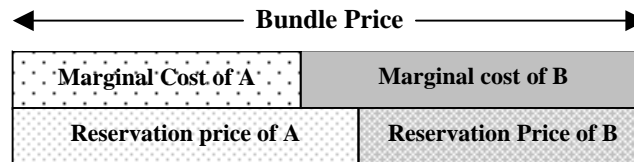
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<sup>1</sup> Similar selling arrangements are in place for television programs where the practice is for television networks to bid for the whole output of a studio and not individual programs.

That is:  $R_2 \geq MC_2 - \delta$

In other words, there is a possibility that product 2 will continue to be sold up to the point where  $R_2 = MC_2 - \delta$  and thus continue to be produced inefficiently at marginal costs greater than consumers' marginal willingness to pay (see figure 5).

**Figure 5: Bundling and Potential for Inefficient Production**



The process illustrated in figure 5 involves a cross-subsidisation of consumer surplus along the lines that are or were common in monopoly supply of telecommunications services. Srinagesh (1991) sought to explain why multiproduct telecommunications monopolists often used mixed pricing structures with some products priced below marginal cost. Examining combinations of linearly priced (e.g., long distance calls) and non-linearly priced (e.g., telephone access) products, he showed that the marginal price of the non-linearly priced product was dependent on whether the two products were complements or substitutes in consumption. With complements, the marginal cost of the non-linearly priced product will be below marginal cost; with substitutes, it will be above marginal cost. The condition was due primarily to the demand interaction between the products and was found to hold for both profit maximising and surplus maximising monopolist.

These results compare pure bundling to the competitive market outcome that equates prices to SRMC. But, as indicated above, SRMC pricing will not achieve full cost recovery for the supply of typical utility services. As a result, second best practices are common and it is against these practices that the welfare effects of bundling will need to be judged. Another approach might be to assess the likely welfare outcomes if current telecommunications bundling practices were to be prohibited.

The issue is further complicated by the fact that the welfare/distributional consequences of bundling depend upon a wide variety of factors (discussed in detail in subsequent sections). According to Salinger (1995:94), the net effect of bundling cannot be determined *a priori* without collecting information on the correlation (across consumers) in reservation prices and on the price elasticities of the bundled goods (both own-price and cross-price). Also it cannot be assumed that bundling will necessarily raise profit. As noted by Economides (1993), bundling may be the result of a prisoner's dilemma where the simultaneous decisions of competitors are likely to lead to a sub-optimal outcome for each of them. The welfare implications of bundling also depend upon the market structure(s) of each bundled good (Mitchell and Vogelsang, 1991:109) and upon the way in which bundling affects costs. Finally, Adams and Yellen (1976:496) have pointed out that bundling causes distributive inefficiencies (that is, potentially, consumers could gain from trading separate components of their bundle).



## 5. Monopoly Bundling

The primary interest of most of the early research literature on bundling was to demonstrate how a monopoly supplier could use the strategy as a surrogate for price discrimination among consumers with different reservation prices for the components of the bundle. Stigler (1963) was the first to recognise this effect. He used the film distribution practice of selling movies as a bundle to demonstrate that when consumer preferences for different goods are negatively correlated (increased demand for one reduces demand for the other), profits may be increased by selling the goods as a bundle. The effect can be illustrated with a simple example.

Assume that there are only two consumers (X and Y) that have different reservation values for two commodities (goods 1 and 2). The reservation values that the two consumers have for each of the goods differ as indicated in table 1. If a firm were able to engage in perfect price discrimination it would sell one unit of each good to the two consumers at prices equal to the consumers' reservation prices for each of the goods. With perfect price discrimination the firm could generate a total of \$260 in revenue. Typically, however, goods are offered at a single price to all consumers with the price set so as to maximise revenue from the resulting volume of sales. A single firm selling the two goods separately would thus choose to sell good 1 at a price of \$50 enabling a unit to be sold to each consumer to generate sales of \$100. Good 2 would be sold at \$90 with only consumer X buying it at that price (at a price of \$40 both consumers would purchase the good, but total sales would be only \$80). By selling the two goods separately, therefore, the firm could generate a maximum of \$190 in revenue. However, by selling the two goods as a bundle, the firm would be able to sell the bundle to each consumer at a price of \$120 to generate a total of \$240 in revenue. Although, this is somewhat smaller than the revenue possible with perfect price discrimination, from the producer's point of view, bundling can clearly capture some of the benefits of price discrimination.

**Table 1: Reservation Prices**

	Good 1	Good 2
Consumer X	\$50	\$90
Consumer Y	\$80	\$40

Pure bundling may not always be attractive to producers. When the demand for two goods is independent, a firm may generate higher profits by adopting a mixed bundling, rather than a pure bundling strategy. Higher profits are possible, particularly when a least some consumers value one of the goods very highly, and the other at less than marginal cost. In such a situation the firm can sell individual goods at prices higher than those prevailing under a pure-bundling strategy. Consumers not valuing the individual goods so highly will not necessarily be driven out of the market as long as their aggregate valuation of both goods is greater than, or equal to, the price of the bundle. This arises because mixed bundling 'allows one to serve highly asymmetric demand with individual components while targeting the bundle toward the less extreme 'middle' segments' (Adams and Yellen, 1976). Mixed bundling can be a profitable strategy even if the two goods are substitutable (Lewbel, 1985).

Mixed bundling (as opposed to pure) can be profitable under a variety of different circumstances. Schmalensee (1982 and 1984), considered bundling in the Adams and Yellen model for the special case of a joint normal distribution of reservation values. Employing both numerical and analytical techniques he demonstrated that bundling can raise profits even when reservation values are not correlated. Also using the Adams and Yellen model, McAfee, McMillan and Whinston (1989:372) distinguished between cases where the monopolist is or is not able to monitor consumer purchases and identified sufficient conditions in each case for bundling to dominate unbundled sales. They noted that an implication of their analysis is that monopoly ‘bundling is always an optimal strategy whenever reservation values for the various goods are independently distributed in the population of consumers (regardless of the monopolist’s ability to monitor purchases. In addition, when purchases can be monitored, bundling dominates unbundled sales for virtually all ... joint distributions of reservation values’. More recently, Bakos and Brynjolfsson (1998:1) found that ‘bundling very large numbers of unrelated information goods can be surprisingly profitable’, but noted that ‘when different market segments of consumers differ systematically in their valuations for goods, simple bundling will no longer be optimal. However, by offering a *menu* of different bundles aimed at each market segment, a monopolist can generally earn substantially higher profits than would be possible without bundling’.

For producers, bundling has also the desirable effect of reducing the heterogeneity of consumers ‘by reducing the effective dispersion in buyers’ tastes. This happens simply because as long as reservation prices are not perfectly correlated, the standard deviation of reservation prices for the bundle is less than the sum of the standard deviations for the two component goods’ (Schmalensee, 1984:228). In addition, Bakos and Brynjolfsson (1998:1) commenting on the *predictive value of bundling*, noted that ‘the law of large numbers makes it much easier to predict consumers’ valuations for a bundle of goods than their valuations for the individual goods when sold separately’.

## 5.1 Welfare effects

While there is a broad consensus among economists working in this field that monopoly bundling (as a form of price discrimination) almost certainly raises profit, the impact on consumer surplus and aggregate welfare is not clear. Analysis of the welfare effects of these issues can be complex. In their detailed analysis, Adams and Yellen (1976) compare the welfare effects of monopoly pure-unbundling, pure-bundling and mixed-bundling, when demand for the bundled goods is independent, and when there are no cost advantages from bundling. After demonstrating that bundling (mixed or pure) generally produces higher profits than pure-unbundling, they analyse the welfare effects of three different types of ‘bundles’ which they label as:

- (1) the restaurant type (mixed bundling of complementary goods);
- (2) the toothpaste type (multiple-container sizes); and
- (3) the automobile type (where manufacturers offer basic and luxury models).

The incentive to engage in the restaurant type of bundling follows directly from negative correlations in reservation prices that ensure increased profitability with mixed bundling. Adams and Yellen (1976:492) show that this type of bundling results in both allocative and distributive inefficiencies. The allocative inefficiencies occur because ‘commodity bundling can lead to oversupply of both commodities, undersupply of both commodities, or oversupply

of one and undersupply of the other'. Distributive inefficiencies occur because consumers could gain by trading among themselves. If, for example, a consumer who values a dessert very highly and another who values an entrée very highly both purchase a bundled three-course dinner, they can both increase the benefits accruing to them by trading with each other.

Essentially, the second type of bundling is a form of second degree price discrimination and this too can generate both allocative and distributive inefficiencies. Allocative inefficiencies can, for example, occur when consumers are encouraged to purchase packages which are larger than needed. Distributive inefficiencies occur because there is a potential for mutual gains from trade.

In contrast, Adams and Yellen argue that the automobile type of bundling can generate allocative inefficiencies, but will not generate distributive inefficiencies as consumers cannot gain by trading some of the 'basics' (say, tyres) for some of the luxuries (say, air-conditioning) because the basics cannot be disembodied from the car.

Given that bundling almost certainly leads to allocative inefficiencies and may also lead to distributive inefficiencies, unsurprisingly Adams and Yellen (p. 494) conclude that 'commodity bundling generally leads to welfare losses when compared with perfect competition'. But interestingly, they also conclude that 'this does not imply that banning package selling per se decreases the burden of monopoly'. Using two examples they demonstrate how with a particular distribution of reservation prices mixed bundling can be Pareto optimal and how a different distribution of reservation prices leads to a larger deadweight loss with bundling than with simple monopoly pricing. In other words, without first identifying the distribution of reservation prices it is not possible to determine whether bundling is better (from a welfare perspective) than monopoly pricing.

Using the Adams and Yellen framework, Wildman and Owen (1985) examined the stability of bundling in a competitive environment and with different distributions of reservation prices and concluded that the welfare implications of bundling are ambiguous. By aggregating the demand of consumers with different reservation prices, bundling may make possible the supply of services that could not be supported on a stand-alone basis. In other situations, however, bundling or mixed bundling may prevent consumption that would otherwise occur with stand-alone pricing.

The importance of reservation-price distributions in determining net welfare effects has also been stressed by others. Salinger (1995:94) concludes that 'the effect of bundling on consumer surplus depends on the precise distribution of reservation values'. A similar conclusion was reached previously by Schmalensee (1982:71) who found that a profitable switch from unbundled to mixed bundled sales 'may increase or decrease net surplus; it all depends on the details of the distribution of reservation prices'. In subsequent work, Schmalensee (1984) examined monopoly price-discrimination type bundling (with no cost-advantages and independent — *Gaussian* — demands) and concluded that bundling can result in a net increase in welfare (beyond that which would occur with pure monopoly pricing), but that 'it generally makes buyers worse off than unbundled sales' (p. 211). Bakos and Brynjolfsson (1997:24) note that 'aggregation strategies can substantially reduce the deadweight loss from monopoly, but they can also lower the surplus left to consumers' and in a subsequent paper (Bakos and Brynjolfsson, 1999:3) they note that 'bundles of more than

two goods will always *reduce* consumers' surplus when the goods have independent linear demands'.

Cready (1991) extends the Adams and Yellen's mixed bundling model by examining the case of sellers charging a premium, rather than offering a discount, on the bundle price. In the Cready model implementation of the premium pricing strategy requires an ability to prevent purchasers from buying all the components of the bundle at their non-bundled prices. The analysis demonstrates the possible use of this strategy when sellers have direct knowledge of customers identities and purchasers or more generally through skilful use of discounts or rebate coupons<sup>2</sup>.

Premium pricing of bundles was also examined by DeGraba and Mohammed (1999). They develop a theory of intertemporal mixed bundling to explain the observed behaviour of bundled concert tickets (commonly called subscription series) being sold in advance and at a higher price than individual tickets. They show that a capacity-constrained seller can this strategy to extract additional rents from high value customers. The strategy creates the perception of an eventual shortage in tickets and forces buyers to self-select on the basis of their reservation values. By employing the strategy, sellers can extract additional rents from high value customers who wish to avoid the possibility that a shortage will eventuate.

## 5.2 Policy implications

Efficient public policy seeks to promote outcomes that maximise social welfare. A policy intervention to alter market outcomes, therefore, is justified only if it leads to an improvement in social welfare. However, because the welfare effects of bundling practices are not clear-cut, monopoly bundling may pose a conundrum for policy makers.

While monopoly bundling is likely to lower consumer surplus and raise producer surplus, no generalised conclusion can be made about the net effect on welfare. Whether the loss in consumer surplus is greater or less than the increase in producer surplus, depends upon the distribution of reservation prices and upon marginal production costs. While hypothetical examples along the lines of Adams and Yellen are useful to illustrate that different outcomes are possible, they do not provide sufficient guidance about likely net welfare outcomes without detailed analysis of the distribution of reservation prices. Such detailed analysis cannot be undertaken without empirical data and because reservation prices can differ substantially from situation to situation, the results are likely to be restricted to the case under study. Nonetheless, it is possible to draw some broad generalisations on the welfare impact of monopoly bundling.

Intuitively the 'efficiency' problem associated with monopoly bundling arises because the strategy may entice or force some consumers to purchase more than they wish to consume (e.g., having to purchase a nut and a bolt when only the bolt is needed) discarding any unwanted part(s) of the bundle. To the extent that consumers 'over-purchase', the resources used in producing the discarded portion of the over-purchased commodity are wasted by the bundling strategy. If the bundled commodities are highly price elastic then it is likely that many consumers will be encouraged to 'over-purchase'. The higher the marginal production costs of the 'over-purchased' commodity, the more likely that bundling will generate dead-weight losses. When attempting to assess the likely welfare effects of price-discriminatory

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<sup>2</sup> For a discussion of coupons as a price discrimination tool see Ben-Zion, Hibshoosh and Spiegel (2000).

bundling, therefore, consideration of the price elasticities and of the marginal production costs of the bundled goods should prove a useful starting point.

Discussion of welfare considerations in the established literature has tended to be restricted to the welfare effects of bundling compared with those of marginal cost or pure-monopoly pricing. As noted earlier, these 'base-lines' are not always relevant and for many cases it will be important to assess welfare effects of different pricing strategies in a second-best world. Mitchell and Vogelsang's (1991:108-9) formal proof that the McAfee, McMillan and Whinston (1989) analysis of multiproduct monopoly bundling is a case where bundling raises welfare beyond that which would have prevailed under Ramsey pricing is a notable example of wider welfare considerations.

While not explicitly addressing the bundling issue, Spence (1976:218) argues that if there are fixed costs and if a firm can price discriminate, then 'the welfare aspects of the product-choice problem are eliminated'. Similarly, Varian (1996:2) considers price-discrimination in high fixed-cost industries and notes that 'differential pricing can generally be expected to contribute to economic efficiency'. Evidently, economies of scale indicate that marginal cost pricing may not be feasible and hence, bundling may increase welfare. Interestingly, Varian also notes that differential pricing of 'essential' services may be desirable on equity grounds. According to him, differences in willingness to pay arise primarily from differences in income rather than tastes. ... Differential pricing implies that users with higher willingness-to-pay end up paying higher prices than users with lower willingness-to-pay. If these differences are primarily determined by differences in income, then differential pricing is effectively charging users with higher income more than those with lower income'.(p. 12)

## 6. Oligopoly Bundling

While it can be fairly concluded that bundling by a profit maximising monopolist will raise producer surplus at the expense of consumer surplus with ambiguous results in terms of net welfare effect, the same result does not always hold in oligopoly situations. In such situations the outcome depends on the strategic interaction of the firms. As many markets for telecommunications products and services are characterised by oligopoly structures, analysis of oligopoly bundling and its effects should be of some assistance to public policy considerations.

The traditional analytical models of oligopoly treat the market situation as a ‘one-shot’ strategic game. The more important game-theoretic analytical models used for the analysis of oligopoly outcomes are:

- The Cournot model which assumes that each firm in the market chooses its output to maximise profit given that other firms are doing the same. The aggregate output of all the producers is simultaneously placed on the market and the price then moves to the market clearing level. In a strategic sense, the firms react to each other’s output decisions and adjust their output decisions to maximise profit given the output of the competitors. The reaction continues until the market settles down at the point where no producer wants to change its output given the outputs of its competitors.
- The Stackelberg model assumes a ‘market leader’ announcing a credible and binding level of output that cannot be changed after the announcement. The other producers then respond by producing a profit maximising level of output given the market leader’s output.
- The Bertrand model assumes that firms simultaneously set prices and then produce and sell what the market demands at those prices. For homogenous products, a producer cannot afford to set a price that is undercut by its competitor without risking the loss of its entire customer base. Consequently, the market quickly moves to a single competitive market price for the output of all producers.

In an analysis of the welfare effects of bundling in both Bertrand and Cournot oligopolies Carbajo, De Meza and Seidmann (1990) show that bundling can be profit maximising even if consumers’ reservation prices for the bundled goods are perfectly correlated. That analysis was based on the assumption that the motivation for bundling was its use as a strategic tool rather than price discrimination. This is particularly important for Bertrand competition where the standard solution under constant returns to scale is prices equal to marginal cost combined with zero profits for all firms.

Commenting on the Carbajo, De Meza and Seidmann analysis, Mitchell and Vogelsang (1991:110) noted that under Bertrand competition, bundling is clearly not part of a welfare-maximising strategy because it leads to less fierce competition and thus makes consumers worse off. They also noted that with constant costs (as assumed by the Carbajo, De Meza and Seidmann analysis) bundling does not maximise social welfare under Cournot competition either. However, they pointed out that if average costs are not constant (or if firms do not have unlimited funds), then ‘bundling ... may be welfare improving in a Cournot oligopoly’ (footnote p. 110).

McAfee, McMillan and Whinston (1990) provide more general conditions for the optimality of bundling in an oligopolistic setting. They show that bundling is always optimal when consumers have reservation values that are independently distributed.

Chen 1997 offers an equilibrium theory of product bundling by rival firms facing a duopoly in the primary market and perfect competition in the other product markets. Using several models he shows that, in equilibrium, at least one firm in the duopoly market chooses a bundling strategy and both firms earn positive profits even though they produce a homogeneous product and compete in prices. Bundling emerges as the equilibrium strategy because it enables product differentiation and reduces price competition. In the absence of this strategic effect, there is no incentive to bundle the primary product with a competitively produced product. The models also show that although bundling benefits firms, it always reduces social welfare.

In industries where transaction costs can be a sizeable proportion of total supply costs, bundling can generate efficiency gains. Fay and MacKie-Mason (1999) examined competition between firms that bundle information goods (characterised by high fixed costs and very low marginal costs). Their analysis compared profits, consumer surplus and aggregate welfare under monopoly, Bertrand duopoly, Stackleberg duopoly and perfect competition with pure bundling, pure unbundling and mixed bundling. They noted that because bundling 'reduces the number of transactions that must be made, [it] is likely to result in efficiency gains and greater profits to the firm compared to unbundling which requires repeated transactions' (p. 26). This observation could be particularly important for many information services, including telecommunications, where billing represents a substantial proportion of the cost of providing a service. The Australian Competition and Consumer Commission (ACCC), for example, notes that consumers have a preference for 'one bill' for telecommunications services (ACCC, 1999a).

Often consumers seek to purchase composite systems made up of several complementary components (e.g., personal computers operating systems and software). If the components are compatible and firms do not bundle, consumers can build their ideal system by purchasing components from separate competitive markets for each component. Using game theoretic tools Matutes and Regibeau (1992) examine the case where each firm supplies all the components for a system and show that excessive standardisation can occur in those industries as a result of firms choosing to produce compatible components as well as offer discounts to those purchasing all the components of a system from one firm. Mixed bundling tends to increase the range of parameters that lead to socially excessive standardisation. With bundling, the resultant Nash-equilibrium can have the characteristics of a prisoner's dilemma and the firms would be better off not bundling their products. Economides (1993) extends these results to show that in a duopoly mixed bundling is the dominant strategy for both firms. However, when the composite goods are not very close substitutes, at the bundling-bundling equilibrium both firms are worse off than if neither engaged in bundling.

The preference for compatibility appears to be limited. DeNicolò (2000) examines the case where some 'generalist' firms supply all the components while 'specialist' firms do not. He shows that when competing with specialist firms a generalist firm may have an incentive to choose incompatibility or to engage in pure bundling. This arises because when systems are more differentiated than their components, specialist firms will be induced to relax price competition with consequential benefit to the generalist firm.

Nalebuff (1999) shows that while bundling may not stop competition, it forces competitors into competing with bundles. Particularly when components are complements or have positively correlated values, a firm selling only one or some components of a bundle will find it difficult to compete against a firm that sells the full bundle at a discount. He also shows that while a monopolist has incentives to bundle to achieve better price discrimination or save costs, it has a greater incentive to bundle to deter potential entrants or to reduce the impact of any entry that does occur. In subsequent work (Nalebuff, 2000), he shows that 'bundle against bundle is ferocious competition', lowers profits 'and the result only gets worse as the bundle size grows beyond two goods'.

Although Economides (1993) and Matutes and Regibeau (1992) note that bundling equilibria tend to produce 'socially excessive standardisation' and a reduction in profits neither explicitly consider consumer surplus or allocative inefficiencies. It is possible to observe, however, that the lower profits arising from a prisoner's dilemma may be due to lower (average) prices. Hence, this type of bundling may raise consumers' surplus. Overall, the net welfare effect will depend on whether the increase in consumers' surplus is larger or smaller than the fall in producers' surplus.

Using a standard oligopoly model, Martin (1998) shows that bundling by a firm with a monopoly in one product has a strategic effect because it changes the relationship between the goods from which consumers choose. He demonstrates that bundling may be profitable and can allow a firm with a monopoly in one market to exercise greater market power in other markets to strategically disadvantage rivals and may reduce net social welfare. However, it does not follow that bundling necessarily reduces net social welfare as there are cases where bundling may increase quality or may reduce marginal or fixed costs. The impact on net welfare, therefore, may involve tradeoffs between those effects.

What emerges from the studies of oligopolistic bundling is that the effects depend crucially on the relative pay-offs and strategies of firms. Consequently, those attempting to assess the welfare effects of oligopolistic bundling face a difficult task. Unlike monopoly bundling, it cannot even be concluded that oligopolistic bundling will raise profits at the expense of consumer surplus. Clearly, there are situations when bundling improves consumer surplus. The conditions most conducive to such an outcome are: oligopoly; high fixed costs; and low marginal (production) costs. However, the presence of those characteristics in an industry does not necessarily imply that bundling in that industry will be 'beneficial' to consumers. All that can be said is that bundling practices in that industry is not necessarily 'harmful'.



## 7. Bundling and Market Power

Much of the early literature on bundling as a strategy for influencing market structure was associated with the issue of ‘tie-ins’ (bundling is conceptually equivalent to tying, subject to the constraint that goods are consumed in fixed proportions). The basic idea underlying bundling/tying in this context, is that there are circumstances when firms can use such strategies to extend their monopoly power from one market to another. As noted by Burstein (1960), firms can raise profits by tying goods that are complementary. In a later study, Blair and Kaserman (1978:401) establish that ‘vertical integration and tying arrangements are alternative means of obtaining precisely the same results’.

However, the plausibility/importance of leverage as an explanation of bundling has been questioned. Cummings and Ruther (1979), for example, note that if tying is used for the express purpose of extending monopoly power, then one should expect to see changes in market share (in the downstream market). In their discussion of the ‘Northern Pacific Case’, they note that market shares did *not* appear to have changed when the Northern Pacific Railway engaged in tying, and they provide several plausible explanations (other than leverage)<sup>3</sup>.

The incentives for leverage are not clear. Posner (referred to in Kaplow, 1985:518) argues that there is a theoretical problem with leverage theory. According to him ‘a [fatal] weakness of (see previous line) leverage theory is its inability to explain why a firm with a monopoly of one product would want to monopolise complementary products as well. If the price of the tied product is higher than the purchaser would have had to pay in the open market, the difference will represent an increase in the price of the final product or service to him, and he will demand less of it, and will therefore buy less of the tying product’. Thus, at least when analysed in a static context, bundling/tying may not necessarily help a monopoly to extend its power into a perfectly competitive market. Leverage theory, however, may nonetheless be relevant for several important reasons.

First, leverage has to be considered in a dynamic context. Kaplow (1985:532), for example, notes that if the short-run costs of tying/bundling are low, then potential long-run benefits need not be particularly high to make such strategies rational (profit-maximising). In other words, bundling/tying could allow a monopoly to extend its power into a perfectly competitive market, but it may take a considerable time to achieve.

Second, although bundling may not allow a monopoly to extend its power into a perfectly competitive market, it may be an important strategic tool in oligopolistic settings. Matutes and Regibeau (1992) go so far as to conclude that because bundling can lower the equilibrium profit of a duopolist (as per the prisoner’s dilemma discussed above) and thus ‘can be used by an incumbent to exclude entry’.

Third, leverage theory may be largely irrelevant if the ‘other’ market is perfectly competitive, but it could be important if the ‘other’ market is oligopolistic. For example, from his analysis of tying when the tied good is in an oligopoly market structure (derived from economies of scale), Whinston (1990:838) concluded that ‘tying is frequently a profitable strategy for the

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<sup>3</sup> As part of the disposal of some of its landholdings, Northern Pacific Railway had been imposing contractual obligations tying buyers and lessees to use its rail services to ship commodities produced on the lands unless lower rates or better services were available from competing railways.

monopolist in these models and it is often so precisely because of its potential for altering the market structure of the tied good market' (p. 839). Nalebuff (1999) extends this outcome by showing that bundling by an incumbent both reduces an entrant's profit and mitigates the incumbent's profit loss if entry occurs.

The analysis becomes even more complex when all markets for bundled goods are oligopolistic. Carbarjo et al (1990) examined such a situation and noted that the incentives to bundle depend, interactively, on the type of oligopoly and upon the cross-price elasticities of the bundled goods. Specifically, they show that if the bundled goods are independent, then Bertrand oligopolists have a big incentive to bundle whereas Cournot oligopolists do not. In contrast, if the bundled goods are complementary, then Cournot oligopolists appear to have a much bigger profit incentive to bundle than do Bertrand oligopolists.

However, it does not necessarily follow that those wishing to determine the strategic/leverage incentive of bundling need 'simply' determine the cross-price elasticities of demand and the appropriate oligopoly model. Bulow et al (1985) demonstrate that the issues are far more complex by analysing feed-back effects in multi-product oligopolies and reach the conclusion that 'when thinking about oligopoly markets the crucial question may not be do these markets exhibit price competition or quantity competition or competition using some other strategic variable? but rather, do competitors think of the products as strategic substitutes or as strategic complements?'. While their analysis did not address bundling explicitly, it made a valuable contribution by providing yet another example of situations in which counter-intuitive results occur in oligopoly settings (their example is one in which a subsidy serves to lower profits). As noted above, it is evident that monopoly conclusions regarding the profit-incentive for bundling do not simply extrapolate to oligopolistic settings.

In their analysis of the similarities (with respect to profit) between vertical integration and tying, Blair and Kaserman (1978) discuss the welfare implications of altered market structures. They note that while tying (or vertical integration) may increase efficiency (and reduce prices) downstream (because a monopoly does not have to extract all rents from its intermediate product), it may also reduce efficiency (and raise prices) upstream. Hence, it is possible to determine the net welfare effect of bundling related changes to market structure. This ambiguity is also noted by others. Whinston (1990:839), for example, observes that '... tying that leads to the exit of the monopolist's tied market rival frequently leads to increases in all prices, making consumers uniformly worse off ... though ... some consumers may be made better off by the introduction of tying. The effect on aggregate welfare, on the other hand, is uncertain because of both the ambiguous effects of price discrimination and the usual inefficiencies in the number of firms entering an industry in the presence of scale economies and oligopolistic pricing'.

Choi (1996) presents a new perspective on 'leverage theory' through the use of R&D bundling for pre-emptive innovation. He models R&D incentives in 'systems' markets and shows that bundling provides a firm with a significant advantage in one market with the ability to shift that advantage to another market to deter competition. The shift has the effect of mitigating rent dissipation in the systems market and bundling can be profitable if the reduction in rent dissipation outweighs the negative effect of intensified price competition. He examines the welfare implications for two specific cases. In a 'clear winner' situation he found that private and social incentives coincide and bundling is efficiency enhancing. In the 'narrow specialist' (neither firm is best at both activities) case he demonstrates the possibility

that bundling can be welfare reducing but privately optimal suggesting that greater scrutiny by regulators may be warranted.

The complexity of the problem has led many to use computer simulations to model oligopolistic bundling. Thus, through a similar process to that discussed above in relation to monopoly bundling, there is some evidence to suggest that bundling can improve both profit and consumers' surplus in oligopolistic industries which are characterised by large fixed costs, and low marginal costs of production. The outcome, however, is not unique for there is also evidence to suggest that a firm which uses bundling *can* increase its market share. Such an outcome will inevitably force the other firms to use bundling too (the prisoner's dilemma). Clearly then, in an oligopolistic setting the dynamic responses (and feedback effects) of competitors cannot be ignored in considerations of leverage theory.

In summary, it appears that bundling cannot always be used as a means of extending monopoly power from one market to the other. When one of the markets is oligopolistic, and/or when one considers the problem in a dynamic rather than in a static setting, then the issues become quite complex. The capacity of a monopolist to use leverage to extend its power to another market is not categorically established. While some evidence suggests that leverage is possible (the implication being that it is detrimental to consumers and aggregate welfare), other evidence suggests that it is not. The likely success of a leverage strategy depends on the structure of the market and the dynamic response and interaction of firms operating in the market.

## 8. Bundling and Costs

Bundling may be able to generate cost savings for a variety of reasons. Porter (1985), referred to in Hanson and Martin (1990:156), offers ‘several qualitative observations on the benefits of bundling for controlling manufacturing setup costs, combined with industry examples’. With reference to Kenney and Klein (1983), Hanson and Martin (1990:156), argue that producers of goods such as diamonds have great difficulty in correctly (and exactly) classifying their products. Faced with such difficulties, producers may be better off bundling ‘good’ and ‘bad’ products together which can then be sold at an ‘average price’ per unit and thus avoid the considerable classification costs. More specifically as stated by Kenney and Klein (1983:500) ‘to economise on transaction costs, a group of goods of individually uncertain and difficult-to-measure quality are average priced. Such block packaging can operate only if sufficiently high brand-name capital exists. Sellers are shown to choose the particular contractual arrangement that minimises the brand-name costs in addition to other transaction costs’.

Most of the research on the capacity of bundling to reduce costs, however, has focused on the potential to generate savings through economies of scope. Economies of scope occur when two commodities can be produced by a single firm for less than the cost of two separate firms producing one commodity each. But economies of scope in production do not necessarily imply that it will be cheaper to *sell* the goods jointly or in a bundle. That is, there is a distinction between economies of scope deriving from joint production, versus those deriving from joint distribution, administration or billing (hereafter referred to as economies of distribution). Bundling may be able to lower supply costs when there are economies of distribution including administration and billing. This is an important point not always elucidated in the literature. Hanson and Martin (1990:165), for example, argue that in some circumstances, economies of scope mean that firms will *have* to bundle to generate non-negative profits. But their proof was built on the basis that the bundling option ‘encourages customers to purchase those products which are the cheapest to produce’. In other words, it relies upon the price-discriminatory aspects of bundling (discussed earlier) and not upon economies of scope.

Where economies of distribution are present, it follows that the greater the cost savings from bundling, the larger the *potential* gains to both producer and consumer. Who gets a larger share of these cost-savings, depends upon the relative elasticities of demand and supply — the more inelastic is demand relative to supply (or more precisely, marginal cost), the larger the potential gain in consumer surplus (relative to the potential gain in producer surplus).

Analysis of the net welfare effect of bundling in situations where it is likely to generate economies of scope or distribution can be complex. The primary difficulty arises from the fact that bundling will always have some price-discriminatory effects. As discussed above, bundling may increase the consumption of some goods to the point where the marginal valuation is less than marginal cost, thereby generating welfare losses. Any such losses, of course, must be weighed against the potential gains from economies of distribution when assessing the net welfare effect of bundling. As noted by Salinger (1995:95) ‘the effect of bundling on consumers is complicated and counterintuitive. It is theoretically possible for bundling to lower welfare even though the firm’s sole motivation is to lower costs and prices’.

Kahn and Shew (1987:233) discuss a range of different price issues in telecommunications and observe that ‘unbundled pricing produces an improvement in economic efficiency only where the gain from improved price signals exceeds the increase in other costs (measurement, billing and inconvenience to customers)’. Chae (1992) analyses the effects of bundling subscription TV channels when economies of scope in distribution technology are present. The conclusion of that analysis is that the presence of economies of scope forcing a private monopolist to bundle may increase welfare and consumer surplus (provided the monopoly is not forced to change its production decision). However, forcing a monopoly to unbundle in such a situation can never increase welfare and consumer surplus. Bakos and Brynjolfsson (1997) in their discussion of bundling of information goods note that it can lower deadweight losses (compared to monopoly pricing) and may lower consumer surplus.

As noted above, welfare losses from (price-discrimination type) bundling are likely to be relatively small if the bundled goods have relatively inelastic demand (and hence low consequential effect on consumption) or if the marginal production cost of the bundled goods is low (meaning that few resources are wasted if parts of the bundle are discarded). This is likely to be an important for many telecommunication services with very low (close to zero) marginal cost. If bundling is able to simultaneously lower costs (via economies of distribution), then it is theoretically possible for the strategy to have a net positive impact on welfare. The important issue is the size of the potential distribution cost-savings *relative to* the consumption-side losses. Thus ‘the choice of optimal bundling lies in the? balance between cost-savings from bundling and loss of surplus due to cases where consumed goods are valued at less than marginal cost’ (Chung-I Chuan and Sirbu, 1999).

## 9. Information Effects of Bundling

There is growing evidence that consumers prefer ‘certainty’ over ‘uncertainty’ with respect to prices. When offered choices between fixed fee (subscription) pricing versus per-use pricing, many consumers tend to select a fixed-fee scheme, even when that results in higher overall costs for the consumer (Fishburn, Odlyzko and Siders, 1997). Also as noted by the US Federal Communications Commission (FCC, 1997:63), ‘Customers have shown a strong preference for simple pricing systems’.

Some forms of bundling are likely to simplify and reduce search costs with consequential benefits to consumers. However, it is perhaps more likely that bundling necessitates the publication of complex price menus that can impose evaluation costs on consumers. Furthermore, if complex menus are coupled with asymmetric information complete market failure can result. Kephart, Das and MacKie-Mason (1998), give a ‘market-for-lemons’ type example of the bundling of information goods<sup>4</sup>. They argue that ‘the fundamental characteristics of information goods mean that they can, and likely will, be offered in widely varying configurations. Participating agents will need to deal with uncertainty about both prices and location in multi-dimensional product space’. Taking these factors into account, they then demonstrate the theoretical possibility that ‘a reasonable, albeit naive, consumer learning strategy’ can lead to complete market failure.’

The prospect that market failure might occur provides firms with an incentive to simplify the price-menus offered to consumers. Other strategies to ‘ameliorate’ the problem, such as enticing consumers back into the market with marginal price reductions, are also available (Kephart, Das and MacKie-Mason, 1998). The extent of this problem, however, might not be large. MacKie-Mason, Riveros and Gazzale (1999) argue that there is evidence to suggest that ‘while there is a steep initial learning curve, decision makers rapidly develop an understanding of innovative pricing schemes’. Nonetheless, complex pricing menus covering widely divergent ‘bundles’ can impose significant evaluation costs on consumers.

It should also be noted that the complexity of the menus themselves offer firms other means of increasing profits. Randomised pricing, for example, is a widely recognised means to enhance profits. Such strategies are designed to increase evaluation costs and uncertainty about what the best deal may be and thus act as a disincentive to consumers to switch products.

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<sup>4</sup> See Akerlof (1970) for a discussion of markets for goods of uncertain quality (lemons).

## 10. Indicators of Welfare Effects

The preceding appraisal of the literature on bundling enables some general conclusions to be made with regard to bundling and its application in different market structures and conditions. The analysis began with a discussion of price-discriminatory monopoly bundling and highlighted how it generally leads to increased producer surplus at the expense of consumer surplus. The net welfare effect of the outcome depends upon the relative size of the changes in producer and consumer surplus. Deadweight losses are most likely to occur for goods with relatively elastic demand and high marginal production costs.

In oligopolies, the welfare effects of price-discriminatory bundling are somewhat more difficult to assess. In most cases, it appears that bundling is a dominant strategy, but without precise information on relative pay-offs, the effect on producer and consumer surplus (compared to a no-bundling strategy) is indeterminate. In some situations bundling has the characteristics of the prisoner's dilemma because it may lower firm profits while raising consumer surplus. There are also situations when bundling can raise efficiency. This is most likely to occur in industries with large economies of scale. In such situations, second-best pricing strategies (the most relevant 'base-line' for comparisons) are, on occasion, Pareto-inferior to bundling.

Particularly for goods or services where distribution makes up a substantial proportion of supply costs, bundling may be able to take advantage of economies of distribution and generate some cost savings. Consequently, it is theoretically possible for the strategy to lead to increases in producer surplus, consumer surplus and social welfare. The condition for this to occur is that the cost savings must outweigh any deadweight losses associated with the unavoidable price-discriminatory effects of bundling. If the demand for each of the bundled goods is relatively inelastic, if marginal production costs are low, and if there are substantial economies of distribution, then this type of bundling is likely to improve welfare.

A monopolist can use bundling to extend its power to other markets where it competes with other firms in the supply of a non-monopoly product. The capacity to do so, however, is limited by a number of factors. In particular, when one of the markets is oligopolistic, and/or when one considers the problem in a dynamic rather than a static setting, the issues become quite complex. However, there is some evidence to suggest that in these situations, leverage can occur thereby lowering both consumer surplus and net welfare.

Bundling is often accompanied by complex pricing menus. Particularly when complex pricing menus relate to widely divergent 'bundles', they can impose significant costs on consumers (at least in the short-run). In some cases, this may lead to complete market failure. The likelihood of such failure, however, may provide firms with an incentive to simplify their practices to avert the failure. Hence, in the long run, there may be an element of self-correction in the practice and costs may be low.

Overall, the findings of a substantial body of research on bundling suggest several key indicators that may assist the making of preliminary assessments of the likely welfare effects of bundling in particular situations. These key indicators are summarised in table 2. For example, bundling of products with relatively low marginal costs of production is likely to lead to an increase in net social welfare. Conversely, bundling of products with relatively high marginal costs of production is likely to lead to a decrease in net social welfare.

**Table 2: Key Indicators of Likely Welfare Effects of Bundling**

<b>Factor</b>	<b>Effect on Welfare</b>	
	<i>Increase</i>	<i>Decrease</i>
Demand	Inelastic	Elastic
Marginal Cost	Low	High
Economies of Distribution	Substantial	Low
Pricing Menus	Simple	Complex
Fixed Costs	High	Low



## 11. Telecommunications and Bundling

The Australian telecommunications market has undergone extensive liberalisation over the past decade. A government owned monopoly was replaced by a regulated duopoly in 1992 and open competition in the carriage and supply of services was introduced in 1997. With over 60 carriers and many more service providers, competition is now commonplace in the supply of many services. However, competition is not evenly spread across all markets. Much of the infrastructure investment by the new carriers has been confined to major metropolitan markets and has led to strong competition in those markets. Elsewhere, infrastructure investment by the new carriers has been slow to emerge and competition is weak or non-existent despite the access provisions of the *Telecommunications Act 1997*, that require incumbent operators to provide access to their unbundled infrastructure to competitors on cost-based terms.<sup>5</sup>

In spite of the competition, Telstra (the partly privatized successor of the previously government-owned monopoly) remains the dominant supplier in most markets (mobile telephony is an exception). None of the markets, other than perhaps Internet services, are strongly competitive. In most markets an oligopoly structure pertains (few effective competitors).

Bundling has always been a feature of telecommunications markets. Up until the end of monopoly supply in 1992, the only choice available to customers was a telephone service that bundled together the telephone handset, line rental, maintenance, and access to local, long distance and international calls for a single price. Today, customers can make different choices for each of the previously bundled elements. Nonetheless, bundling continues to be a feature of the industry, particularly in relation to new services, and its use as a pricing strategy is widespread.

This study focuses on the bundling of services sold to end-users and the discussion is confined to that use of bundling. The bundling of network elements and other services sold to competitors, is subject to the access provisions of the *Telecommunications Act 1997* and raises issues beyond the scope of this study. The primary issues considered in this analysis are: whether the prevailing bundling practices of consumer services reflect competitive outcomes of benefit to end users; whether they hinder competition; and whether they result in a loss of net social welfare. A particular consideration is whether regulatory intervention might be necessary and whether such intervention would have the capacity to improve market outcomes.

### 11.1 Nature of telecommunications bundling

In an oligopolistic setting, there are two principal variants of bundling that are commonly used as pricing strategies for the supply of products or services. The first is traditional packaging of two or more goods for sale as a bundle. The discussion is confined to mixed bundling situations where the goods may be purchased individually or at a 'discounted' bundle price. We exclude tying, or the selling of one good conditional on the purchase of the second good (pure bundling) from this discussion as such a practice would be clearly

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<sup>5</sup> The access provisions apply to 'declared services' only. Cost-based pricing has so far been applied to all declared services with the exception of 'local call resale' where a 'retail price minus selling cost' formula has been set by the competition regulator.

anticompetitive and prohibited by Trade Practices legislation. The second is the discounting of aggregate expenditure on two or more goods that a customer purchases from a supplier. Both of these bundling strategies are common in the supply of telecommunications services in Australia.

In both forms of bundling the concern is that a dominant supplier may use bundling as an anticompetitive pricing strategy to extend its market power in the supply of services that are or can be supplied competitively. While the access provisions of Part XIC of the Trade Practices Act seek to facilitate competitive entry in the telecommunications market, as noted by the ACCC (1999a), there is always a risk that a player with significant monopoly endowments could use bundling as a ‘predatory pricing’ strategy to substantially lessen competition. Predatory pricing refers to situations where a firm uses its market power to sacrifice short-term profits for long-term gain by pricing below cost to deter competitive entry. If proven such behaviour is subject to severe penalties. However, proof of predatory conduct may be difficult to establish, particularly when bundling is involved.

Some forms of bundling would clearly be anticompetitive. For example, an attempt by Telstra to tie rental of its proprietary telephone handset with the supply of access to the local loop, where it largely has a monopoly, would be anticompetitive. However, the similar practice of tying a discounted mobile telephone with a subscription plan would not be so, as many choices of telephones and subscription plans are available from several suppliers. As discussed above, bundling can be economically efficient and can provide benefits for both producers and consumers. But it is not always so. Its effects need to be assessed in the light of circumstances in which it is used.

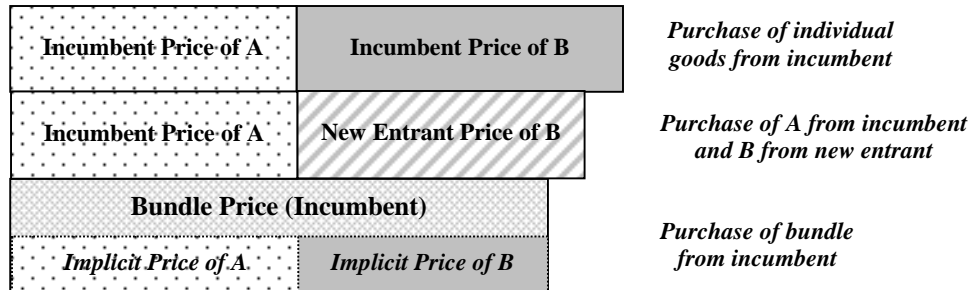
## **11.2 Bundled product packages**

A firm that has market power in two goods can use bundling to protect its market power against competitive entry in the market for one of the goods. The firm can use bundling as an alternative to predatory pricing without necessarily running foul of the anticompetitive provisions of the Trade Practices Act. By selling the two goods at a discounted bundle price, the firm can make it more difficult for rivals with only one of the goods to enter the market, without having to offer a low price on each of the goods. As demonstrated by Nalebuff (1999), the use of bundling as an entry deterrent is at its most effective when the goods are positively correlated (i.e., consumers buy both goods), but it loses its effectiveness when the goods are perfectly negatively correlated in value (note that these are the converse of the conditions for the use of bundling as an effective tool for price discrimination).

When goods are positively correlated consumers buy both goods and single product entrants are unable to satisfy the full customer demand. The advantages of bundling as an entry deterrent in such a situation are illustrated in figure 6. Assume that an incumbent is producing two goods (A and B) and sells individually at prices above marginal cost (monopoly pricing). A new entrant is seeking to enter the market with only one of the two goods (say, B) at a price equal to marginal cost (i.e., it undercuts the incumbent’s price). The incumbent responds by offering the two goods as a bundle at a price equal to the marginal cost of B plus a discounted price for A (but still above marginal cost) as well as continuing to sell the two goods individually at the original price. From a consumer’s perspective, the incumbent’s response is equivalent to offering a price below marginal cost that the new entrant cannot match. The incumbent, therefore, can deter competition by any single product

entrant without the need to match the individual prices offered by the new entrants and can still extract some of the original monopoly profits.

**Figure 6: Bundling as Entry Deterrent**



By not having to make a price reduction on both products, the incumbent would still be better off bundling even if a single product supplier were to enter the market successfully. In such a situation, the incumbent would be able to reduce the extent to which its customers become contestable by the new entrant. That is, those purchasing the competitively supplied product only would be challenged; those buying the competitively supplied product as well as the second product would not be contestable. Of course, in this simple example entry of two or more single product firms could allow consumers to produce their own bundle of the two goods from two different suppliers and thus erode the advantage of the incumbent. But even then, the consumer would incur a cost in producing the bundle, which would act as an incentive to buy a similarly priced bundle from the incumbent (e.g., buying local call and long distance call services from two different providers). Also, the incumbent would be able to benefit from any economies of scope that may be available in the production and distribution of the two goods giving it a competitive advantage over single product producers (e.g., use of a common billing system for the two services).

### 11.3 Discounted packages

Discounting is a common practice in a competitive market and is usually considered to be a sign of vigorous competition. They generally reflect the passing on to consumers of cost savings in either production or distribution that are generated by the ‘discounted’ sale. However, if markets are not fully competitive, discounting by a dominant firm may have anti-competitive effects. For example, if not justified by demonstrable cost savings, discounts on total expenditure on a bundle of products, including one in which a firm is dominant, could have tying-like effects even though a customer is not compelled to buy the goods as a bundle.

In essence, the discount on total expenditure on two separately supplied goods is the same as bundling of the two goods. The competitive good is sold at the market determined price by all suppliers. Say all suppliers offer discounts based on a customer’s expenditure. The discount may be at a single rate or increase with the level of total expenditure by a customer. A supplier dominant in one of the goods can include expenditure on that good as part of the expenditure qualifying for the discount. Thus customers buying both goods would be better off by buying the bundle. Thus the strategy can act as a deterrent to them switching to alternative suppliers of the competitive good.

would If the goods are negatively correlated (value of one declines with increases in the value of the other) or not correlated (valuations are independent) then consumers would fully satisfy their need by buying the desired good only and the discount would have no effect. By offering the discount on total expenditure on the two goods, the dominant firm would be able to limit the impact of competitive entry to those consuming the competitively produced good.

Discounts on total expenditure on a range of services including one in which the supplier is dominant can be quite powerful as the following example illustrates. Say a dominant fixed telephone service supplier offers a 25 per cent discount on eligible calls (in both directions) between the fixed service and a mobile service which it supplies in a competitive market. Assume that a consumer makes \$10 worth of calls per period from a fixed service provided by the dominant supplier to a mobile service purchased from a different supplier. We also assume the consumer makes the same value of calls in the reverse direction from the mobile to the fixed service. By switching to a competitively priced mobile service plan offered by the supplier of the fixed service, the consumer would be able to save \$5 per period on calls between the fixed and mobile services. This is equivalent to a 50 per cent saving on the expenditure from the mobile service to the fixed service. A competitor who supplies only a mobile service would thus have to offer at least a 50 per cent discount on calls on its mobile services to compete for customers who are purchasing a fixed service from the dominant supplier of fixed services. The effects are summarised in table 3.

**Table 3: Effects of Expenditure Discount Bundles**

Service	Expenditure	
	<i>Mobile + Fixed supply</i>	<i>Mobile supply only</i>
Mobile to Fixed	10	10
Fixed to Mobile	10	--
Discount at 25 %	5	2.5
Effective discount on mobile to fixed expenditure	50%	25%

Discounted packages can be structured in a variety of ways including:

- Product packages discounts such as giving a discount on subscriptions to customers subscribing to telephony services and the Internet;
- Mixed product packages where equipment costs are discounted as part of a subscription plan such as those common in mobile telephony;
- Site discounts where the scale of the discount depends on the total expenditure across a range of services at a particular site; and
- Whole of firm discount where the scale of the discount depends on the total expenditure across a range of services at all the customer's sites (demand aggregation models are a variant based on the ability of combining demand from many customers in a geographic area to secure such discounts).

## 12. Examples of Bundling in the Telecommunications Market

As part of the study, indicative information was collected on the types of bundling practices used by seven major carriers and service providers operating in the Australian telecommunications market. The intention was to collect information to illustrate the more common practices carriers engage in, rather than to produce a comprehensive catalogue of bundled services offered in the market. The information collected was also used to provide a practical focus for the analysis of the effects of bundling in the Australian telecommunications market.

The sale of bundled services is commonplace in the Australian market and consumers are faced with an extensive and bewildering range of choices from competing carriers and service providers. The range of bundles offered by carriers or service providers reflects the range of services they supply and the markets in which they operate. For example, Telstra with its ubiquitous market presence offers bundles (product packages or discounting) in virtually every sector of the consumer market. The wide range of bundles on offer in the Australian telecommunications market and variations in the offerings of different carriers and service providers make it difficult to categorise and summarise the bundles other than at a very broad general level. A comprehensive listing of bundles on offer was considered to be beyond the scope of this study. As the primary aim of the study was to assess the impact of bundling generally, it was felt that broad descriptions of the major uses of bundling by representative suppliers would be sufficient for the analysis. Table 4 provides examples of the more common bundles offered by Telstra, CW Optus, Vodafone and AAPT — the largest service providers in the Australian market.

The information in table 4 highlights the extensiveness of bundling in the telecommunications market. Major carriers involved in both fixed-line and mobile services markets appear to be seeking to exploit the consumer's preference for a single bill and offer bundles of services in each of the two markets as well as bundles spanning both markets. Both Optus and AAPT, for example, resell Telstra's local services to provide bundles of local and long distance services. AAPT also resells Optus and Vodafone mobile services. Vodafone, which operates primarily in the mobile market, tends to confine its bundles to that market.

Another important observation drawn from our data collection is that the bundles offered to consumers, particularly those relating to mobile telephony services, tend to be complex and not easy to evaluate. Potential customers are faced by an array of plans from each carrier offering many combinations of handsets, subscription rates, call rates, and a variety of other discounts, bonuses and add-on features. Organisations representing telecommunications users regularly decry this feature of the mobile telephony market. In terms of social welfare, of course, complexity of the plans would suggest that there may be significant loss of benefit accruing to consumers. This issue is discussed in more detail below.

**Table 4: Examples of Bundling by Major Telecommunications Carriers**

Service	Consumer Bundles Offered
<p><i>Telstra</i></p> <p>Fixed Service</p> <p>Mobile Service</p> <p>Internet</p>	<p>Offers different bundles combining higher access charges with lower call costs, options of different long distance capped rates, capped call rates to Telstra mobile services at night and international call options. An additional discount is provided to customers that receive and pay telephone account online. Additional options include:</p> <p>(1) 5 per cent discount on eligible call or Internet charges if two of fixed, mobile and Internet services are on single bill; 10 per cent if all three are on a single bill, plus an annual bonus of 15 per cent of eligible discounted charges.</p> <p>(2) 25 per cent discount on eligible calls between fixed and mobile services on a single bill (50 per cent discount applicable if mobile phones are on higher monthly rates)</p> <p>At least 17 different plans combining monthly charges with different peak and off-peak call rates with a choice of discounted mobile phones for fixed subscription period contract. Group plan available for two or more mobile services combined on one bill featuring discounted subscription rates for second or additional service and special call rates.</p> <p>Several plans incorporating monthly access charges and hourly usage charges above a given monthly usage hours (some with unlimited hours) that varies with the access charge.</p>
<p><i>Optus</i></p> <p>Fixed Service</p> <p>Mobile Service</p> <p>Internet</p>	<p>Three different packages combining equipment with varying access and usage charges to customers in areas connected to the Optus pay TV cable network. Preselection of Optus for long distance calls (STD and International) is a condition of service. Additional features may be added on to the service. In other areas, customers pre-selecting Optus for long-distance calls are offered resale of Telstra local services on one bill. STD customers offered flat rates, capped per call charge and 'free time' on long distance calls and calls to mobile phones connected to any Australian mobile network.</p> <p>Over 20 plans combining monthly charges with different peak and off-peak call rates with a choice of discounted mobile phones for fixed subscription period contract. Limited free calls off-peak and weekends to mobiles on the same network</p> <p>Several plans incorporating monthly access charges with hourly usage charges above a given monthly usage hours (some with unlimited hours) that varies with the access charge. A five hour free bonus per month provided to subscribers to other Optus services (a reduced monthly subscription rate applied to unlimited hours plans).</p>
<p><i>Vodafone</i></p> <p>Mobile Service</p> <p>Internet</p>	<p>Seven packages combining monthly charges with different peak and off-peak call rates with a choice of discounted mobile phones for fixed subscription period contract. Limited free calls off peak to mobiles on same network and to fixed telephones.</p> <p>Various plans incorporating monthly access charges and hourly usage charges above a given monthly usage hours that varies with the access charge.</p>
<p><i>AAPT</i></p> <p>Fixed Service</p> <p>Mobile Service</p> <p>Internet</p>	<p>Bundle combining local call service (line rental and calls) with preselection for long distance calls and calls to mobile services</p> <p>20 or more packages available. Mobile services are provided through Vodafone or Optus and have similar features to packages offered by those carriers.</p> <p>Two plans, one with unlimited hours of access for a fixed monthly subscription or monthly subscription plus hourly usage rates above 11 hours per month</p>

### 13. Bundling and Competition

Our detailed review of the literature on bundling presented above highlights the fact that most of the interest of economists has been on competition issues, or more particularly on the scope for dominant producers in a monopoly or oligopoly to use their market power to increase profits and deter or limit the impact of competitive entry. In most cases, it has been taken for granted that the primary incentive for bundling lay with an incumbent. However, observed market behaviour of non-dominant carriers in the Australian market indicates that bundling is often initiated by them. Indeed, bundling seems to be much more prevalent for new products or services than for traditional services dominated by Telstra. That Telstra also bundles extensively in those areas might simply be a reflection of a prisoner's dilemma-like response to competitors. Perhaps reinforced by the fact that Telstra has only recently introduced bundling discounts – it may have held off as long as it could – basically until it started bleeding when new competitors started offering local calls.

In industries, such as telecommunications, that are characterised by high levels of capital investment and high fixed operating costs, incumbent operators gain a substantial degree of market power from their ability to exploit economies of scale and scope. The local loop, in particular, has traditionally been regarded as a natural monopoly. However, some economists have argued that local telecommunications are no longer a natural monopoly (for example, Spulber, 1995). In their analysis of telecommunications economics and policy in Australia, Albon, Hardin and Dee (1997) conclude that there is no firm empirical evidence either supporting or denying the existence of economies of scale. Technological changes and alternative means of supplying services in the local loop further complicate considerations. Without further research, specifically addressing the current situation, it is difficult to determine to what extent high fixed costs are present and continue to be a major factor in determining industry structures. Nonetheless, there is substantial evidence of growing competition in some market segments (particularly the central business districts of Sydney, Melbourne, and Brisbane (ACCC, 1999a), but not in others (sparsely populated rural areas). This suggests that economies of scale are not a substantial barrier to entry in densely populated urban areas, but may be important in rural areas. The assessment of welfare implications of telecommunications bundling, therefore, has to be conscious of these differences and adopt methodologies that are appropriate for the circumstances being examined. For example, when assessing the welfare implications of bundling in urban areas, it would be appropriate to compare bundling with marginal-cost pricing. In rural areas, on the other hand, it may be more appropriate to compare the practice against other second-best pricing strategies. Taking these differences in account, it is possible to conclude that, *ceteris paribus*, bundling is less likely to be welfare reducing in rural areas than in urban areas. Perhaps, particularly where maximum prices already set by regulation are below cost.

The progressive liberalisation of the Australian telecommunications market has resulted in an increasing number of players entering the market to challenge Telstra for customers. There are now over 60 licensed carriers and over 200 service providers. However, only a few are operating on such a scale as to pose a significant threat to Telstra. Market entry, of course, is facilitated by the *Telecommunications Act 1997* and the presence of many carriers and service providers is a reflection of the legislation's market liberalisation provisions.

From a competition point of view, the most important consideration is whether Telstra as the dominant operator has attempted to use its market position to frustrate competition. More specifically with respect to bundling, the issue is whether Telstra has used it as a predatory

pricing strategy to deter entry or compete unfairly with new entrants. As would be expected, empirical information that could be used to assess the motivation for bundling is difficult, if not impossible to obtain. Our research, therefore, has had to rely on qualitative analysis guided by general observations of market behaviour. We do this by identifying potential incentives likely to influence market behaviour.

Telstra is probably the only player in the Australian telecommunications market in a position to use bundling anticompetitively to maintain its market power or to minimise the impact of competition from new entrants. By definition, other players are not dominant and thus their use of bundling is likely to be motivated more by a desire to improve their competitiveness in the market.

As the dominant player operating in all telecommunications services markets, Telstra would have had many opportunities to use bundling as a competitive strategy against competitors supplying only a limited range of services. However, apart from continuing to offer pre-existing bundles, Telstra does not appear to have pursued bundling as an aggressive competitive strategy. Indeed, there are several factors suggesting the presence of considerable disincentives for Telstra to employ such a strategy.

At least in the early stages of market entry, new entrants have typically supplied localised geographic markets with a limited range of services. Competition with Telstra, therefore, has tended to be localized both in the geographic and product sense. In a completely unregulated market, Telstra could have easily produced a product bundle of services including at least one of the services in which it is dominant (for example, local call service). However, services in which Telstra is dominant are subject to price controls and related regulation<sup>6</sup>. And those controls limit Telstra's scope to use bundling to deter competition for several reasons.

Assuming that price controls are based on the cost of supplying a service, any attempt by Telstra to bundle one of its dominant, price-controlled, services with another service would clearly signal the implicit price charged for the other services in the bundle. The implicit price being the bundle price less the regulated price for the monopoly service. The inability of competitors to match the implicit price, would then signal the likelihood of Telstra cross-subsidising the competitive service with the dominant service. In that event, the ACCC would be quickly alerted to the possibility that Telstra may be employing predatory pricing against competitors. There would be a risk, therefore, that Telstra might find itself facing an investigation, and possibly sanctions, by ACCC.

Furthermore, it is unlikely that Telstra would be allowed to maintain and exercise its dominance in the current regulatory regime. The access provisions of the Telecommunications Act allow for the declaration of monopoly or bottleneck services to which Telstra must provide access to its competitors on a cost basis. Local carriage services have already been declared by the ACCC for this purpose and so has access to unbundled local loops. These declarations take away much of Telstra's monopoly power in the provision of access to the local loop and the supply of local calls.

In addition to these regulatory related constraints, Telstra would also face strong pecuniary disincentives to engage in anticompetitive bundling. While a competitor may be operating in

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<sup>6</sup> Price controls apply to a basket of services and allow some movement in the relative prices of the components provided the weighted basket price does not increase more than the permitted amount.



a localised market, price regulation precludes Telstra from implementing a localised response to the competitor. Telstra is required to offer the same price nationally. Implicit losses that it may incur from the 'predatory' bundle, therefore, are not confined to the local market subject to competition but would accrue in all geographic markets. Consequently, could be substantial relative to the potential local gains from anticompetitive bundling and much more difficult to sustain for extended periods. Furthermore, there may be longer-term and ongoing revenue losses. The formula used to control prices has an inbuilt ratchet mechanism that allows downwards movements only. Price increases in any one year are restricted to movements in the CPI minus a factor for productivity increases. Thus any price reduction on services subject to price control cannot be recouped by subsequent price increases.

New entrants on the other hand, have an incentive to better Telstra's prices for the services they supply. Their chances of success in a market in competition with Telstra are likely to be small unless they can supply services offering consumers a better price/quality combination than that provided by Telstra. However, success in the market would be limited by Telstra's reaction to the new entrants who would need to anticipate the reaction and take account of it when establishing the price/quality setting for their services. But they would also be aware that although Telstra has considerable capacity to match their prices, pricing controls would be a constraining factor to the reaction. Bundling of services by new entrants in such a situation also serves the purpose of confounding Telstra on the individual price charged for the services. By not knowing how to respond to individual prices and because of the constraints of price controls, the only way for Telstra to match a competitor's offering would be to offer a bundle of its own with similar features.

Another important motivation for new entrants to bundle services is their limited information on consumer tastes and valuations for the services they supply. Unlike an incumbent, they do not have historical consumer expenditure information that can be used as an indicator of trends in consumer tastes and thus face considerable search costs in getting such information. As noted above, bundling reduces such costs because of its desirable effect of reducing effective dispersion of consumer tastes (see Schmalensee, 1984). It also makes it much easier to predict consumer valuations for the bundle than for its individual components (Bakos and Brynjolfsson, 1998).

Not only are consumer tastes heterogeneous but they also change rapidly as new telecommunications products and services become available. Historical information, therefore, is only of limited value in developing an adequate understanding of the direction of change. All suppliers face this problem and they tend to respond to it by changing their selling strategies. In a market with several suppliers, the combined effect of changing seller strategies and changing consumer tastes makes it difficult to determine what might be the best bundle/price combination. As a result, there is an incentive to offer a range of bundles. Faced with a range of bundles, consumers are forced to self-select into the bundle/price combination they consider best meets their needs. For the supplier, consumer self-selection is desirable because it exploits the pricing discrimination attributes of bundling and captures more consumer surplus than a single bundle. By offering a range of bundles, a supplier gains the additional benefit of confounding competitors about its pricing strategy.

Bundling also appears to be partly driven by consumer preference for a single bill. New entrants have been purchasing line rental and local call services from Telstra for resale to customers being supplied with other services. There are anecdotal claims that some carriers

are reselling these services at a loss as part of bundle that includes customer pre-selection of the carrier for long distance and international calls.

At least theoretically, bundling can be shown to have an advantage over the selling of individual components. In much the same way that an incumbent can use bundling to deter or mitigate the effects of competitive entry, a new entrant could be seeking to secure a similar advantage over an incumbent whose pricing strategies may be constrained by regulation. Such an advantage, however, will materialise only if the incumbent perseveres with the sale of individual components. If the incumbent responds with a bundle of its own, strong bundle-to-bundle competition develops and prices are rapidly driven down. Although this will make both the incumbent and new entrant worse off, neither can afford not to respond in kind when the other adopts a bundling strategy. Attempting to compete against a bundle with individual products would lead to an even worse outcome (the effects of the competitive possibilities in such a situation are illustrated in figure 7). Consumers, of course, would be beneficiaries of the lower prices. But the extent of the benefit accruing to them may be limited if they are faced with too many bundles that are difficult to evaluate (this issue will be explored below).

**Figure 7: Effects of Bundles and Components Competition**

		<b>Incumbent</b>	
		<i>Component (C<sub>i</sub>)</i>	<i>Bundle(B<sub>i</sub>)</i>
<b>New Entrant</b>	<i>Component(C<sub>e</sub>)</i>	<b>C<sub>e</sub> Vs C<sub>i</sub></b> <b>Incumbent has advantage of scale/scope economies</b>	<b>C<sub>e</sub> Vs B<sub>i</sub></b> <b>Incumbent has advantage</b>
	<i>Bundle (B<sub>e</sub>)</i>	<b>B<sub>e</sub> Vs C<sub>i</sub></b> <b>New entrant has advantage</b>	<b>B<sub>e</sub> Vs B<sub>i</sub></b> <b>Both worse off (profits not maximised)</b>

In the telephony market, the timing of Telstra's bundling tends to suggest that it may be a competitive reaction to the bundling strategies of new entrants with the intention to mitigate their impact rather than an anticompetitive manoeuvre to lock out competition. Yes, when local access was available to competitors. The literature on bundling suggest that the choice of a bundling strategy by at least one new entrant to compete with established players, will act as a catalyst for bundle-to-bundle competition to emerge. If the use of bundling leads to increased competition among established and new players and helps to drive down prices, then, in that regard at least, it helps to generate the kind of benefits to end users that current legislation was designed to promote. Should a 'prisoners' dilemma' be present as suggested

by theoretical analysis, this kind of bundling by itself should not be cause for concern to policy makers or competition authorities.

The markets for other telecommunications products (eg, data/Internet) are much more competitive, and not historically characterised by a dominant firm. To this end, it is possible that Telstra initiatives to bundle the Internet with other telephony services could be an attempt to extend market power. As noted in the literature review, however, this is difficult to do when the 'other market' is extremely competitive — the leverage argument holds only when analysed in a static context. In major metropolitan markets, competition in the supply of telecommunications services is increasing both through infrastructure investment by carriers and by the impact of regulatory provisions providing access to incumbents' declared services and facilities. Such increased competition will reduce the scope for a dominant carrier to use bundling as a leverage mechanism. In other markets, however, competition remains weak and prospects for such bundling could remain a significant factor for consideration. It would appear, therefore, that the best option for policy makers and regulators might be to allow such practices (noting that there are potential consumer gains) subject to regular review to ensure that no single firm is gaining undue market power. It may also be desirable for regulatory authorities with access to industry performance data to commission empirical research so that a better understanding of this issue may be developed.

## 14. Bundling and Consumers

Improved benefits to consumers is the primary objective of the current Australian telecommunications policy regime. The legislation actively promotes competition, not as an end in itself, but with the ultimate aim of benefiting end-users. There is a fine distinction between the two inherent in the legislation. Although the interests of end-users are paramount, the regime governing the access of competitors to the declared services of incumbents takes into account the legitimate business interests of both parties and not just the fact that access promotes competition.

Telecommunications liberalisation generally has produced substantial benefits for consumers (see Australian Communications Authority, 1999). The prices of many traditional services have fallen considerably below pre-competition levels and many new services are available. Bundling has become a familiar feature of the industry and current pricing strategies include extensive use of menus of bundles of services. Initially, bundling was associated mainly with the introduction of new products or services in the competitive environment, but more recently, increasing use of bundling has emerged as a feature of pricing strategies for traditional services as well.

In the context of the liberalised policy prescriptions, bundling should be assessed from the point of view of consumers and not just for its competitive effects on industry structures. Certainly the price reduction effects of ‘bundling’ competition are of benefit to consumers. There is also some evidence that consumers prefer one bill for all telecommunications usage, rather than separate bills for different services, something that is facilitated by bundling. This has been used as an argument for the declaration of unbundled access to Telstra’s local network (ULL unbundled local loop) by competitors (see for example, ACCC, 1999a). However, other properties of bundles may substantially erode the value of those benefits.

As noted in the literature review, there is no clear conclusion that can be drawn on the impact of bundling on consumer surplus. The effect depends on a variety of factors including the distribution of consumer reservation prices; the correlation of the values consumers place on the components of the bundle; the price elasticities and marginal cost of the components; the nature of the products (eg, experience goods); and the availability of information (search costs) to evaluate competing bundles. These factors may have opposing influences and the net impact on consumers cannot be determined *a priori* and without empirical analysis of the individual case.

For example, while research findings indicate that the introduction of competition in the telecommunications industry was followed by a reduction in prices and an extension in the range of services offered, it was also followed by increased complexity of pricing menus. Muir, Jennings and McAnally (1999:124) argue that the existence of price differentials between suppliers suggests:

either lack of interest or awareness on the part of consumers of the ‘menu’ of prices on offer or else the existence of real or perceived disparities in the quality of the services themselves or their supplier. Alternatively, consumers may believe that the effort involved in identifying and evaluating the increasingly complex ‘menu’ and the complexity of

switching service providers or using more than one operator, may exceed the benefits.

Consumers generally seek to maximise the utility they derive from a purchase. To do so effectively, they need to obtain information and learn about the quantity, quality and price combinations offered by the various suppliers. Evaluation of the alternatives, particularly when products are bundled, can be a complex task. The task becomes even more complex when new products or services are involved or are included in a bundle, because consumers may need to gain experience in consuming the products or bundle before they are a position to make an effective valuation. Consequently, search costs may be substantial and may provide some explanation for the tendency of consumers to prefer fixed pricing over per-use pricing. Fishburn, Odlyzko and Siders (1997:4), for example, argue that:

There are three main reasons that probably lead consumers to prefer flat-rate pricing....: (i) Insurance: It provides protection against sudden large bills. (ii) Overestimate of usage: Customers typically overestimate how much they use a service, with the ratio of their estimate to actual usage following a log-normal distribution. (iii) Hassle factor: In a per-use situation, consumers keep worrying whether each call is worth the money it costs, and it has been observed that their usage goes down’.

These type of considerations may underpin the popularity of fixed rate Internet packages that do not charge for consumption and possibly the motivation for inclusion of capped charges for timed calls (mobile, long distance and international) in telephony menus. But fixed rate charging is not a common feature of the bundling of telecommunications services. Typically, the bundles are a complex mix of an access charge and a variety of charges for use depending on time of use. Menus of bundles further complicate evaluation. As noted by the Australian Communications Authority (1999:10), ‘consumer groups have expressed concern about the complexity of pricing structures, which can be confusing and therefore limit competition because lack of clear benefits means that consumers are reluctant to transfer to another provider’.

The difficulty of consumers to evaluate complex prices was demonstrated long ago. Russo (1977) shows that unless unit prices are explicitly available in a format that is easy to process consumers are unlikely to use them accurately in decision making. This was reinforced by field tests conducted by Capon and Kuhn (1982) showing that when products are offered in various packages and different prices, a majority of consumers were unable to identify the optimal package.

More recently, Estelami (1999) argues that consumers may have considerable difficulties in evaluating the value of product bundles and tend to resort to simplification strategies to reduce their cognitive effort. Drawing on research findings, he argues that consumer assessment may be influenced by the manner in which the bundle is presented and that evaluations may systematically deviate from rational prescriptions. Sellers ability to demand surcharges in product bundles appears to be particularly evident in bundles of complementary goods.

Under normal circumstances, it would be expected that the preference for fixed-fee pricing schemes would be eroded over time as consumers gain experience with their consumption of a service. Because of the consumer’s tendency to overestimate future consumption,

consumers with low levels of consumption, for example, are likely to find themselves better off with a pay-as-you-use scheme. Knowledge of their consumption pattern, thus, can considerably reduce uncertainty over likely expenditure from a pricing scheme and can guide future choices. Losses in consumer surplus arising from inappropriate self-selection of a bundle that does not maximise utility are not likely to endure in the longer-term. Experience should also facilitate better choices with respect to the more complex pricing schemes associated with telecommunications bundling. But the range of products and rates included in a menu of bundles considerably complicate the evaluation task of consumers. Losses in consumer surplus are thus also not as easily avoided in the long term.

The evaluation of complex menus is further complicated by the introduction of new products and by randomised pricing strategies designed to maximise supplier profits. The adding of new products, including optional features to communications services menus perpetuate evaluation difficulties for consumers. Randomised pricing strategies tend to produce a lock-in effect by compounding evaluation difficulties and increasing search costs. According to Baye and Beil (1994:438-439) randomised pricing works 'by increasing the uncertainty about where the best deal exists, (thereby reducing) consumers' incentive to shop for price information...it (also) precludes rivals from knowing precisely what price to charge to undercut a given firm's price'.

The conclusion to be drawn from this is that, at least in the short run, the complex menus that have emerged are imposing deadweight losses. While the size of these losses cannot be determined without empirical data, it is clear that they are not insignificant. In a fully competitive market, these costs would tend to disappear in the longer term as customers become better informed or competitors begin offering simpler, more easily evaluated menus. Others would be forced to follow suit to avoid the risk losing customers. However, the telecommunications market is not yet fully competitive and it may take a long time for it to become so. The use of randomised pricing strategies suggests that suppliers may have a greater incentive to adopt such practices than to offer simpler menus as a means of drawing customers away from competitors.

Until simpler menus emerge as a feature of the market, it may be necessary for regulatory authorities to make a modest intervention to reduce the information asymmetry faced by consumers. What we are suggesting is some light touch intervention to enhance market operations and not intervention that acts as a constraint to them. Regulatory authorities or consumer organisations, for example, could be funded to undertake research to develop typical consumer telecommunications expenditure profiles covering products and services that are typically bundled. Bundlers of services could then be required to provide consumer information on the likely overall cost of the bundles for each of the typical consumer profiles. For bundles sold on a term contract basis, the cost should be calculated for the term of the contract. In other cases, the cost over one year should be provided. The profiles may need to be updated on a regular basis.

In addition, consumer evaluation of bundles could be aided by facilitating access to their consumption records. The information is collected for billing by service suppliers and included in regular bills to customers. Historical data, however, is not readily available to consumers. If the data were available, say electronically, consumers would be in a better position to evaluate competing bundles. To a limited extent, an evaluation service on the basis of past consumption is offered by some carriers. The service, however, is restricted to helping established customers to identify the package best suited to their needs from the

range offered by the carrier. With historical data at their disposal consumers would be in a better position to evaluate all packages offered by all the carriers. The development of typical consumer profiles, together with more readily available historical data, could also act as a catalyst for the setting up of evaluation bureaus by consumer organisations or private brokers<sup>7</sup>.

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<sup>7</sup> Brokers assisting consumers to identify 'best deals' are beginning to emerge in the market.

## 15. Overall Assessment

Several major implications emerge from our assessment of bundling applications in different market structures and conditions. The effects differ depending on market conditions.

In a monopoly market, it is clearly established in the research literature that the price-discriminatory effects of bundling generally lead to increased producer surplus at the expense of consumer surplus. The net welfare effect of the outcome depends upon the relative size of the changes in producer and consumer surplus. Deadweight losses are most likely to occur for goods with relatively elastic demand and high marginal production costs.

In oligopolies, the welfare effects of price-discriminatory bundling are somewhat more difficult to assess. In most cases, it appears that bundling is a dominant strategy, but without precise information on relative pay-offs, the effect on producer and consumer surplus (compared to a no-bundling strategy) is indeterminate. In some situations bundling has the characteristics of the prisoner's dilemma because it may lower firm profits while raising consumer surplus. There are also situations when bundling can raise efficiency. This is most likely to occur in industries with large economies of scale. In such situations, second-best pricing strategies (the most relevant 'base-line' for comparisons) are, on occasion, Pareto-inferior to bundling.

Particularly for goods or services where distribution makes up a substantial proportion of supply costs, bundling may be able to take advantage of economies of distribution and generate some cost savings. Consequently, it is theoretically possible for the strategy to lead to increases in producer surplus, consumer surplus and welfare. The condition for this to occur is that the cost savings must outweigh any deadweight losses associated with the unavoidable price-discriminatory effects of bundling. If the demand for each of the bundled goods is relatively inelastic, if marginal production costs are low, and if there are substantial economies of scope in distribution, then this type of bundling is likely to improve welfare.

A monopolist can use bundling to extend its power to other markets where it competes with other firms in the supply of a non-monopoly product. The capacity to do so, however, is limited by a number of factors. In particular, when one of the markets is oligopolistic or the problem is considered in a dynamic rather than a static setting, the issues become quite complex. However, there is some evidence to suggest that in these situations, leverage can occur thereby lowering both consumer surplus and net welfare.

It is difficult to generalise with regard to bundling and market structure. Some major regulatory authorities in different economies appear to assume that the more concentrated the market, the more likely that bundling is 'anticompetitive' (See FCC, 1998:4; ACCC, 1999a; Oftel, 1998:2). While there is some evidence suggesting that this may not necessarily be the case, it is difficult to envisage a better and workable gauge of the potential risk of leverage inherent in the practice of bundling. Even in a duopoly, bundling may be the result of a prisoner's dilemma and not necessarily a profitable strategy to extend market power. Yet, without precise information on the relative pay-offs of different strategies the effect remains indeterminate.

On this basis, the more competitive a market is the less likely the risk that bundling will be used as an anticompetitive device. As shown in tables 5 and 6, the degree of competition is



assessed to vary markedly across different telecommunications 'services'. As bundling appears to be concentrated in the more competitive markets, the risk of it being a device for potential abuse of market power would seem to be relatively low. The level of concentration in an industry, however, would still remain an appropriate first test of the potential for bundling to be used to deter competition.

**Table 5: Market Shares of Major Carriers**

Market	Market shares as at June 1998 (per cent)		
	<i>Telstra</i>	<i>Optus</i>	<i>Others</i>
Fixed Access	>99	<1	negligible
Local Calls	94.0	0.3 (own network only)	6.0 (includes Optus resale)
Long Distance	76	19	5
International	60	23	17
Mobile (October 2000)	47.4	33.1	19.5

Sources: Fixed access: authors' estimate.

Local and Long Distance: ACCC (1999b).

International: Merrill Lynch & Co quoted in ACCC(1999b).

Mobile: Paul Budde quoted in ACCC (2000).

**Table 6: Indicative Concentration of Australian Telecommunications Markets**

Service	Market Structure
Fixed Access	Highly concentrated (some low-level localised competition in metropolitan areas)
Local Calls	Highly concentrated (some low-level localised competition and reselling of Telstra services by other carriers)
Long Distance Calls	Quite competitive (Telstra and Optus are the main players; several new entrants post open competition regime)
International Calls	Competitive (all long distance players plus several others)
Fixed to Mobile	Fixed end: Relatively concentrated; Mobile end: fairly competitive.
Mobile	Quite competitive (Telstra, Optus and Vodaphone are the main players; several others already in the market or about to enter market)
Data	Competitive

Source: Authors' assessment.

The net effect of bundling on welfare depends on several factors that can have opposing influences on welfare. As a result, it is not possible to be prescriptive about the conditions in which bundling is likely to lead to a welfare improvement. Nonetheless, there are some

conditions that are more conducive to a welfare improvement outcome than others. The presence of relevant conditions, therefore, although not sufficient to determine the welfare outcome of bundling in a given situation may be a useful indicator of the likelihood of the outcome. For example, it seems reasonable to conclude that substantial economies of scope in distribution exist for most telecommunications products — it will almost always cost less to send a single bill for several products, than to send a separate bill for each. Thus, to the extent that firms can take advantage of those economies, telecommunications bundling can have positive welfare effects. However, the potential gains from the existence of such a condition must be weighed against any potentially detrimental effects that may arise from the presence of other influences. The net result of those influences cannot be determined without empirical measurements.

Our analysis suggests that bundling is likely to generate net welfare losses when at least some of the following conditions are present — the more of the conditions present the greater the likelihood of a welfare loss. The conditions conducive to a welfare loss include:

- (1) demand for the bundled goods is relatively elastic;
- (2) the marginal costs of production are relatively high;
- (3) fixed costs are not high;
- (4) there are few economies of scope in distribution; and
- (5) pricing menus are complex.

The opposite set of conditions are more likely to lead to improvements in welfare. Thus conditions conducive to a welfare improvement from bundling include:

- (1) demand for the bundled goods is relatively inelastic
- (2) the marginal cost of production is relatively low
- (3) there are high fixed costs
- (4) there are substantial economies of scope in distribution
- (5) pricing menus are relatively simple.

**Table 7: Demand Elasticities and Marginal Costs in Components of the Australian Telecommunications Industry**

Service	Price Elasticity of Demand	Marginal Cost
Fixed Access	Inelastic	Relatively high
Local Calls	Relatively inelastic	Relatively low
Long Distance Calls	Relatively elastic	Low
International Calls	Elastic	Low-medium
Fixed to Mobile	Relatively elastic	Relatively low
Mobile	Relatively elastic	Relatively low

Sources: Price elasticities derived from Albon (1997).

Marginal costs are indicative estimates by authors.

Table 7 presents *a priori* qualitative assessments of the price elasticities of demand and marginal cost for several different telecommunications services. The entries are intended

only as rough guides (as opposed to definitive measures) to facilitate an indicative assessment of the likely welfare implications of bundling in the market for those services.

This table serves to highlight some of the difficulties which arise when attempting to assess the welfare effects of bundling. To illustrate, note that the results of the table suggest that, in some respects, there may be low social welfare costs associated with the bundling of access and local calls. Specifically: the demand for both products is relatively inelastic, hence there will be little 'over-consumption' (generating deadweight losses due to relatively high marginal costs). As noted earlier, there are economies of distribution and the related pricing menus are likely to be relatively simple. Hence, it appears as if the bundling of access and local calls may be welfare improving. Nonetheless, these 'positives' must be weighed against any negative aspects that arise in the event that this type of bundling helps Telstra retain its market power.

The effects of bundling other services listed in the table are equally difficult to assess. Where there is an elastic demand, for example for international calls, the low/medium marginal costs of providing for the increased demand associated with bundling may lead to some social welfare costs from oversupply of these calls. The relative size of any offsetting economies of distribution is likely to be important in this situation. The issue will be further complicated by the existence of complex menus of options for consumers depending on the bundles of local, STD and international calls purchased.

Bundling is often accompanied by complex pricing menus. Particularly when complex pricing menus relate to widely divergent 'bundles', they can impose significant costs on consumers (at least in the short-run). While there may be incentives for firms in a highly competitive industry to benefit by simplifying their pricing practices, in an oligopolistic setting there appears to be a greater incentive to use randomised pricing to increase profits. There is a sizeable risk, therefore, that over time the loss of consumer benefit is substantial.

## 16. Conclusion

The effects of bundling on social welfare depend on a number of factors. In some cases, bundling will transfer consumers' surplus to producers' surplus and have a negative effect on social welfare. Assessments of the welfare effects of bundling are not possible without empirical analysis. However, it is possible to make a preliminary judgment as to whether a more detailed examination is warranted. Our analysis suggests that bundling is unlikely to produce a welfare improvement unless one or more of the following conditions exist:

- demand for the bundled goods is relatively inelastic
- the marginal costs of production are relatively low
- there are substantial economies of scope in distribution
- price menus are relatively simple
- there are high fixed costs

However, while their existence is likely to be a necessary condition for welfare improvement, it does not necessarily follow that an increase in net welfare is guaranteed as the latter depends on the relative impact that each of the factors has on welfare.

In an oligopoly where firms are acting strategically it is difficult to generalise about the effects on social welfare — particularly, when 'reverse-leverage'-type arguments (ie that bundling is used to retain rather than extend market power) are a relevant consideration. This is an important area for future research. Similarly, the size of the economies of scope in distribution are likely to be important in determining the overall effects of bundling in the Australian telecommunications market. Empirical research in this area, may also help policy makers assess whether these benefits are likely to outweigh other potential costs.

Finally, consumers face substantial difficulty in assessing the relative merits of different bundles on offer from various suppliers. As suppliers can benefit directly from inappropriate consumer choices they have little, if any, incentive to facilitate better choices by consumers. Increased competition should eventually resolve this problem. But until that is achieved — and it may take considerable time for it to happen — some light touch intervention by policy makers may be necessary to facilitate consumer evaluation of bundles. The development of typical consumer profiles that can be used to assess competing bundles would be a useful start.

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