

# Market structure and innovation in the telecommunications sector

A framework for assessing the impact of structural separation of the incumbent

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**Abstract** *A debate continues on whether the structural separation of incumbent telecommunications operators would increase competition in telecommunications markets leading to a more dynamic industry. John Cubbin and David Currie, the future Chairman of OfCom, and the OECD have both contributed to this debate. More recently (in Issue 4 of this Volume) Professor Martin Cave asked the question "Is LoopCo the answer?". In the light of the regulators' objectives in the new EU framework to promote efficient investment, this article answers some of Professor Cave's arguments against structural separation and sets out a framework for analysing the impact of separation on innovation in the sector and in other industries which use telecommunications as a key input. The article draws on work conducted by other academics, notably The Netherlands Bureau for Economic Policy Analysis and Michael Porter.*

The structural separation of incumbent telecommunications operators into competitive and non-competitive businesses continues to be a subject of debate amongst telecommunications commentators. Recent arguments in favour of some form of separation have been proposed by John Cubbin and David Currie (2002) and by the Organisation for Economic Co-operation and Development (OECD) (2002). Both Cubbin and Currie and the OECD argue that separating the competitive, or potentially competitive, elements from the non-competitive elements of public utilities facilitates regulatory withdrawal and the benefits of competition.

Cubbin and Currie state that "vertical separation could hold out the prospect of progressive de-regulation even of local loop services in the event that local wireless, cellular

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and cable offerings become able to provide substitute services at equivalent costs". The normal process of the market and *ex post* competition rules could take over from sector specific, and intrusive, *ex ante* regulation.

Arguing against structural separation is, amongst others, Professor Martin Cave. In his recent *info* article (Cave, 2002), Cave sets out six questions which he says need answering to test the desirability of structural separation of incumbent telecommunications operators. He concludes that:

I regard the benefits of LoopCo as being limited and conjectural, and its potentially adverse effects on network development as likely or significant. There are circumstances in which it would pass the cost-benefit test, but these seem to me to be unlikely. On this basis, I regard the LoopCo option as a high risk gamble (Cave, 2002).

In this article we first discuss some of Professor Cave's arguments suggesting a seventh, and overriding, question which should be answered and then go on to propose an alternative framework to assess the benefits of structural separation, in particular whether it supports innovation.

For the purposes of this discussion, LoopCo is a separate economic entity which has ownership and control of all of the incumbent's local loop ducts and the metallic loops up to and including the Main Distribution Frame (MDF). LoopCo would not own xDSL equipment located on the backhaul side of the MDF. However, LoopCo would own (or lease) all local exchange and remote concentrator sites, land and buildings. The network elements owned by LoopCo are the bottleneck for any service provider wanting to access customers (Sandbach, 2001). Professor Cave's definition is slightly different in that he excludes the MDF from LoopCo's assets, although this does not impact significantly on the arguments in this paper.

The important point is that LoopCo does not provide any downstream services which compete with its own customers, as happens in an integrated incumbent where the business unit selling access services may sell to its own downstream Internet Service Provider (ISP), for example, as well as the ISPs of various competitors. It is this potential conflict of interest, and its adverse affects on competition, which is the motivation behind the structural separation proposal.

Cubbin and Currie's definition of structural separation is different to Professor Cave's and our own as they propose a split between the incumbent's wholesale and retail activities.

One further point to make is that, for the purposes of judging whether structural separation would deliver benefits, the manner in which structural separation arises, i.e. as a voluntary move by incumbents' shareholders or through a legal requirement, is not material.

Finally much of this discussion centres on the situation in the UK. However, the same or similar potential problems exist in other EU member states and so the framework discussed in the second half of this paper has an international application.

## **A response to Professor Cave**

There are three key areas of Professor Cave's paper which we will discuss here: the proper objectives of regulation, whether the local loop is a natural monopoly and problems of investment co-ordination.

### **The objectives of regulation**

Professor Cave states that to evaluate the LoopCo proposal it is necessary to be clear about the objectives of policy. He takes these to be Oftel's basic objective of "providing the best deal to the customer in terms of price, quality and choice" (Oftel, 2001a).

This objective is sound, but a subset of what should be the objectives of policy in the broadband age. In our view the objective of policy today must include development of sustainable competition and innovation. In this, we are supported by the European Commission which sets out three objectives for national regulatory authorities:

- (1) ensuring that users [...] derive maximum benefit in terms of choice, price and quality;
- (2) ensuring that there is no distortion or restriction of competition in the electronic communications sector; and
- (3) *encouraging efficient investment in infrastructure and promoting innovation* (our emphasis) (European Commission, 2002).

In the long term, efficient investment and innovation should lead to the maximum benefit for consumers as competition drives prices towards marginal cost and innovation brings new products and services on stream. However, a short term concentration on the best deal for consumers may require intrusive regulation which deters investment and innovation.

The advent of OfCom and the adoption in UK law of the Framework Directive allows the opportunity to adopt this newer, broader set of objectives, placing the promotion of innovation as a key policy goal.

We will later return to discuss the importance of innovation in the modern economy.

### **A natural monopoly?**

Professor Cave argues that the local loop is not a natural monopoly and that this is shown through the presence of competing loops provided by cable companies which pass 55 per cent of households, and a larger proportion of businesses, and which have taken a majority of broadband customers.

This is both a rather optimistic view of the degree of competition in the UK and looks at competition at the wrong point in the value chain, in that his focus is on the retail, rather than the more appropriate wholesale access market.

Certainly the cable companies pass 55 per cent of homes. However, their market share nationally remains limited at only 11 per cent of exchange lines (Oftel, 2001b). Further, the jury must still be out on whether the two cable operators are economically sustainable. Despite being

operational since 1989, and despite being handed an innovation advantage through a monopoly on the provision of cable TV services, neither company has yet made a profit and indeed ntl has been subject to significant financial restructuring[1]. The wireless local loop competitors, Ionica and Atlantic Telecom, both failed to make a profit and are now no longer in business.

Therefore to claim that the presence of cable operators demonstrates that the local loop is not a natural monopoly is in our view optimistic.

Second, Professor Cave looks at competition at the wrong point in the value chain. Whilst the cable companies compete with BT at a retail level they do not do so at a wholesale level, and it is at this level of the value chain that there is most concern that incumbents can abuse their power to disadvantage competitors. ISPs wanting to offer broadband access must buy service from BT, which remains the only national supplier of wholesale access. Passing 55 per cent of homes restricts cable companies' ability to operate in the wholesale market which requires ubiquitous coverage and it is the lack of competition at this wholesale level which is stifling innovation.

### **Investment co-ordination**

Let us now turn to Professor Cave's six questions. The first five questions he answers in a way which does that not preclude structural separation. It is only the sixth and final question: "Do problems arise in co-ordinating investment activities?" where he introduces arguments against it.

Professor Cave suggests that investment over the next decade is likely to take the form of pushing fibre from the local exchange to the kerb or the home and this is necessary for truly fast Internet access. In an optimally designed network, he states, the MDF will disappear, but with LoopCo it, or something equivalent, will have to remain as the demarcation point. The implication being that with LoopCo these developments would require co-ordination with the backbone network operator. He claims that this co-ordination would be "very hard to achieve" and would be a "major and potentially durable cost of separation, and one which is very hard to quantify".

Certainly there would be need for co-ordination between LoopCo and network operators, but this is already the case. BT is not the sole provider of backbone networks in the UK, so other providers have to liaise with BT to ensure their current investments are compatible with local loop developments and to request special facilities. To argue against network investment co-ordination would be to argue against investment in competing infrastructure.

However, there is no reason to suspect that this co-ordination would be any more difficult in a structurally separated environment and every reason to think it would in fact be easier.

In a structurally separated market, LoopCo will be indifferent between the needs of all of its customers and

would therefore respond to them equitably. It is far less likely to discriminate in favour of one customer, nor will it need intrusive regulation to prevent it from doing so, as is the case today.

So, while there would certainly be a need for co-ordination of investment activities in a structurally separated market, this is no different to the situation today and is actually likely to be better. Indeed it could be argued that greater investment co-ordination would be a good problem to have as it suggests that both investment and innovation are more intense.

Professor Cave's clear and unambiguous conclusion is not, therefore, supported by the arguments he sets out in his paper and, further, even if LoopCo was less likely to deliver against Oftel's current objectives, as he interprets them, these objectives themselves will soon be developing to include the promotion of innovation.

### **An alternative approach**

In the remainder of this article we set out an alternative approach to the six questions set out by Professor Cave to assess the desirability of structural separation. This approach is designed to answer just one question: would structural separation lead to increased innovation in the telecommunications sector which would benefit customers and the national economy, without ignoring static efficiency gains? We believe that this question should be the basis for all future debate on structural separation.

### **Competition, productivity growth and prosperity**

Innovation is a key priority for both the European Union and its member states. The priority given to innovation is to make up the difference between the European economy and that of the USA. From 1990 to 2000, the EU achieved only one year of economic growth above 3 percent. By contrast the USA experienced just one year with growth below 3 percent during the same period (Bannerman, 2002). To try to overcome this gap Europe's leaders agreed, at the Lisbon summit of March 2000, an ambitious ten-year programme of economic reform with the goal of making Europe "the most competitive and dynamic knowledge-based economy in the world" by 2010.

Electronic communications is an essential input to, and distribution medium for, knowledge-based products and services and so indispensable if the Lisbon agenda is to be fulfilled.

There is broad agreement in economics that innovation is the source through which goods and services of increasing value are produced by firms, and the means by which goods are produced more efficiently (see Ahn, 2002 for a comprehensive review of the literature). The development of the global economy towards a more integrated and networked basis has only increased the importance of innovation. The OECD has described the Internet as "a key technology for speeding up the innovation process" (OECD, 2000).

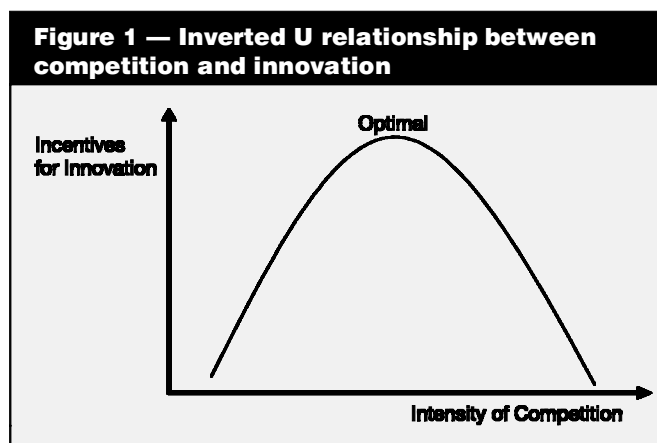
Porter (2001a) argues that healthy competition within industries is essential for the prosperity of a nation. Although control of price/cost margins through competition is recognised as beneficial for short-term consumer welfare, Porter suggests that the real benefit of healthy competition is:

To drive productivity growth through innovation, where innovation is defined broadly to include not only products, but also processes and methods of management.

While innovation can be influenced by a number of factors, Porter identifies healthy competition in a supportive business environment as an essential driver. Competition promotes innovation, innovation supports productivity growth, which in turn sustains increases in a nation's prosperity and competitiveness.

In a paper funded by the Dutch telecommunications regulator, OPTA, and written by The Netherlands Bureau for Economic Policy Analysis, Bennett *et al.* (2001) identify the lack of a direct correlation between competition and innovation as a complicating issue in the analysis. This contrasts with the Schumpeterian view where competition appears to be detrimental to innovation and technical progress (Schumpeter, 1942). Bennett *et al.* (2001) support the proposition that an inverted U-shaped relationship exists between the health/intensity of competition within a market and the incentives to innovate (see Figure 1). This view has also been supported in a recent paper by the Institute for Fiscal Studies (Aghion *et al.*, 2002).

At low levels of competition intensity, the incentive for firms to innovate is low – incumbent firms have high levels of market power and high profits. Encouraging competitive intensity will have the effect of increasing incentives to innovate up to a point – after which competition becomes so intense that innovation is no longer worthwhile (as a result of lower rents accrued). Where competition is fierce and price intensive, firms are less confident that they will be able to generate the necessary returns to justify the investment costs required for innovation. Clearly the best situation in the medium to long term occurs when the level of competition within the market creates the greatest incentives to invest.



The framework developed below is based on the work of Bennett *et al.* (2001) and placed in the context of Porter's productivity growth paradigm. The framework can be used to analyse the current market situation, and the outcome of the scenarios of the future structure of the telecommunications industry such as:

- business as usual, i.e. maintaining the current integrated structure of the incumbent operator; and
- structural separation, where the local loop assets up to and including the MDF are transferred to the completely separate entity, LoopCo.

Assuming no other influences, improvements in productivity of the telecommunications sector will support improvements within key sectors of the economy that will then support overall improvements in the prosperity and competitiveness of the national economy as a whole.

### The proposed framework

Bennett *et al.* proposed the framework for analysing exogenous developments and static and dynamic efficiency states with a view to analysing the type of policies required to move to the most desirable market state (i.e. high static, high dynamic efficiency). We propose an adaptation of the analytical framework so that it is used as a basis for understanding the impact of different scenarios on dynamic and static efficiencies within the industry – and the implications of these developments for the prosperity and competitiveness of the economy.

For both scenarios, a combination of static and dynamic efficiency states can be analysed. By way of example, a market may be in a "high static, low dynamic" state with very different implications for productivity growth compared to a market in a "low static, high dynamic" state.

Static efficiency is defined as a combination of allocative and productive efficiency, keeping investments and product or process innovation constant, i.e. the ability to get the most out of existing resources and technology. This is a condition in which the short term combined welfare of consumers and producers is maximised with production taking place at the lowest cost. In practical terms it can be interpreted as offering good value for money for consumers while firms achieve normal profits.

Given the practical difficulties associated with measuring static efficiency in economic terms, it can be analysed indirectly through reviewing the level of competition between firms. Under specific conditions, intense competition will lead to static efficiency – it is therefore possible to define these conditions, analyse the extent of competition and approximate the resulting level of static efficiency.

Bennett *et al.* (2001) use the example of five mobile players in situations of both high and low competition intensity and the implications for static efficiency. They suggest that even if five players are the optimal number in the market, they can choose the level at which they compete.

If they compete softly, each can sustain stable market shares and achieve super-normal profits over time – despite their cost differences. Alternatively, the firms can compete aggressively with their market shares varying according to their different cost structures. The implication in this latter case is that the least efficient firm will eventually go bankrupt – however, overall welfare can only be achieved if the bankrupt firm can be easily replaced. This case shows that intense competition alone is not sufficient for improvements in static efficiency, low barriers to entry are also required.

As the measurement of static efficiency within the specified scenarios may be impractical, it can be approximated through an analysis of the nature and intensity of competition and the specific conditions that support it, for example:

- price-cost margin;
- barriers to entry and level of fixed costs; and
- firm concentration/market share variability.

If enough factors indicate it – a market can be regarded as having low or high levels of static efficiency. On a simplistic level – high static efficiency can be interpreted as competition intensity leading to “value for money”.

Dynamic efficiency in a market can be defined as the extent to which total welfare can be maximised over the long term through investment in product and process innovation, i.e. the market’s capacity to stimulate and take advantage of advancing technology. In practical terms it can be interpreted as the level and type of investment in innovation undertaken by firms.

Again, the practical measurement of dynamic efficiency presents methodological challenges and for the purpose of this analysis, proxies can be used as estimates, for example:

- (1) R&D expenditure;
- (2) innovation data, patent data:
  - product and service innovation;
  - process innovation;
- (3) increases in choices available to consumers;
- (4) increase in quality of products and services.

The level of dynamic efficiency in a market can be said to be high over time if the proxies are also high compared to other sectors within the market. On a basic level, investment in innovation can be regarded as the key factor supporting dynamic efficiency.

The results of the analysis can be plotted on an “efficiency states matrix” as shown in Figure 2.

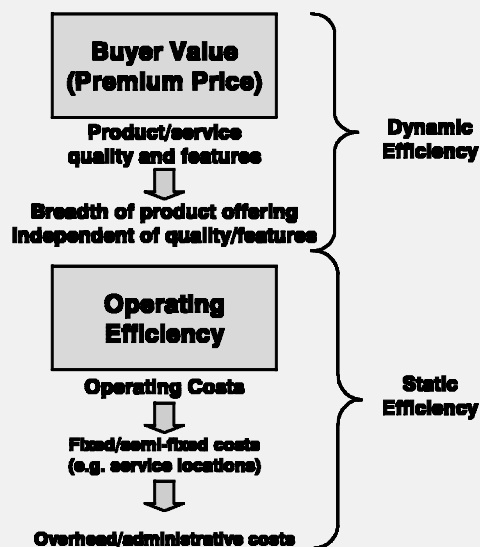
The importance of the contribution of dynamic and static efficiency to productivity at the individual firm level is shown in Porter’s hierarchy of productivity enhancement (Porter, 2001b) (see Figure 3).

Both static and dynamic efficiency contribute to productivity growth, however, dynamic efficiency makes the greatest contribution and therefore carries a greater weight in the analysis. The benefit of dynamic efficiency gains is that they tend to increase the size of the economy, whereas static

**Figure 2 — Efficiency states matrix (1)**

Efficiency States	DYNAMIC EFFICIENCY	
	LOW	HIGH
STATIC EFFICIENCY	LOW	
	HIGH	

**Figure 3 — Porter’s hierarchy of productivity enhancement**



Source: Adapted from Porter (2001b)

efficiency gains lead to more efficient production within the economy.

### Efficiency drivers

When looking at a proposed change in market structure, such as the separation of LoopCo, it is not possible to analyse existing data to measure gains in static and dynamic efficiency. Therefore the proposed framework seeks to understand how the change is likely to affect competitive dynamics and their impact on static and dynamic efficiency. To do so, Porter’s five forces analysis (Porter, 1980) can be employed as a way to encapsulate the impact of the most important drivers on the various scenarios, namely market structure and entry and regulation (including anti-competitive practices and competition policy).

The five forces analysis was developed by Porter in the 1970s/1980s to provide a dynamic and focused structural

analysis of industry, recognising that competition goes beyond the established firms within an industry. The five forces covered in the analysis are inter-firm rivalry, suppliers, customers, substitutes and potential new entrants. Porter does not explicitly allow for regulation as a force affecting the competitiveness of markets. We propose that regulation is included in rivalry amongst competitors as many of the *ex ante* functions of the regulator are a proxy for competition, for example the use of price caps to mimic the normal market effects on costs and prices (Laffont and Tirole, 2000).

The five forces on the fixed access market are shown diagrammatically in Figure 4.

Porter identifies the drivers for each of the five forces as follows:

- (1) Rivalry among existing competitors – concentration, industry growth, fixed costs, intermittent overcapacity, product differences, brand identity, switching costs, informational complexity, diversity of competitors, corporate stakes, exit barriers.
- (2) Threat of new entrants – economies of scale, proprietary product differences, brand identity, switching costs, capital requirements, access to distribution, absolute cost advantages, proprietary learning curve, access to necessary inputs, proprietary low-cost product design, government policy, expected retaliation.
- (3) Threat of substitute products/services – relative price performance of substitutes, switching costs, buyer propensity to substitute.
- (4) Bargaining power of suppliers – differentiation of inputs, switching costs of suppliers and firms in the industry, presence of substitute inputs, supplier concentration, importance of volume to supplier, cost relative to total purchases in the industry, impact of inputs on cost or

differentiation, threat of forward integration relative to threat of backward integration by firms in the industry.

- (5) Bargaining power of buyers – bargaining leverage through buyer concentration vs firm concentration, buyer volume, buyer switching costs relative to firm switching costs, buyer information, ability to integrate backward, substitute products, pull-through, price sensitivity through price/total purchases, product differences, brand identity, impact on quality/performance, buyer profits, decision makers' incentives.

Analysing the impact of the drivers on each of the five forces in the current situation and hypothetical scenarios will provide a basis on which to understand the efficiency state of the market, i.e. the degree to which the market experiences healthy competition leading to improvements in both static and, more importantly, dynamic efficiency.

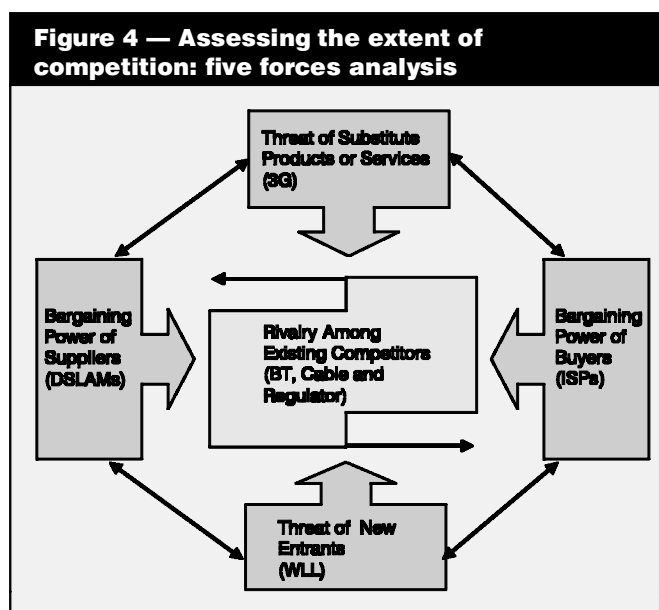
### Mapping the analysis outcome

The following characteristics will lead to a market having both high static and high dynamic efficiency:

- when there is intense, yet profitable, rivalry between firms such that each firm is able to make a reasonable profit from current activity and yet has the expectation of more profit from investment in innovation;
- there is a strong threat from new entrants, providing a strong incentive for current suppliers to maintain their competitive position through the development of new products and features;
- there is a strong threat from substitute products providing the same incentive as new entrants;
- suppliers are not so powerful that they are able to control the industry; and
- customers are powerful, especially having choice based on both price and quality.

Using the five forces analysis, the current situation and outcome of the scenarios for dynamic and static efficiency can be mapped on the matrix shown in Figure 5.

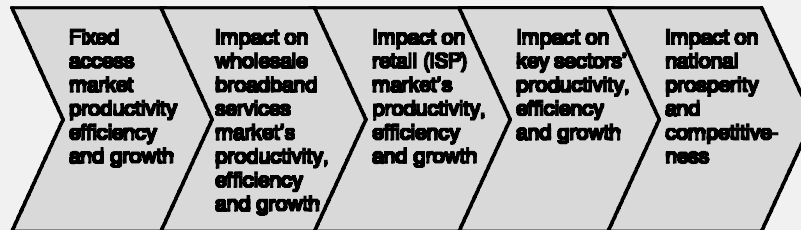
The ideal situation is one in which the market offers value for money for consumers and high levels of investment in



**Figure 5 — Efficiency states matrix (2)**

Efficiency States	DYNAMIC EFFICIENCY		
	LOW	HIGH	
STATIC EFFICIENCY	LOW	Low Value for Money + Low Investment in Innovation	Low Value for Money + High Investment in Innovation
	HIGH	Value for Money + Low Investment in Innovation	Value for Money + High Investment in Innovation

**Figure 6 — The telecoms value chain**



innovation through healthy competition, i.e. high static and high dynamic efficiency states.

The outcome of the analysis using this framework provides an indication of the impact of change on the potential for productivity growth within the fixed access market and, through the ISPs, the potential of the market to support productivity growth within commercial sectors which are heavily dependent on telecommunications. By supporting productivity growth within such sectors, the telecommunications market will directly contribute to improvements in national prosperity thus helping to meet the Lisbon agenda.

### **Innovation in the value chain**

The access market, which would be served by LoopCo, only exists in that customers need to use its assets to access other services, for example ISPs. We should therefore not just be interested in assessing the five forces affecting access, but also the various downstream markets and ultimately end-user economic sectors which are heavily dependent on telecommunications, for example financial services (see Figure 6). Through this sort of analysis, the true benefits of a restructured telecommunications market can be assessed.

The authors have used the analysis framework discussed in this paper to analyse the impact of the structural separation of BT on the UK broadband market and on three key sectors of the economy: pharmaceuticals and biotechnology, financial services and creative industries (Cadman *et al.*, 2002). We conclude that structural separation is, *prima facie*, more likely to increase innovation than intrusive regulation and recommend that a further cost benefit study of structural separation is conducted following a market review. ■

### **Note**

1. Its US parent is now in Chapter 11, giving protection from creditors while restructuring debt.

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