

# The Economics of Telecommunications and Its Regulation

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Telecommunications is a network industry, which means that the market operates in a different manner from the conventional market for goods of various sorts. These economic features create the very real danger of market dominance by a single operator (with all the negative effects associated with it), thereby providing the rationale for price and other forms of regulation of the industry. Price regulation itself poses many challenges, because information asymmetries between the operator and the regulator prevent the setting of optimal prices. The tools used to regulate prices try to balance the incentives for the operator to reduce costs against concerns over the distribution of profits from cost-savings. This chapter provides a brief and non-technical overview of the established literature on the economics of telecommunications and its regulation.

## 1. The Defining Economic Features of Telecommunications

The defining economic features of network industries such as telecommunications are significant economies of scale in production, network externalities, the need for compatibility and standards, and complementarities in demand and switching costs for consumers.<sup>1</sup> These economic features have an impact on the nature of competition in the industry. In particular, they provide the means for a single firm to establish and maintain a dominant position in the market. This may be to the detriment of consumers if that dominant position is abused through above-cost pricing. The economic features of the sector and the incentives they provide for anti-competitive practice provide the basis for regulatory oversight. These features also have implications for the provision of affordable service to low-income consumers, providing the basis for universal service policy.

### 1.1 Significant Economies of Scale

The significant economies of scale in constructing telecommunications networks relative to the market demand in the sector was the original rationale for public monopolisation of the sector. It was argued that the economies of scale were such that costs were minimised when there was only one operator in the market (a so-called ‘natural monopoly’). Introducing more operators would increase the average costs for all the operators as their scale is reduced, resulting in increasing prices.<sup>2</sup> In order to ensure that the single operator did not abuse this monopoly position by charging excessive prices, the operator was owned by the State. However, these large economies of scale did not exist in every component of the service, and governments began introducing competition in those parts of the network where sharing the market amongst many operators would not result in higher average costs. These include the customer premises equipment (CPE), long-distance networks and value-added services provided to subscribers to the network. The only surviving natural monopoly component is seen as the fixed-line local loop, but this too is changing with the substantial growth in consumer demand and technological changes.<sup>3</sup>

<sup>1</sup> O Shy *The Economics of Network Industries* (2001) 1.

<sup>2</sup> W Viscusi, J Vernon and J Harrington *Economics of Regulation and Antitrust* (1998) 351.

<sup>3</sup> D Newberry *Privatization, Restructuring, and Regulation of Network Utilities* (1999) 331.

Whilst economies of scale relative to market demand have changed sufficiently to permit competition, they still have an impact on the nature of competition and regulation. In particular, it is still argued that a small number of competitors in network provision are essential in order for all operators to reach a sufficient economic scale that brings costs down to a minimum. However, regulating entry on this basis implicitly assumes that any potential entrant either may not be able to make this judgement for themselves, or that their entry may reduce the customer base of current operators, driving up their average costs and prices.<sup>4</sup> Even if entry is not restricted to a few operators, the scale economies are such that only a few large operators are likely to exist in network provision. In some cases a single firm may exist (for instance, in the local loop), which then acts as a bottleneck or essential facility for other operators downstream. Some of these firms will therefore have a large degree of market power, creating the opportunity for excessive price-cost mark-ups and abnormal profits. This is especially true of the former public monopoly that begins the liberalisation process with 100% of the market, which will only be eroded slowly. This potential to abuse their market power is the rationale for regulating the price of such dominant operators until their market power has been sufficiently eroded to enable competition between operators to discipline their pricing behaviour.

Large economies of scale also have implications for affordability and access. The economies of scale for the network component arise from having a high proportion of fixed costs and very low marginal or incremental costs in providing a service. For instance, it is often said that the cost of routing a call is almost nothing, but clearly, the cost of establishing a network to connect people is significant. This cost structure means that firms are unable to price calls at marginal cost — the economic measure of efficient pricing. Second best is to recover the fixed costs through a combination of an installation and a monthly subscription fee, and price calls closer to their marginal cost.<sup>5</sup> In the extreme, only a fixed monthly fee is charged with no charges for local calls (as is the case in the USA). However, high installation and monthly subscription fees pose a barrier to low-income consumers wanting to get onto the network. Even in cases where low-income consumers can afford the actual fees, their consumption may be so low that it is not worthwhile subscribing. The operators will be loath to reduce the installation and monthly subscription fees too much, even with increases in call prices to recover more of the fixed costs through profits on calls.<sup>6</sup> This is because if the consumer makes few calls anyway, the profit on the calls may not cover the reduction in installation and monthly fees, causing the operator to make a loss.<sup>7</sup> This problem is exacerbated when the fixed costs of providing access to the network differ geographically. In particular, the costs of connecting subscribers in rural areas tend to be higher because the population density is low. In these circumstances, the operator would want to charge higher installation and monthly fees for those subscribers that have higher fixed costs.

If it is politically desirable to extend coverage beyond those who are able to

<sup>4</sup> M Armstrong, S Cowan and J Vickers *Regulatory Reform: Economic Analysis and British Experience* (1999) 106-11.

<sup>5</sup> J Church and R Ware *Industrial Organisation. A Strategic Approach* (2000) 816.

<sup>6</sup> Church and Ware (note 5 above) 816.

<sup>7</sup> The cellular operators have managed to eliminate monthly fees on the prepaid option (but not installation fees) but have used the expiration of airtime vouchers as a means to ensure that subscribers spend a sufficient amount to recover their contribution to fixed costs. Cellular also has a lower proportion of fixed costs compared to fixed line, which also enables them to reduce monthly fees.

afford the fixed costs of connecting them to the network (ie universal service objectives), then these consumers need to be subsidised or provided with an alternative service (ie payphone access rather than a residential service). There are a number of ways to do this. Under a monopoly market structure, it is possible to cross-subsidise the low-income subscribers through above-cost pricing on calls for all subscribers. Typically, long-distance and international calls were targeted for these price increases because greater price increases on local calls would defeat the purpose. This is because low-income consumers make a majority of local calls, and higher prices on these calls would increase their costs anyway, making the package of subscription and calls unaffordable. For rural subscribers, the installation and monthly fees were reduced through cross-subsidies on long-distance and international calls, and price increases on urban installation and monthly fees.

However, as competition is introduced, such cross-subsidies become unsustainable. This is because an entrant can choose to service only the profitable subscribers, enabling them to undercut the prices of the incumbent by the extent of the cross-subsidy. As these profitable subscribers switch to the entrant for lower prices, the incumbent is left without the means to cross-subsidise the low-income and rural subscribers. This would result in the incumbent's either going bankrupt or being forced to raise prices to remain profitable — driving the previously subsidised subscribers out of the market. In order to continue to subsidise unprofitable consumers under competition, each operator needs to share the burden of the subsidy. This can be achieved in a number of ways. Each operator could contribute to a universal service fund (USF) that is then paid out to either the operators providing service to unprofitable subscribers or to the subscribers themselves. Alternatively, each operator could be tied to a licence obligation to provide service to a specific number of unprofitable subscribers, thereby forcing them to raise prices to profitable subscribers in order to cross-subsidise the unprofitable ones.

## 1.2 Network Externalities

Another distinct feature of telecommunications is the existence of network externalities for the consumer. This means that the value of joining a particular network depends on how many other people are also on the network. A phone is not very useful if there are only a handful of other people you can call. Network externalities have a significant impact on competition between telecommunication networks and are the basis for regulatory rules requiring the compulsory interconnection of public networks.<sup>8</sup>

If interconnection were not compulsory, then consumers would prefer to subscribe to the larger network rather than a smaller one — because it would offer more value in terms of the number of people they would be able to call. This results in a self-reinforcing process by which the larger network then gets even bigger and becomes even more attractive to future consumers relative to smaller networks.<sup>9</sup> The outcome is usually that one network will dominate the market (much like Microsoft's domination of office software, which has network

<sup>8</sup> Shy (note 1 above) 3.

<sup>9</sup> Economists refer to this as 'tippy' competition.

externality features too<sup>10</sup>). The dominant network is most likely to be the network that is first in the market (because it will initially be larger than any other network), making the entry of new competitors extremely difficult.<sup>11</sup> The domination of one network due to network externalities poses serious competition issues. It is able to maintain a higher price than its competitors without much threat of market share loss, precisely because consumers are willing to pay more for the extra value offered by the larger network (from being able to call more people). Compulsory interconnection ensures that a customer joining any network has access to the customers of all other networks, removing the role of network externalities in competition.

However, only ensuring the compulsory interconnection of networks does not guarantee fair competition. In a system of interconnected telecommunication networks, we would assume that the proportion of calls to subscribers of each network is in proportion to the market share of each network.<sup>12</sup> This means that if one network has 80% of subscribers in the market, then 80% of calls made from any other network will be to subscribers of that network. The fact that the majority of calls from small networks are to the dominant network enables the dominant network to influence the quality and price of calls of the smaller networks through its interconnection strategy.<sup>13</sup> The dominant network can raise the average price of calls from the smaller networks by charging them a high price for connecting calls to its customers. Alternatively, the dominant firm could achieve the same outcome by raising the cost of interconnection — for instance, by requiring the connecting firm to invest in costly equipment to ensure technical compatibility. Similarly, the dominant network can degrade the quality of interconnection, and therefore degrade the quality of most calls made from the smaller networks. Raising the call prices and lowering the call quality of rivals will then drive consumers to subscribe to the dominant network rather than the smaller rivals because of its lower prices, reinforcing its dominance. It is these strong incentives to discriminate against rivals that have resulted in regulation that tries to ensure non-discriminatory interconnection, and not just compulsory interconnection.

Even with non-discriminatory and compulsory interconnection, however, a dominant network will be able to make abnormal profits by raising the price of interconnection for itself and its rivals above the cost of interconnection. This has the effect of raising the call prices of all the networks, including the dominant network. Although this offers no competitive advantage for the dominant network in acquiring subscribers, it allows it to make abnormal profits in the interconnection ‘wholesale market’.<sup>14</sup> It also ensures that it does not lose subscribers as a result of price increases, because the use of the interconnection charge ensures that rivals are forced to follow its price increases for subscribers. It is due to this strategic use of interconnection pricing that regulation also includes the price regulation of interconnection (or access) prices by dominant (or major) suppliers. Note that the price regulation of interconnection applies to dominant networks only. This is because a small network pursuing the same strategy would not be able

<sup>10</sup> These are slightly weaker than in the case of telecommunications and stem from the ease of sending and receiving documents in the same software package.

<sup>11</sup> Shy (note 1 above) 115.

<sup>12</sup> This is referred to as a ‘balanced calling pattern’.

<sup>13</sup> J-J Laffont and J Tirole *Competition in Telecommunications* (2000) 201.

<sup>14</sup> Laffont and Tirole (note 14 above) 195.

to force similar price increases on its rivals as only a small proportion of their calls would be made to its network. Raising its interconnection cost to itself and others would then result in it offering higher subscriber prices than its rivals and losing market share.

However, differences will often exist between the cost of routing calls within the same network and that of routing calls through another network. This cost difference permits operators to charge a different retail price to subscribers for calls made to other subscribers on their network (on-net) and calls made to subscribers of other networks (off-net).<sup>15</sup> These call price differences can work in favour of the dominant operator in much the same way as discriminatory interconnection pricing.<sup>16</sup> If a new customer expects to have a balanced calling pattern, then he or she will favour the dominant provider because most of his or her calls will be to other subscribers of the dominant provider and these calls are discounted if the customer subscribes to the dominant provider too (the calls are then on-net).

The use of interconnection as a strategic competitive tool to create and maintain market power applies equally to competition amongst service providers, when one service provider is vertically integrated with a dominant network provider. The network provider has an incentive to raise the costs of rival service providers by raising the price or cost of interconnection relative to its own service provider.<sup>17</sup> This gives its own service provider a competitive edge, allowing it either to undercut the competitors to gain market share or to raise prices to earn greater profits.

Interconnection pricing also plays a crucial role in international telecommunications traffic. In the era of State monopolies, each national operator had a monopoly over international calls to its subscribers (as incoming calls had to be routed by the national operator to the end-subscriber). The operators in most developing countries imposed high interconnection charges for incoming calls from other countries, raising the price for the foreign consumer. As it did not affect the price for the domestic consumer and raised enormous foreign currency revenues from foreign consumers, this interconnection pricing strategy was actively encouraged. However, with all national operators pursuing the same strategy, the price of international calls universally increased well above cost. In the era of competition, different operators in a country will compete with each other to provide the routing and termination service for incoming international calls. This competition destroys the ability of one operator to charge excessive prices for termination calls, reducing call prices for foreign consumers.

### 1.3 Compatibility and Standards

A telecommunications service is unlike a product such as scissors that can be purchased and used by it. A telecommunications service is a system of interconnected parts that is useful to the consumer only when it is put together. In order for the system to operate, the various parts must be compatible.<sup>18</sup> This requires that the various components must operate on the same standard.

<sup>15</sup> For instance, the cellular operators have different call rates for on-net and off-net calls.

<sup>16</sup> Laffont and Tirole (note 14 above) 202.

<sup>17</sup> Armstrong (note 5 above) 120.

<sup>18</sup> Shy (note 1 above) 2.

Ensuring compatibility and setting standards requires coordination among the various firms that make products that are part of the system or interconnect to it. This coordination problem is more difficult the greater the number of firms involved in producing parts for the system or operating networks themselves. Failure to coordinate and set standards can result in networks not being able to interconnect (or to interconnect only at high cost) or items of customer equipment not working on a different network. For instance, if one cellular company used the GSM standard and the other CDMA, then consumers with phones that operated on a GSM network standard would not be able to use their phones on the other network, and vice versa. It would also impose costly interconnection solutions to overcome the compatibility problems. Aside from the coordination problem, there is also the concern that in the process of collaborating to determine a standard, firms may find themselves engaging in price-fixing too.

In fact, one of the primary rationales behind the International Telecommunications Union (ITU) was the coordination of telecommunications standards globally to ensure the interoperability of networks in different countries. Similarly, at a national level the regulator has to fulfil a technical coordination role to ensure that compatibility problems do not leave some consumers with unusable equipment or some networks unable to interconnect to others. Whilst many of the technical standards will be decided in international forums, the national regulator still has a role to play in enforcing the standards locally, and sometimes choosing amongst a variety of available standards for the country.<sup>19</sup>

## 1.4 Complementarities in Demand

In many instances, telecommunication services involve a collection of complementary components that are bundled together as part of an overall service. For example, fixed voice telephony includes component services such as access, call termination, local call origination, long-distance call origination, directory services, etc. Components such as access would not be consumed independently, whereas other components would display varying degrees of complementarities in demand. Where services are strong complements, there will be strong consumer demand for bundled service packages. As noted by Shy,<sup>20</sup> 'complementarity means that consumers in these markets are shopping for systems ... rather than individual products'. Operators can use this complementarity strategically to leverage market power in one part of the system to sell other parts of the system.

## 1.5 Switching Costs

Switching costs are simply the costs that consumers incur in moving from one telecommunications provider to another.<sup>21</sup> The existence of switching costs locks in consumers to one provider, providing a captive market. The strength of the lock-in depends on the size of the switching costs relative to the potential savings for the consumer from switching providers. Switching costs provide the operator with a

<sup>19</sup> For instance, in cellular there is more than one technical standard and South Africa needed to decide between GSM and CDMA.

<sup>20</sup> Shy (note 1 above) 2.

<sup>21</sup> Alternatively, they provide a barrier to consumers moving from one tariff plan to another within the same provider. It is for this reason that cellular operators allow prepaid customers to keep their number when migrating from one tariff plan to another.

degree of market power over its existing customers, but not over potential new customers.<sup>22</sup> This has important implications for pricing by a dominant operator, ie the operator with a large number of subscribers relative to its competitors. Switching costs enable the dominant operator to sustain a price above that of its competitors without fear of subscribers moving to the competitors, precisely because the consumer has to weigh up the potential saving of lower prices against the costs of switching. The higher the switching costs, the higher the price difference that the dominant operator is able to maintain. Therefore, regulatory efforts to reduce the switching costs for consumers enable greater price competition in the market.

In telecommunications, the primary switching cost is the loss of a telephone number. This imposes costs on the consumer in the form of informing all family, friends and business associates of the change in number, and any costs of changing business stationery that includes the phone number on it (eg letterheads, business cards, advertising). A second switching cost is the administrative time required to cancel a subscription to one provider and initiate a subscription to another provider. A third switching cost arises when consumers want to switch providers only for certain calls, for instance, long-distance calls. In this case, they need to dial a carrier code before dialling the number in order for the call to be routed to their preferred operator. The additional effort of prefixing every call with a carrier code represents a small time cost to consumers that grows in significance with the number of calls made.<sup>23</sup>

The move from a public monopoly to a competitive market for telecommunications leaves the incumbent operator with 100% of the market initially, allowing it to benefit from switching costs to the detriment of new entrants. It is for this reason regulations that reduce the switching costs for consumers are seen as important in enabling competitive entry and price reductions by the incumbent. The standard solutions to the switching costs cited above are number portability and carrier pre-selection. Number portability between networks enables the consumers to retain their telephone number when switching providers, eliminating this source of switching costs. Carrier pre-selection enables consumers to choose their preferred operator as the default option for certain calls (long-distance or international), eliminating the need to dial the carrier code before dialling the number. If the consumer wishes to use another operator for a particular call, then he or she would need to dial that alternative operator's code. This eliminates the other source of switching costs for consumers.

## 2. The Economics of Telecommunication Regulation

The economic features of the telecommunications industry mean that operators with market power will exist. This market power can be abused in a number of ways. An abuse of market power may harm consumers directly, through high prices, or indirectly by preventing or substantially reducing competition. The purpose of regulation is to prevent dominant or monopoly firms from abusing

<sup>22</sup> Church and Ware (note 5 above) 547.

<sup>23</sup> Armstrong (note 4 above) 118.



their market power, in order to protect the well being of consumers and society at large. For example, retail prices may be regulated in order to prevent a monopoly from increasing its prices to levels that would be harmful to consumers. Regulations could also be introduced in respect of interconnection and the provision of facilities as the monopolist or dominant firm has an incentive to abuse its market power in order to restrict competition.

Price regulation in respect of retail tariffs and interconnection fees is preemptive in that the regulator enforces ex-ante a rule or set of rules designed to limit the pricing power of the monopoly firm, so as to bring about a socially optimal outcome. This form of ex-ante regulation is implemented on a sector-specific basis — ideally by an independent regulator.

A system of ex-ante regulation can be contrasted with ex-post, or after the fact, regulation. In the case of ex-post regulation the regulatory authority intervenes only after an abuse has occurred. Such intervention would normally take place based on a court order and only where there is sufficient evidence of an abuse. Which conduct constitutes an abuse and the standard of evidence required in order to prove that an abuse has occurred is set out in the applicable legislation.

Competition law and policy provides a good example of ex-post regulation. Competition law is often not sector specific but applies instead across a range of different industries. However, it is also possible to have sector-specific ex-post regulation in respect of competition in a particular sector. There is much debate as to the appropriateness of ex-post versus ex-ante regulation in the telecommunications sector, as well as debates over who should have jurisdiction over competition matters in the sector.<sup>24</sup> A discussion of these debates is beyond the scope of this chapter. Suffice it to say that the introduction of ex-post competition regulation depends to a large extent on a country's policy on liberalisation, as well as on the stage of liberalisation of the telecommunications sector in a particular country. The basic reasoning is that general ex-post competition regulation should be introduced in those areas where there is effective competition, and also where the potential exists for dominant firms to abuse their position so as to restrict the competitive process. Competition is effective where it acts as a constraint on the market power of dominant firms and brings about socially optimal outcomes, without the need for ex-ante regulation (such as price regulation). Sector-specific ex-ante regulation is necessary where natural monopoly components persist and where the liberalisation process has not sufficiently progressed to bring about effective competition.

It should be noted that, given the inherent network externalities in telecommunications, there will always be a need for some optimal mixture of ex-ante and ex-post regulation. For example, it is arguable that without certain ex-ante rules and regulations around interconnection (even in a fully liberalised market), effective competition may not be sustainable, due to the incentives of dominant networks to undermine the competitive process.

Determining the optimal mix of ex-ante and ex-post regulation is an important part of managing the liberalisation process. This process entails a significant change in the mind-set of policy-makers, the sector regulator, and incumbent

<sup>24</sup> See, for instance, the Competition Commission and Tribunal discussion paper on the issue (2000).

operators. Before the initiation of a liberalisation process, regulation would have been focused exclusively on controlling (yet sustaining) a monopoly structure, whereas regulation in the context of liberalisation increasingly tends towards promoting and sustaining effective competition in the context of an imperfectly competitive market structure. In this regard, the decisions of policy makers and regulators must have a sound basis in the economics underlying competition, or antitrust regulation.

## 2.1 Some Aspects of ex-ante Regulation

An abuse of market power through the overpricing of retail tariffs and interconnection fees is detrimental to consumers and competition. This is the rationale for regulation of both these prices. If the regulator had perfect information on the costs and demand faced by the operator, price regulation would enable them to ensure socially optimal pricing. However, the regulator is always constrained by having access to inferior information relative to the operator (an information asymmetry problem). The regulator's pricing decision is based on information fed to it by the operator, giving the operator the means and the incentive to provide incomplete information that gives it a more favourable price. The regulator is also restricted to a large extent from ignoring the operator's information and setting more stringent prices. This is because the regulator cannot risk driving the operator out of business due to the central importance of telecommunications to society. This provides the operator with bargaining power in the price regulation process.

### 2.1.1 Retail price regulation

There are a number of approaches to regulating retail prices. It is important to note that all of these approaches have pros and cons, and a country must select the approach that is expected to have the fewest drawbacks in their institutional and economic environment.

### 2.1.2 Rate-of-return regulation

Under rate-of-return regulation, prices are set such that all the operating costs are covered and a fair rate of return on capital is provided. The operator needs to provide the regulator with detailed cost and demand information under this exercise. Prices are determined after calculating the total revenue requirements of the operator, and the expected volumes of sales.

Rate-of-return regulation has been primarily criticised for not providing any incentives for operators to reduce costs.<sup>25</sup> Given that the operator will earn the same rate of return on their capital whether they reduce costs or not, there is little incentive for management to make the effort to reduce these costs. In fact, there is even an incentive for cost-padding (or 'gold-plating') by management for the same reason. This is especially the case when the operator also competes in unregulated sectors (such as value-added services). The operator has an incentive to allocate

<sup>25</sup> Church and Ware (note 5 above) 847.

costs (in an accounting sense) from the competitive service to the regulated service, because it enables the operator to lower prices in the competitive service to gain market share, while still ensuring a fair return on these costs in the regulated service.<sup>26</sup> The operator may also allocate its best human resources to the competitive service, because leaving less inefficient human resources in the regulated service will not impact its return for that service, whilst it will in the competitive service. The regulator can tackle these to some extent through requiring accounting separation of different operating units and not including costs that it feels are unwarranted, but the information asymmetry between the regulator and the operator means that these can never be entirely eliminated.

However, there are a number of advantages to rate-of-return regulation. The guarantee of a fair rate of return to the operator can be important in attracting capital investment in countries with high risk (demand, political or currency risk). It also prevents the operator making excessive profits as their rate of return is limited. For countries concerned about the distribution between firms and consumers, this may be an important consideration. The problem of incentives for cost reduction may also be reduced through lags in the review of prices. This allows the firm to engage in some cost-reduction that enables it to earn additional profit until the next rate review.<sup>27</sup>

### ***2.1.3 Price cap (or incentive) regulation***

Price cap (or incentive) regulation is the most common approach in telecommunications globally. Under a price cap, the average increase in prices each year is restricted to the rate of inflation less a productivity factor that is set by the regulator.<sup>28</sup> The higher the productivity factor set by the regulator, the lower the average increase in prices.

The major benefit of this approach is that it provides very strong incentives for operators to reduce their costs. This is because they need to reduce costs by at least the productivity factor to remain as profitable as before, and any additional cost reduction is additional profit for the operator. It also provides the operator with greater flexibility in deciding the price changes on individual services. Under rate-of-return regulation all prices increase by the same amount, but under a price cap the operator can put through different price increases for different services as long as the weighted average is in line with the cap. Finally, it is also considered less information-intensive than rate-of-return regulation.

Despite its popularity, price cap regulation is not without its problems. Probably the most serious problem is a distributional one. Without adequate information, the regulator is prone to setting a lenient price cap that enables the operator to make substantial profits. This is because they do not want to drive the operator out of business, which ensures that they err in favour of the operator. Even if a stringent cap does not completely drive the operator out of business, it may reduce their profitability to the point where they no longer have an incentive to invest, causing a long-run deterioration of the network.<sup>29</sup> A further problem is that the

<sup>26</sup> Laffont and Tirole (note 13 above) 145.

<sup>27</sup> Church and Ware (note 5 above) 849.

<sup>28</sup> The so-called 'CPI-X' rule, where X is the productivity factor.

<sup>29</sup> Armstrong (note 4 above) 85.

operator has strong incentives for reducing the quality of service, as this will enable it to reduce costs. This can be handled through stipulating quality standards but it requires monitoring by the regulator. Even under a price cap the incentive to reduce costs may be limited because low costs and high profits in one period will most likely cause the regulator to increase the productivity factor in the next period (this is known as the ‘ratchet effect’). The increasingly stringent price cap resulting from good performance will reduce the incentives for the operator to reduce costs. A price cap is generally considered a good approach when the regulator has no cost information (making rate-of-return regulation impossible), when the potential for cost reduction is large, or when distributional issues are not politically important.

#### ***2.1.4 Earnings sharing***

Earnings sharing falls between rate-of-return and price cap regulation. Under earnings sharing, a price cap is set but restricts the operator’s profits to between a lower and an upper threshold level. If the operator’s profits exceed a predetermined upper threshold level, then a share of any profits over and above the threshold level are ploughed back into additional price reductions in the next period. Similarly, if the firm makes profits below the lower threshold, then a share of any additional losses beyond the lower threshold are recouped through additional price increases in the next period. This way both the firm and consumers are protected from either unexpected changes in the market or the inadequate setting of the price cap by the regulator. As a combination of the other two regulatory approaches, earnings sharing offers the benefits and problems of both but to a far more limited extent.<sup>30</sup>

#### ***2.1.5 Interconnection (or access) price regulation***

As with retail price regulation, there are a number of approaches to regulating interconnection rates, each with their respective pros and cons.

- **Backward-looking cost-based pricing**

Backward-looking cost-based pricing is rate-of-return regulation of the wholesale market for interconnection. The price is set to cover both operating and fixed costs, with a fair rate of return provided. It has the same benefits (namely a risk-free investment environment and normal profits) and suffers from the same problems (namely, no incentives for cost reduction).

- **Long-run incremental cost (or forward-looking cost-based pricing)**

Long-run incremental cost (LRIC) pricing does not make use of actual operator costs in determining the price, but rather the costs of a hypothetical efficient operator using current technology brought at current prices. This approach has proved immensely popular in telecommunications because it overcomes the problem of incentives for cost reduction. By setting price based on an efficient benchmark, the operator has every incentive to reduce costs in order to prevent

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<sup>30</sup> Church and Ware (note 5 above) 856.

itself from making a loss on interconnection and losing market share to rival firms (that would get interconnection at a price below that available to the operator's own services).

However, the significant problem with LRIC for regulators with few resources and technical capacity is that it is information-intensive and technically demanding.<sup>31</sup> The regulator needs to design an optimal network based on the current subscriber base of the operator and price that network using the lowest equipment prices available in the market. If the regulator lacks technical expertise and information, it will be unable to provide a true efficient benchmark, permitting the operator to continue to profit from interconnection (or be inefficient). An equally serious problem with LRIC is that when it is done correctly, it prevents the operator from making profits on interconnection and provides it with a strong incentive to use interconnection as a tool to make profits in the downstream service provision by hindering rivals<sup>32</sup>. Whilst they may not be able to hurt rivals through higher prices, they can do so through other means (such as raising interconnection costs or degrading the quality of interconnection).

- **Efficient component pricing rule (ECPR)**

The ECPR bases the interconnection price on the profit foregone by the operator as a result of not providing the downstream service itself and allowing a rival to do so through interconnecting to its network. This access price can be calculated as the retail price of the downstream service by the operator less the costs associated with providing the service only (not the interconnection costs). Interconnection prices are therefore the actual cost of interconnection to the operator plus the profit margin on retail services. The advantage of this approach is that it provides no incentive for the operator to use interconnection as a means to hurt rivals in the downstream service market. The operator makes the same profit whether it provides the downstream service itself or the interconnection to allow another operator to provide it.

However, the ECPR also has numerous disadvantages. The operator has the incentive to raise retail prices to make additional profit unless these are adequately regulated themselves. In raising retail prices the operator raises the interconnection price (as it is based on the retail price), forcing rival downstream service providers to do the same. This ensures that raising price is profitable as the operator will not lose market share if downstream rivals follow its price change. Similarly, if there is no adequate regulation of retail prices, there is no incentive for the operator to reduce costs, as all cost increases can be passed on in the interconnection price. Even with adequate price regulation, ECPR provides greater incentives for the operator to reduce costs in the downstream service market and not in the basic network.

## 2.2 Some Aspects of ex-post Regulation

In its Relevant Market Notice ("RMN") of 1997 the European Commission considered the definition of the relevant market as the foundation for the

<sup>31</sup> Laffont and Tirole (note 13 above) 148.

<sup>32</sup> Laffont and Tirole (note 13 above) 162.

application of competition law:

market definition is a tool to identify and define the boundaries of competition between firms. It allows the establishment of a framework within which competition policy is applied by the Commission.<sup>33</sup>

Therefore, in the application of ex-post regulation, market definition is a crucial first step in assessing whether firms are engaged in prohibited practices. The standard approach to market definition involves considering substitutability patterns by asking consumers whether they would switch from one product to another if the price of the first one were increased by 5% or 10% for a prolonged period. The group of substitutes for which customers would not switch if a hypothetical monopolist increased the price by 5% or 10% constitutes the relevant market.

This approach is generally applicable to market definition in the telecommunications sector. However, certain characteristics of telecommunication products and services may complicate attempts to define the market in this manner. For example, the existence of a wide range of differentiated telecommunication products and services makes it difficult to identify substitutability patterns. The main reason for this is that customer preferences vary considerably and telecommunication service providers have to be flexible in order to be able to provide services to different customers. Defining markets solely based on demand-side substitutability patterns could result in many narrow markets being defined according to the many different customer preferences. However, it is possible to aggregate narrow markets into broader more workable markets by considering supply-side substitution.

The discussion below takes a brief look at some aspects of the economics underlying prohibited practices as they appear in the Competition Act, with reference to issues arising in the telecommunications sector.

### **2.2.1 Restrictive Horizontal Practices**

In liberalised markets a firm's profitability is often dependent on the conduct of its competitors. Where two firms are competitors they produce substitute goods and are said to be in a horizontal relationship. Each firm in a horizontal relationship would like to see the other firm increase the price of its product so that it can enjoy the higher profits arising from softer price competition.<sup>34</sup> There is in fact a strong incentive for firms producing substitute products to agree to fix the price of their product rather than compete. When two or more firms agree to fix a common price for their substitute products, these firms are said to be colluding and are members of a cartel. Cartel members enjoy higher profits because they do not compete as vigorously as they would have in the absence of an agreement. However, a cartel resembles a monopoly and, much like a monopoly, it is able to charge high prices and restrict output to the detriment of consumers.

<sup>33</sup> European Commission *Commission Notice on the definition of the relevant market for the purpose of Community competition policy* (1997).

<sup>34</sup> S Bishop and M Walker *The Economics of EC Competition Law* (1999) 88.

Arrangements involving direct or indirect agreement among competitors for purposes of restricting competition are generally known as *restrictive horizontal practices*. Many countries have laws that prohibit cartels and other types of restrictive horizontal practices. These laws are enforced ex-post by competition regulators, who impose some form of penalty on the members of the cartel. An example of a penalty would be a hefty fine and an order to disband the cartel.

The effectiveness of a cartel depends on the presence of a number of market conditions. Cartels are more likely where there is only a small number of firms in the relevant market, where products are fairly homogeneous, and where there is a mechanism for coordination (such as a trade association). Collusion is facilitated where there is a small number of firms producing similar products, as it is much easier to share information and coordinate behaviour than in a situation where there are many firms producing highly differentiated products.

In the sphere of telecommunications, mobile telephony is a good example of a market where conditions allegedly facilitate collusion among mobile operators. In most countries only a limited number of firms are licensed to provide mobile telephony. In such circumstances collusion is often tacit, with the dominant firm acting as the price leader and the smaller firms following. Some competition can be introduced in the short run when the government (or the regulator) provides a licence to a new operator. The new entrant will compete on price in order to gain market share. However, once it has achieved critical mass, there is a strong incentive for the new operator to become a price follower.

It should be noted that the ex-post regulation in respect of restrictive horizontal practices, discussed here, must be distinguished from merger regulation. Merger regulation involves structural remedies aimed at preventing the development of the kind of highly concentrated market structure that would facilitate tacit collusion. For example, a horizontal merger that reduces the number of competitors in the relevant market from four to three could be prohibited.

### 2.2.2 Restrictive vertical practices

A firm's profitability also depends on the conduct of other firms positioned elsewhere in the production or supply chain. For example, a firm's relationship with its input supplier will impact on its profitability, through the price paid for the input. Firms at different levels of the supply chain are said to be in a vertical relationship and produce complementary products. Unlike in horizontal relationships, each firm in a vertical relationship would like to see the other firm reduce its price.<sup>35</sup> This is because with complementary products the demand for the product increases as the price of the complementary product falls. Therefore, vertically related firms have an incentive to see prices reduced, thus lowering prices to consumers and raising their overall welfare.

Consequently, agreements and restrictions between firms in a vertical relationship would generally be considered to be pro-competitive. However, there are circumstances where vertical practices are anti-competitive because they restrict competition at the horizontal level. Such practices are known as restrictive

<sup>35</sup> Bishop and Walker (note 34 above) 88.

vertical practices.

Restrictive vertical practices take many forms but generally involve some form of vertical restraint. A vertical restraint may involve a loyalty discount where a discount is awarded in exchange for purchasing a minimum amount of output or it may be based on a pure exclusivity contract. One anti-competitive reason for using vertical restraints is to foreclose markets. For example, the incumbent fixed-line operator could enter into long-term contracts with large businesses for the provision of data services, thus (depending on the terms and conditions) foreclosing existing and potential entrants from this part of the market.

### 2.2.3 Abuse of dominance

A foreclosure strategy often involves a dominant firm leveraging its position in the upstream input market so as to restrict competition in the downstream output market. This ‘leveraging’ possibility is particularly relevant in the case of telecommunications, where incumbent operators are often the sole providers of network facilities to downstream service providers with whom they also compete. Examples of where a leveraging strategy can be employed include bottlenecks such as local access and mobile termination (where the calling party pays).<sup>36</sup> In such cases the bottleneck is offered as one of a bundle of services in competition with other service providers who offer similar service bundles but who do not have free access to the bottleneck. The incumbent operator would be abusing its dominant position by denying access to the bottleneck or providing access on discriminatory terms so as to restrict competition in the downstream services market.

In many cases ex-ante regulations are applied in respect of pricing and access to bottlenecks. However, even where there is ex-ante price regulation, there are still alternatives for incumbent providers to abuse their position. Examples of strategies employed by dominant operators to exclude rivals in competitive downstream markets include implementing a vertical price squeeze and predatory pricing.

A vertical price squeeze refers to an exclusionary act employed by a vertically integrated firm ‘to leverage its market power in the upstream market to squeeze the margins of its downstream competitors’.<sup>37</sup> A vertical price squeeze may occur where the incumbent operator is vertically integrated into a downstream services market that has been opened to competition. Crocioni and Veljanovski have identified three main types of price squeeze:

- *A discriminatory price squeeze.* The vertically integrated firm provides the upstream input to its downstream division at a much lower price than the price it charges its downstream competitors, thus raising the costs of its downstream competitors relative to its own costs.
- *A non-discriminatory price squeeze.* The vertically integrated firm increases the price of the upstream input equally in respect of all downstream purchasers of the input, including its own downstream division.
- *A predatory price squeeze.* The vertically integrated firm lowers its downstream

<sup>36</sup> The concept of the essential facility is closely related to that of the bottleneck, where the bottleneck is an essential facility required by a competitor. A firm abuses its dominant position by denying another firm access to an essential facility.

<sup>37</sup> P Crocioni and C Veljanovski *Vertical Markets, Foreclosure, and Price Squeezes: Principles and Guidelines* (2002) 28.



price to below the cost (or the ‘wholesale’ price) of the upstream input, or sufficiently low so as to prevent the downstream rivals from obtaining an adequate margin.<sup>38</sup>

Crocioni and Veljanovski emphasise that in order to find that a price squeeze has indeed occurred, it must be shown that the firm implementing the price squeeze:

- Is dominant in the upstream market, with a market share of 80% or more;
- Is vertically integrated and is active in both the upstream and the downstream market; and
- Has control over the upstream input.

It must be further shown that:

- The upstream input is an essential facility required by downstream competitors and/or is essential to downstream competition;
- The alleged price squeeze must have the effect of substantially preventing or reducing competition in the downstream market by making it unprofitable for rivals to compete in the downstream market; and
- The duration of the price squeeze must be long enough that it has an exclusionary effect.<sup>39</sup>

There are also other means, such as tying, by which monopoly firms engage in exclusionary tactics. Tying also involves leveraging in that a firm with a monopoly in one market may attempt to ‘leverage’ this monopoly into a second market, thus attempting to gain market power in the second market. The firm does this by somehow ‘tying’ consumption of the product from the second market to that of the monopoly good. It should be noted that tying is not necessarily anti-competitive and often involves efficiencies; however, there are circumstances where tying could constitute an abuse.<sup>40</sup>

Where such abuses occur, ex-post regulation may involve the imposition of fines but also structural remedies such as vertical separation and divestiture. A classic example of vertical separation is the break-up of AT&T in the 1980s into the Regional Bell Operating Companies following a lengthy anti-trust dispute. However, despite the possibility of ex-post competition-law intervention, the fact remains that many potential competition problems can be prevented by the effective implementation of appropriate ex-ante regulations.

<sup>38</sup> Crocioni and Veljanovski (note 36 above) 32-3.

<sup>39</sup> Crocioni and Veljanovski (note 36 above) 38-41.

<sup>40</sup> P Rey, P Seabright and J Tirole *The Activities of a Monopoly firm in Adjacent Competitive Markets: Economic Consequences and Implications for Competition Policy* (2001) 21-2.