DEPARTMENT OF INDUSTRY

Regulation of British Telecommunications' Profitability

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DEPARTMENT OF INDUSTRY

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Foreword

This study of alternative schemes for regulating British Telecommunications' (BT) profitability was commissioned on 28 October 1982. Its terms of reference were as follows.

Objectives

1. Professor Littlechild shall study and evaluate proposals to regulate BT's profitability, having regard to the objectives set out in Clause 3 of the Telecommunications Bill and to:

(a) preventing the use of a dominant market position to exploit consumers;
(b) encouraging efficient and innovative telecommunication systems;
(c) ensuring the maximization of net proceeds from the sale (on particular regulatory and profit assumptions);
(d) facilitating the successful operation of BT plc as a commercial organisation after flotation,

and bearing in mind that the regulatory arrangements will need to fit into the framework of licensing in the Telecommunications Bill ordered by the House of Commons to be printed on 17th November 1982.

Tasks

2. The study will, taking account of what is practicable in the light of planned accounting arrangements at BT which the Board is determined should be to the standards appropriate for a major private sector company and the difficulties inherent in measuring efficiency and innovation:

(a) prepare a practicable scheme for an output related profits levy applicable to those licensable activities in which BT is likely to have a strong actual or potential monopoly position;
(b) evaluate the strengths and weaknesses of an output related profits levy and of the controls on BT's profitability proposed by the Inter-Departmental Working Group;
(c) consider relevant variants of the schemes evaluated in (a) and (b) above and make recommendations as appropriate

in each case taking account of the fact that some but not all of BT's commercial activities will be regulated.

Implementation

3. Consideration of an output levy should start from proposals outlined by Professor Walters whose comments on more detailed suggestions should be sought.

4. Amendments to the Telecommunications Bill can be introduced in committee, but it will not be possible to extend the scope of the licensing provisions in Clauses 5 and 7 of the Bill to cover other than the running of public telecommunication systems.

5. The work outlined in sub-paragraph 2(a) shall be completed by the end of November 1982 and a draft report on the entire study should be available by 17th December. A final report reflecting discussion with all interested parties including HM Treasury, BT and financial advisers shall be available by 14th January 1983 at the latest.

In preparing this Report, I have benefited from discussions with a large number of people, especially at DoI, HM Treasury, CPRS, Prime Minister's Office, BT, Kleinwort Benson and Warburgs. None of them is responsible for the analysis or conclusions herein. It will be appreciated that pressure of time made it impossible to follow up all their suggestions as thoroughly as one would have liked, but it seems unlikely that the main conclusion of the Report would have been changed if more time had been available.

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1. Executive summary

1.1 Alternative schemes have been proposed for regulating British Telecommunications' (BT) profitability. The task of the present study was:

(a) to prepare a practicable scheme for the Output-Related Profits Levy (ORPL) suggested by Professor Walters,
(b) to evaluate the ORPL and the Maximum Rate of Return (MRR) scheme proposed by the Inter-Departmental Working Group, and
(c) to consider possible variants and make recommendations as appropriate.

1.2 The principal conclusions are as follows.

(1) The ORPL and MRR schemes both have merits but also serious disadvantages. Neither can be recommended.
(2) A Profit Ceiling scheme would overcome some of these dis-advantages but would not provide adequate protection against BT's monopoly power.
(3) A Local Tariff Reduction scheme is recommended as the best way to achieve the desired ends.
(4) It would not be desirable to superimpose a profit ceiling on such a Local Tariff Reduction scheme.
(5) The success of any form of regulation depends upon increasing competition. There are further significant possibilities for encouraging competition in telecommunications.

1.3 Section 2 describes the background to this study. Professor Walters pointed out the objections to the original proposal to impose a maximum rate of return on BT, and proposed an alternative scheme for taxing BT at a lower rate if it increased its output above an agreed norm. The Inter-Departmental Working Group recommended a revised maximum rate of return scheme, involving customer rebates and a degree of flexibility in the maximum return. As just noted, this study was commissioned to evaluate these two schemes and to consider possible variants.

1.4 Section 3 summarises the salient features of the current Telecommunications Bill.

1.5 Section 4 sets out the conditions for effective regulation.

(a) The main purpose of regulation is to protect domestic and small business subscribers against BT's dominant market position. Improving efficiency is a means to that end. Prevention of excessive profits to shareholders is *not* a relevant consideration, since expected profits will be reflected in the price of BT's shares at flotation, so shareholders will not earn an excessive return on their investment.
(b) Competition is by far the most effective means of protection against monopoly. Vigilance against anti-competitive practices is also important. Profit regulation is merely a 'stop-gap' until sufficient competition develops.
(c) There is always a danger that regulatory authorities will be 'captured' by incumbent suppliers and influenced against allowing new entry. A non-discretionary scheme is less vulnerable in this respect. US experience in airlines and telecommunications shows how over-zealous regulation has restricted competition, to the detriment of consumers.

1.6 Section 5 sets out five criteria for evaluating the various profit regulation schemes: (1) Protection against Monopoly, (2) Efficiency and Innovation, (3) Burden of Regulation, (4) Promotion of Competition, (5) Proceeds (of flotation) and Prospects (for BT).

1.7 Section 6 examines the consequences of not imposing any explicit constraints on profits (beyond the provision in the Bill for a sufficient return on capital and references to the Monopolies and Mergers Commission (MMC). This would not seem to provide adequate protection against monopoly in the short-term, but would score highly on all other criteria.

1.8 Sections 7 and 8 set out and evaluate the Working Group's MRR scheme. It would be perceived as providing protection against monopoly, and BT's prospects would be safe but dull. However, there are disincentives to efficiency and innovation, the burden of regulation would be heavy, and new entry could be prejudiced.

1.9 Sections 9 and 10 set out and evaluate the Output Related Profits Levy. It provides a positive incentive for BT to increase output and reduce prices. The incentives to efficiency are not impaired. However, the precise effects on prices are uncertain, competitors may be disadvantaged, a levy could

prejudice investment and innovation, and the burden of operating the scheme could be greater than is immediately apparent. The novelty of the scheme would mean lower proceeds on sale or delaying privatisation.

1.10 Section 11 is an interim comparative evaluation of the two schemes plus the 'no explicit constraints' scheme. It is difficult to rank the MRR and ORPL schemes overall. However, with respect to all criteria except protection against monopoly, both schemes are significantly worse than the absence of constraints. Moreover, it is not certain that either MRR or ORPL provides an adequate protection in the longer run. In both cases, the 'cure' seems to be worse than the 'disease'.

1.11 Section 12 analyses a Profit Ceiling scheme. This would constrain unacceptably high total profits, but would not focus precisely upon the monopoly services of greatest concern. Provided the ceiling were set sufficiently high, there would be no significant disadvantages on the other criteria. However, a low ceiling would involve many of the serious defects of traditional rate of return regulation.

1.12 Section 13 explores a Local Tariff Reduction scheme, by which BT would be required to set tariffs such that a Local Tariff Index increased by less than retail prices in general (the RPI – X per cent formula). This index would comprise rentals and prices of local calls (including call-boxes). BT's licence would contain conditions to prevent anti-competitive price discrimination. The scheme would focus precisely upon the domestic and small business subscribers whom it is desired to protect. The scheme scores highly on all criteria.

1.13 Section 14 contains a final evaluation of all the schemes examined; as reflected in the accompanying table of rankings. MRR and ORPL are ranked lowest on most critera. 'No explicit constraints' ranks first on four criteria but last on protection against monopoly. A Profit Ceiling ranks between 'no explicit constraints' and the two earlier schemes. Local Tariff Reduction scores highly on all criteria. It is significantly better than all other schemes with respect to protection against monopoly, and roughly as good as 'no explicit constraints' with respect to the other criteria. Local Tariff reduction is clearly the recommended scheme.

1.14 Superimposing a high profit ceiling on the local tariff reduction scheme is not recommended: a high ceiling would be unnecessary, and a low ceiling would introduce the undesirable burdens and disincentives of traditional regulation.

1.15 Section 14 also includes recommendations for measures to strengthen the effectiveness of regulation. These concern the 'sufficient return on capital' obligation in Clause 3, the provision of public subsidy for uneconomic services, and the criteria to be used by the MMC in modifying licences. Several possibilities for stimulating competition are discussed. Most important, it is recommended that new entry be encouraged by requiring unrestricted resale of BT circuits for voice, and negotiating access to international switching by Mercury and other potential competitors.

1.16 Appendix 1 develops a theoretical model of a profit-maximising firm subject to an output-related profits levy. Appendix 2 discusses the advantages and difficulties of constructing a practicable scheme for such a levy.

Final Ranking of Schemes for Regulating BT's Profitability

	No Explicit Constraints	Working Group MRR	ORPL	Profit Ceiling	Local Tariff Reduction
Protection against Monopoly	5	3	2	4	1
Efficiency and Innovation	1=	4=	4=	3	1=
Burden of Regulation	1	5	4	3	2
Promotion of Competition	1	5	4	2=	2=
Proceeds and Prospects	1=	4	5	3	1=

2. Background to this study

2.1 The Government has announced its intention to convert BT into a public limited company and to sell 51 per cent of its shares following the next General Election. BT currently holds a dominant market position in many areas of telecommunications, and it was widely believed that this would continue to be the case for many of its services even after liberalisation of entry. The question therefore arose as to whether and how the exercise of BT's market power should be controlled. A committee of officials proposed a maximum rate of return for BT as a whole.

2.2 Professor Walters expressed concern that a maximum rate of return had many of the characteristics of a 100 per cent tax rate. It would have undesirable consequences for cost control and enterprise. Research on rate of return regulation in the USA had shown that it resulted in waste of investment and a costly bureaucracy. Professor Walters proposed as an alternative an output-related profits levy. The greater the expansion in output over the year, the lower the rate at which the levy on profits would be charged. This would encourage BT to expand output and lower prices, rather than restrict output and raise prices.

2.3 An Inter-Departmental Working Group convened by DoI economists examined these and other options. It was unable to recommend the output-related profits levy, but accepted many of the criticisms of rate of return control expressed by Professor Walters and tried where possible to mitigate the adverse consequences. The Working Group recommended that an overall rate of return on capital employed should be determined for those of BT's activities which are subject to licence. If BT exceeded the maximum, more than half the excess (but less than 100 per cent) should be rebated to consumers. To prevent a recurrence, the Director General of Telecommunications (DGT) should have power to limit the general level of tariffs in any regulated activity where excess profits were made. The DGT would also have power to vary the rate of return by up to 10 per cent in return for improved performance.

2.4 After some debate on the merits of the two schemes, it was agreed to commission the present study.

3. The Telecommunications Bill

3.1 In order to understand the context in which various schemes of profit regulation are being proposed, it will be helpful to provide a brief summary of the salient points of the Telecommunications Bill ordered to be printed 17 November 1982. At the time of writing, this Bill is just beginning the 'Committee Stage' between the second and third reading.

3.2 The purpose of the Bill, according to its Long Title is:

> 'To provide for the appointment of a Director General of Telecommunications and to confer functions on the Director General so appointed; to abolish the exclusive privilege with respect to telecommunications conferred on British Telecommunications by section 12 of the British Telecommunications Act 1981 and to make new provision with respect to the provision of telecommunication services; to make provision, in substitution for the Telegraph Acts 1863 to 1916, for the matters there dealt with and related matters; to provide for the vesting of all property, rights and liabilities of British Telecommunications in a company nominated by the Secretary of State and the subsequent dissolution of British Telecommunications; to make provision with respect to the finances of that company; to amend the Wireless Telegraphy Acts 1949 to 1967 and to make further provision for facilitating enforcement of those Acts; and for connected purposes.'

3.3 Clause 1 empowers the Secretary of State to appoint the DGT, who in turn may appoint the staff of the Office of Telecommunications (OFTEL). It is expected that the staff of OFTEL will number about 50.

3.4 Clause 2 abolishes BT's exclusive privilege to run telecommunications systems.

3.5 Clause 3 provides guidelines for the Secretary of State and DGT, the first part of which may usefully be reproduced in full.

> '(1) In exercising the functions assigned to them by this Part the Secretary of State and the Director shall take into account all matters which appear to them in the particular circumstances to be relevant and, among other things, shall have regard to—
>
> (a) the need to secure so far as practicable the provision throughout the United Kingdom of such telecommunication services as satisfy all reasonable demands for them including, in particular, public call box services, emergency services and services in rural areas;
>
> (b) the need for persons supplying telecommunication services to achieve a return on capital employed sufficient to enable them to finance the supply of such services as are mentioned in paragraph (a) above and the development and use of new techniques;
>
> (c) the desirability of promoting the interests of consumers, purchasers and other uses of telecommunication services and telecommunication apparatus in the United Kingdom in respect of the prices charged for them and in respect of their quality and the variety of services and apparatus supplied;
>
> (d) the desirability of maintaining and promoting effective competition between persons supplying telecommunication services or telecommunication apparatus in the United Kingdom; and
>
> (e) the desirability of maintaining and promoting competitive activity in markets outside the United Kingdom on the part of persons supplying telecommunication services, and persons producing and supplying telecommunication apparatus, in the United Kingdom.'

3.6 Clauses 4 to 7 require all operators of telecommunication systems (with certain exceptions) to be licensed. A licence may be granted by the Secretary of State after consultation with the DGT, or by the DGT with the consent of the Secretary of State.

3.7 Clause 8 makes provision for such licences to include certain conditions, including payment of fees, and obligations to provide services.

3.8 Clause 10 empowers the DGT to modify the licence conditions after making public his intentions and if the licensees concerned do not object. Clause 11 empowers the DGT to refer the question whether licences should be amended to the Monopolies and Mergers Commission (MMC) to which up to 3

additional members may be appointed by the Secretary of State for the purpose of considering such references.

3.9 Clause 12 requires the MMC to report on the matters referred to them and Clause 13 obliges the DGT to modify licence conditions to remedy any adverse effects identified by the MMC.

3.10 Clause 15 enables the DGT, after giving notice to the person concerned, to issue orders to secure compliance with the conditions of licences and Clause 16 allows the person concerned to question the validity of the DGT's orders in the courts.

3.11 Clause 22 empowers the Secretary of State to designate systems whose licences oblige the licensee to provide services as public telecommunication systems. Clauses 26 to 28 provide for compulsory purchase of land by public telecommunication operators for such systems. Clause 42 empowers local authorities to pay subsidies to public telecommunication operators for the provision or maintenance of telecommunication facilities (e.g. public call offices) which benefit their area.

3.12 Clause 44 places further duties on the DGT to monitor and collect information on telecommunications and to provide advice and information to the Secretary of State or the Director General of Fair Trading.

3.13 Clause 48 enables the DGT to exercise certain functions relating to telecommunications which are at present the responsibility of the Director General of Fair Trading, notably with respect to monopoly situations and anti-competitive practices.

3.14 Clause 49 provides for the Secretary of State to give general directions indicating (a) considerations to which the DGT should have particular regard in determining the order of priority in which matters are brought under review, and (b) considerations to which he should have particular regard in determining whether to exercise his functions. Such directions shall be published unless disclosure is against the commercial interests of any person.

3.15 Clause 50 gives the DGT powers to seek information and Clause 51 requires the DGT to report annually to the Secretary of State and for his reports to be laid before Parliament.

3.16 It is estimated that the costs of the DGT and his staff, plus the additional costs of the MMC and the Secretary of State, will be about £1.5 million a year. There will also be income from licence fees which will be set to cover the cost of issuing, monitoring and amending licences (at present estimated at £1 million). The total net expenditure on the regulatory arrangements is estimated at £0.5 million a year.

4. The conditions for effective regulation

4.1 Various reasons have been put forward for the current policy of liberalisation and privatisation in telecommunications. In moving the second reading of the Telecommunications Bill, Mr. Jenkin said that for BT to become a major force in the world telecommunications market, as he wanted, it needed the financial freedom which a nationalised industry did not and never could have. The Bill ends the situation in which BT licensed its competitors and gives licensing power to the Secretary of State. Elsewhere, hopes have been expressed that new competitors, and even the threat of entry, will induce greater efficiency on the part of BT, reduce prices, make available a wider range of products and services to consumers, stimulate innovation, and so on.

4.2 At the same time, Mr. Jenkin argued that telecommunications could not be a free-for-all, and the Government's approach had been coloured by the inevitable market dominance of BT for many years ahead. This view is reflected in the new regulatory system described in Section 3 above, and also in the search for a suitable scheme of profit control to be embodied in the licence issued to BT.

4.3 This section is concerned with the conditions for effective regulation. It explores in more detail (a) the main purpose which regulation is intended to achieve, (b) the means available for achieving this purpose and the contribution which a profit control scheme for BT can make, and (c) the problems which regulation and control themselves induce.

(a) *Purposes of regulation*

4.4 The Government's policy of liberalisation means that BT will no longer enjoy its exclusive privilege in any part of its business except switched international services. There will be competition in the running of public systems (from Mercury and the cellular radio companies), in the supply of services (from these two sources and suppliers of value-added network services (VANS), and in the supply of apparatus. Competitive pressures will initially be strongest in the field of VANS and apparatus. Competition may also build up fairly quickly in the supply of telecommunication services, especially in large cities. Nevertheless, for some time to come, BT may be expected to dominate the supply of telephone services to domestic and small business subscribers, especially those not in major cities. International services are also an area of significant monopoly power, but it would appear that most concern is felt for domestic and small business subscribers.

4.5 In those sectors which BT continues to dominate, where competition cannot be relied upon to exercise effective control, it is widely feared that BT will have the ability to earn monopoly profits, tolerate inefficiencies and use its monopoly power to prevent, restrict or distort competition, both in the market sectors it dominates and in other areas. For example, it is felt that BT would have the ability to earn excessive profits by overcharging domestic subscribers; it would then have a discretionary fund which it could use either to pay excessive dividends to shareholders and excessive wages to its workforce, or to engage in selective price-cutting of trunk services or extension telephones, thereby under-cutting its competitors and driving them out of business. BT could also use its market power to engage in other anti-competitive practices, such as requiring anyone who wanted to rent an exchange line to purchase from BT all the apparatus connected to that line, even though BT's prices might be higher than those of its competitors, or offering 'loyalty discounts' for not dealing with competitors such as Mercury.

4.6 From the point of view of public policy, the primary purpose of regulation is to protect the consumer. This primary purpose should be distinguished from the secondary purposes. Inefficiency and high costs, and the ability to earn excess profits and pay high wages, are of significance insofar as they lead to higher prices for the consumer. The consumer's prime concern is with the range and quality of the goods and services he is offered, and the terms on which these goods and services are offered, rather than with the reasons lying behind it all. The means should not be confused with the ends: regulation considers bringing pressure to bear on profits, wages, costs and efficiency as a means of reducing prices and improving other aspects of performance. Similarly, constraints are imposed on certain forms of market conduct, not in order to penalise BT or favour its rivals, but as a means of fostering competitive market forces which, in turn, are expected to protect the consumer and provide telecommunication services on ever-improving terms.

4.7 One misconception should be dealt with here, concerning 'excess profits' and the payment of 'excessive dividends' to shareholders. Regulation of profits is frequently advocated, not on the grounds that prices or costs are too high, but because the owners of a company are 'making too much money'. The profits are thought to be 'undeserved', and the owners 'undeserving'. But when a company's shares are first traded on the Stock Exchange, the share price adjusts to reflect the market's expectations about future profits, dividends and growth. New investors do *not* enjoy any 'excess' profits; they earn no higher return on their investment than could be earned on comparable shares elsewhere in the market.

4.8 In the case of BT, the share price established in the stock market upon flotation will reflect the market's expectations about BT's performance *and* about the regulatory environment in which it will operate. The share price will be higher or lower, depending on whether regulation is expected to be light or severe. But anticipated severity of regulation will not reduce the return to the shareholders of BT. It *will* reduce the wealth of the present owners of BT, *viz.* the taxpayers of this country. Conversely, regulation 'with a light rein' will *not* generate abnormally high returns on shareholders' investments, though it *will* increase the proceeds of flotation, which may be used to reduce taxes or borrowing, or to finance desired investments elsewhere.

4.9 On the other hand, *unanticipated* changes in regulation will generate windfall gains and losses. Thus, shareholders will gain if a harsh regulatory regime is relaxed after flotation, though they would not have gained if a relaxed regime were instituted from the outset. For this reason, it may be politically difficult to relax a harsh regime, even when changes in circumstances justify it.

4.10 There is an important consequence for the cost of capital. If BT is perceived as a growth stock, its shares will stand at a higher price. The cost to BT of raising additional capital will thereby be reduced. If, on the other hand, BT is perceived as a reliable utility but one which is unlikely to grow, or likely to be constrained, then its shares will stand at a lower price. Raising additional capital will be more costly. Thus, the regulatory climate does not determine investors' returns, but it does affect BT's cost of capital and, ultimately, the costs of providing telecommunication services in Britain.

(b) *The Means of Achieving this Purpose*

4.11 Competition is indisputably the most effective means — perhaps ultimately the *only* effective means — of protecting consumers against monopoly power. Regulation is essentially a means of preventing the worst excesses of monopoly; it is not a substitute for competition. It is a means of 'holding the fort' until competition arrives. Consequently, the main focus of attention has to be on securing the most promising conditions for competition to emerge, and protecting competition from abuse. It is important to ensure that regulation in general, and the profit control scheme for BT in particular, do not prejudice the achievement of this overall strategy.

4.12 The willingness of competitors to enter the UK telecommunications market depends in part upon technological and market conditions, but it also depends upon government policy with respect to entry. Put another way, control of BT's monopoly power does not depend solely upon the terms of BT's licence, but depends crucially upon the policy with respect to the granting of licences to others. The policy of the present government is to encourage competition. It must be acknowledged that certain decisions will have the effect of limiting competition for BT (and Mercury) — that Mercury should be the only other public telephone system for the time being, that there should be only one other mobile radio telephone company in addition to the consortium of which BT is a member, that switching of interactive services between cable TV networks should be done by BT or Mercury.

4.13 There is still scope for further competition, however. Mercury would like to obtain unrestricted access to US networks through an arrangement with a US-based carrier such as MCI. This could probably be negotiated, and perhaps similar arrangements could be made with a few other countries too. Within the UK, there is immediate scope for further competition from unrestricted resale of private circuits for voice telephony, which is at present forbidden. We return to these possibilities later. The point to establish here is that it *is* possible to introduce further competition as a means of limiting BT's monopoly power, and that licensing new entry is likely to be more effective than imposing profit regulations within BT's licence. As Mr. Jenkin pointed out in his speech, the more competition there is, the less need there would be for regulation.

4.14 The protection of emerging competition will require a vigilant policy with respect to anti-competitive practices (such as price discrimination, predatory pricing, tie-in sales, loyalty discounts, etc.). BT's rivals and consumers are all vulnerable to its dominant position. Present legislation already provides for the MMC to investigate whether anti-competitive practices are against the public interest. Given BT's abnormally dominant position it would be possible and desirable to include provisions in the licence to provide additional protection e.g. by explicitly prohibiting price discrimination or requiring publication of prices.

4.15 Turning now to the possibility of a profit regulation scheme embodied in BT's licence, the body

of this Report examines and evaluates several schemes put forward. They variously focus on profits, efficiency, performance, output, prices and so on. Only one general point will be made at this stage. As far as possible, the scheme should focus on the precise area of concern. That is, it should focus on the price and quality of service provided to domestic and small business subscribers, especially those not in major cities. Clause 3 of the Bill refers explicitly to securing the provision of public call box services, emergency services and services in rural areas. It is here assumed that BT's licence will include explicit conditions to this effect, but we shall need to consider the prices charged for these services and the possibility of explicit subsidy.

(c) *Effects of Regulation*

4.16 It is obviously important to evaluate the alternative schemes for controlling BT in the light of the way they will *actually* work, rather than the way one might *like* them to work. That is, it is necessary to look beyond the formal provisions of each scheme to ask whether there would be any unintended adverse consequences, which may well have effect over the longer run rather than immediately.

4.17 Consider how regulation in general, and any profit control scheme in particular, will be implemented. Clause 3 of the Bill (paragraph 3.5 above) sets out five formal guidelines for the Secretary of State and the DGT (and the MMC). But how are these guidelines to be interpreted? How are conflicts between the different objectives to be resolved (e.g. between sufficient rate of return on capital and consumers' interests with respect to price)? Both the Secretary of State and the DGT will be subject to conflicting pressures from BT itself; from its competitors, suppliers, employees and customers (both present and potential); and from the general public, MP's and 'the media'. It seems likely that the Secretary of State and the DGT, having different decisions to take and having different conditions of accountability, will attach different weights to each kind of pressure and hence arrive at different interpretations of the public interest. The MMC is in yet a different position.

4.18 BT and other incumbent suppliers will attempt to secure maximum advantage from regulation. Firstly, with respect to the DGT's decisions, they may find it commercially advantageous to modify their policies with respect to pricing, output, investment, accounting, finance, innovation, etc. Constraints on prices or profits, or the imposition of taxes, may lead them to choose different technology, to contract or expand particular services, and so on. Secondly, these firms will wish to influence the judgements and decisions made by the DGT, e.g. with respect to profit and cost forecasts, the implementation of profit controls, and subsequent modifications to the licence. Thirdly, incumbent firms will try to influence the decisions of the Secretary of State against licensing new independent entry. Finally, they will argue for maintaining, modifying or abolishing the whole regulatory framework embodied in the Telecommunications Bill, depending upon whether they feel that, on balance, it protects them from competition or unduly constrains their growth.

4.19 It is impossible to predict precisely how each alternative profit control scheme would work. However, it seems plausible that the more discretion for the DGT which the scheme allows or requires, the more the DGT will need to rely on industry sources for information and advice (if his decisions are not to appear unreasonable), hence the more weight is likely to be attached to incumbent suppliers rather than to new entrants — in short, the more likely the DGT is to be 'captured' by the industry he is supposed to be regulating. Broadly speaking, then, a discretionary scheme is likely to favour BT (including its employees) at the expense of competition and consumers.

4.20 It is most important to take account of the effects of regulation on potential as well as existing suppliers. High prices and profits, poor performance, inefficiency, excessive wages — all these represent inducements for more efficient competitors to enter. Controls on profits, prices and performance, insofar as they are effective, diminish these inducements. Thus, against any short-term benefits to consumers of a profit-control scheme must be set the longer-term disadvantages of a reduction in the degree of competition.

4.21 Alternative profit control schemes must be examined, not in isolation, but in the context of the other means available for dealing with the problem of monopoly power. In particular, it is important to consider how the scheme will affect both the incentives of new competitors to enter and the response of regulatory authorities (Secretary of State, DGT and MMC) to such applications for entry. One must attempt to minimise the danger that a scheme for controlling profit will prejudice the future development of competition, which as noted earlier is the most effective means of tackling the monopoly problem.

4.22 US experience of regulation is not encouraging, and suggests that regulation should not be too ambitious. Profit can stem from superior performance, monopoly power or sheer good luck. An effective public policy needs to distinguish between these sources, so as to discourage the exploitation of monopoly without discouraging efficiency and innovation. In the USA, regulators have been given ample powers to extract and analyse information, and considerable discretion in approving tariff structures and rates of return. The end-result

has not been a reduction in monopoly power — in general, quite the opposite has happened. At the same time, investment has been distorted and efficiency and innovation discouraged. Pressures have recently mounted to relax or abandon regulation, notably in airlines and telecommunications. Where further competition has been allowed to replace regulation, the result has invariably been lower prices and the introduction of new and improved services.

5. Criteria for evaluating alternative profit regulation schemes

5.1 The criteria to be used in evaluating the alternative regulatory schemes are the five objectives set out in Clause 3 of the Telecommunications Bill (see paragraph 3.5 above) together with the four additional objectives specified in the terms of reference. For ease of analysis it will be convenient to group these nine objectives under the following five headings, of which the first has been identified as the prime purpose of regulation.

(1) *Protection against Monopoly*
This includes preventing the use of a dominant market position to exploit consumers, particularly with respect to prices, quality, quantity and variety of services and apparatus supplied.

(2) *Efficiency and Innovation*
This includes encouraging efficient and innovative telephone systems. Efficiency includes the effective utilisation of manpower, capital and other resources; and the extent, timing and location of investment. Innovation includes the ability to earn a sufficient return on capital to finance the development and use of new techniques.

(3) *Burden of Regulation*
This includes the extent and nature of the information required to implement the regulatory scheme, the feasiblity and costs of obtaining it, the number of areas of debate or conflict concerning the implementation of regulation, and the extent of discretion involved.

(4) *Promotion of Competition*
This includes the desirability of promoting and maintaining effective competion in the UK and promoting competitive activity in the UK by UK suppliers. It also includes the danger of 'capture' by incumbent suppliers, issues of equity and efficiency *vis à vis* BT and its competitors, possible interactions between the regulatory scheme and the licensing of new entry, and the ease with which regulation can be phased out (without disturbing competition) as and when circumstances permit.

(5) *Proceeds and Prospects*
This includes ensuring the maximisation of net proceeds from sale and facilitating the successful operation of BT plc as a commercial organisation after flotation. It also includes the perceived complexity or unfamiliarity of regulatory arrangements, the ease with which regulation can be phased in, the predictability of regulation, and the prospects for the longer-term evolution of the regulatory scheme.

5.2 It is assumed that BT's licence will require it to satisfy all reasonable demands for public call box services, emergency services and services in rural areas, as specified in Clause 3 of the Bill. Hence these considerations are not dealt with explicitly in comparing alternative regulatory schemes, but reference is later made to the pricing and financing of these services.

5.3 It is perhaps worth noting that the comparisons to be made in this Report are between alternative regulatory schemes, not between regulation and nationalisation. At the time when a choice had to be made whether or not to privatise BT, it was certainly relevant to compare BT's expected performance as a nationalised industry with BT's expected performance as a private industry subject to some form of regulation. For example, it would have been relevant to ask whether regulation would dampen a privatised BT's pursuit of efficiency to the extent that efficiency would be no higher than under nationalisation. But the decision on privatisation has now been made, and the comparison with nationalisation is irrelevant to the choices to be made in the immediate future. The relevant question now is whether a privatised BT is likely to be more efficient operating under regulatory scheme A or B, regardless of how either outcome compares to the outcome under nationalisation.

5.4. The five criteria are to be used to evaluate the various alternative schemes that have been put forward for regulating BT's profitability. These schemes would be written into the terms of BT's licence. All the schemes operate within the regulatory framework set out in the Telecommunications Bill summarised in section 3 above. It is assumed that BT will be privatised after the passage of the Bill, though this may take time. It is also assumed that government policy will encourage competition, though this may take time to develop. Nevertheless, the conclusions of the analysis seem robust to these two assumptions: a different scheme would not be

recommended if either privatisation or further competition were delayed.

5.5 The analysis of the Working Group's Maximum Rate of Return scheme is considerably longer than the analysis of other schemes. This happens to be the most convenient place to introduce most of the arguments, and it would be tedious to repeat essentially the same analysis wherever it applied. For brevity, reference is made back to the original argument. Consequently, the length of treatment is by no means an indicator of the deficiencies of any scheme.

6. The consequences of no explicit constraints on profits

6.1 The suggestion has sometimes been made that BT's licence should contain no explicit constraints on profits, prices or rates of return. This does not mean the abandonment of regulation. The licensing framework embodied in the Telecommunications Bill would still be in effect. The DGT would have the duty under Clause 3 to ensure that BT earned a sufficient rate of return to finance the provision of services and development of new techniques. He would also be able to make references to the MMC — for example, in the event that prices seemed to exploit monopoly power, or achieved profits seemed undesirably high, or there were evidence of anti-competitive practices. The MMC could then propose a variety of remedies, including modification of the licence. But there would be no explicit profit constraints specified in the initial licence.

6.2 One argument for this approach stresses the increasingly competitive environment in which BT will operate, the heavy burden of regulation, the advantage of comparability with other large firms, and the undesirability of prejudging the extent of BT's monopoly power and subsequent conduct. An alternative argument emphasises the need to promote competition and the danger that profit regulation will distort investment decisions and restrict entry.

6.3 It will be useful to evaluate this 'No Explicit Constraints' proposal against the five criteria established in the previous section, partly because it is a practicable option with a measure of support, and partly because it constitutes a benchmark against which to evaluate other schemes intended to improve upon it.

(a) *Protection against Monopoly*

6.4 What kind of pricing policy would a privatised BT adopt in the absence of explicit constraints? Presumably the interests of its shareholders will be an important objective — measured, perhaps, by the stock market value of the company. A commercial yardstick will be applied, and no doubt present policies will be re-examined and modified accordingly.

6.5 A large number of empirical studies conducted by BT suggests that UK demand for telephone calls is price inelastic. Current elasticity estimates range from 0.1 for local calls to 0.84 for cheap rate calls to the USA. The demand for rental seems also to be inelastic.

6.6 One scenario for the future is that BT would aggressively seek profit by increasing prices for each service until demands became elastic. In this case, BT's dominant position would indeed be exploited. However, there are a number of reasons why this scenario is implausible.

6.7 First, even if the demand for telecommunications as a whole remains inelastic, liberalisation and new entry could substantially increase the elasticity of demand for BT's own services. As noted in paragraph 4.13 this could well be the case for apparatus, trunk calls on major routes, private circuits, and even local calls between businesses in large cities. BT would still set its prices where its own demands were elastic, but the resulting prices need not be significantly higher than at present, and could be lower.

6.8 Second, it is not clear how far it would be commercially advantageous for BT to raise rentals. Some 'rebalancing' of tariffs would undoubtedly take place. But low rentals also serve to increase the size and attractiveness of the network, thereby increasing profit from calls. It is necessary to consider the total price of telephone service.

6.9 Third, BT may fear the threat of renationalisation if it 'oversteps the mark', or more likely the threat of referral to the MMC. How significant is this latter threat? BT will certainly wish to avoid the imposition of rebates, price control, divestment of parts of its business, or profit regulation, all of which are reasonably within the MMC's power to recommend under the Fair Trading Act.

6.10 BT's subscribers and customers, for their part, might feel the protection is not particularly adequate. Consider the hurdles which have to be overcome before an effective remedy is secured. The DGT may not wish to refer; he may need to take time accumulating evidence; the MMC investigation may be prolonged; the MMC may conclude that prices charged are not against the public interest; proposed remedies may not appear to alleviate the problem; the Secretary of State or the DGT may be reluctant to enforce the proposed remedies; there may be delay in enforcement; BT may not be deterred from acting similarly in future, and so on. On this view, BT may have very little to lose from exploiting its monopoly power.

6.11 There is merit in both points of view. It seems unlikely that BT will risk alienating public opinion in the immediate future. On the other hand, experience suggests that the MMC is not a particularly swift or effective mechanism for combating the market power of a dominant supplier, although a more streamlined scheme could be designed with a clear understanding as to the specific conditions under which the DGT could make a reference. For the immediate future, as noted earlier, BT's market power does seem particularly acute in the case of rentals and local calls.

(b) *Efficiency and Innovation*

6.12 As a commercial organisation, BT may be expected to seek efficiency in the use of manpower and other resources. This may take some time to achieve, however: it is not so long since the telephone system was run as a department of the Civil Service. BT is so large and dominant that it will not be subject to all the normal stock market pressures, such as the threat of takeover. Despite this, the drive to maintain sales and market share in the face of increasing competition should ensure a continuing improvement in efficiency.

6.13 In the absence of special taxes or controls on prices and profits, and again with the threat of future competition in a rapidly developing industry, the incentive to innovate should be as strong as in any other large commercial organisation and the requisite finance should be available.

(c) *Burden of Regulation*

6.14 The DGT will need to monitor the situation to decide whether and when a reference to the MMC might be called for. In the event of a reference, BT will need to provide substantial information: the burden of this is not negligible but has generally not been found unacceptable. Apart from this, it is conceivable that BT's annual accounts, coupled with the policy of 'keeping eyes and ears open' and investigation of complaints, would be sufficient for purposes of monitoring. The DGT will need to exercise discretion whether to make a reference, but thereafter responsibility is out of his hands.

(d) *Promotion of Competition*

6.15 Since the DGT's involvement is minimal, so too is the likelihood of capture. There is an obligation in the Bill to ensure that BT earns a sufficient rate of return, which implies a degree of protection, but otherwise the DGT will be free to monitor and discipline possible predatory pricing on BT's part and to recommend new entry. The problem of phasing out obsolete regulation does not arise.

(e) *Proceeds and Prospects*

6.16 BT would still enjoy a degree of regulatory protection; apart from this, its future prospects would be largely in its own hands. There would not be additional discretion which a politically appointed DGT could exercise against BT. Phasing in of regulation would present no problem beyond that of privatisation itself. Though its verdicts on mergers are unpredictable, and we do not yet know what line it would take on BT's licence modifications, nonetheless the MMC is regarded by the City and investors as a reasonably known quantity. However, there will be a question in investor's minds as to whether the government might demand a much more severe regulatory regime and this uncertainty will conceivably influence the proceeds of flotation. Nevertheless, this factor seems relatively insignificant compared to some of the other schemes discussed later.

6.17 To summarise, there would be a number of significant advantages in imposing no explicit constraints on BT's profits. Efficiency and innovation would not be discouraged, the burden of regulation would be negligible, and BT's prospects would be good. The regulatory framework does impose limitations on the development of competition, but the absence of explicit constraints minimises the danger of 'capture'. Competition can probably be relied upon to provide protection for consumers over an increasing range of services. Nevertheless, it may be felt that, in the first few years of privatisation, there is inadequate protection for domestic and small business subscribers. The task is to find a scheme which provides this protection without excessive sacrifices on the other criteria.

7. The Working Group's maximum rate of return scheme

7.1 In its report on rate of return regulation in telecommunications, the Working Group noted that the policy of liberalisation would increasingly expose BT's network services and the attachments area to competition. Nevertheless, BT would retain a monopoly in substantial areas of the business. Some control over profits seemed necessary in order to prevent excessive returns on investment and discriminatory pricing through cross-subsidisation. The Group recognised the various criticisms that could be levelled against maximum rate of return schemes, and they wished to overcome these as far as possible by limiting the scope of regulation to those areas where BT had market power, and introducing flexibility into the operation of the maximum.

7.2 The Group envisaged that the following provisions would give effect to their recommendations:

(1) BT's licence would specify the overall rate of return on capital employed that would be the trigger for regulatory action. Rates of return would be separately specified for the local, trunk and international businesses;
(2) the licence would also set out the proportion of excess profits to be returned to customers and how the rebate would be made;
(3) the Director General of Telecommunications (DGT) would have the power, if BT made excess profits, to limit the general level of tariffs in any regulated activity where excess profits were made;
(4) the DGT would be able to vary in any year the rates of return specified in BT's licence by not more than ten per cent of the specified rate of return for improvements in quality of service or other measures of efficiency agreed and achieved;
(5) while BT's performance and the conditions of its licence should be subject to review at five yearly intervals, the DGT should be able, on his own initiative, to propose an earlier review of BT's performance not less than two years after a previous review;
(6) BT should be required to provide the DGT with sufficient information for the regulation of profits to be carried out within a current cost accounting framework as soon as is feasible.

Subsequent amplifications of the Group's report enable the following details of the scheme to be filled in.

7.3 The scheme would ideally apply only to those areas of BT's operations where BT has significant market power. In practice, it is assumed to include the proposed operating divisions to be known as Local Areas, National Network Services and BT International. It would not include BT Enterprises or Martlesham Enterprises.

7.4 The maximum rate of return is to be specified on a current cost accounting basis, not on an historic cost basis. It is calculated on profits after depreciation (including supplementary depreciation to take account of replacement cost) but before interest.

7.5 The level of the maximum rate of return is not specified in the Group's report. It 'would be determined taking into account such factors as returns in competitive markets experiencing equivalent conditions of risk and the cost of capital'. It is essentially the same as the minimum rate of return embodied in Clause 3 of the Telecommunications Bill, which refers to 'the need for persons supplying telecommunication services to achieve a return on capital employed sufficient to enable them to finance the supply of such services and the development and use of new techniques'. Although in practice the maximum might be set a little higher to take account of the expected variability of the cost of capital over a period of years. The final paragraph of the Group's report gives an illustration using 6 per cent rate of return for the business overall. BT's current profit target is 6.5 per cent. It seems that 5 to 7 per cent (in real terms) is the level of magnitude envisaged for the maximum rate of return. The appropriate level may change over time, and indeed the Group recommends that the terms of the license be reviewed every 5 years.

7.6 The levels of the separate rates of return for local, trunk and international businesses are not specified. They will not be identical at first, because the services currently differ so much in profitability, but it is hoped that the same rate of return may be specified for each activity in due course. The Group's illustration involves a maximum rate of return of 1 per cent on local, 5 per cent on trunk and 15 per cent on international services. These numbers are purely illustrative, but it seems that the local rate will be significantly below the overall rate and the international rate will be significantly above.

7.7 The rebate of excess profits is to be returned to customers; it is not a tax or levy payable to the Exchequer. The operation of the rebate scheme will be monitored by OFTEL, not by the Inland Revenue. The rebate will be an allowable expense for purposes of Corporation Tax.

7.8 The level of the rebate is not specified in the Group's report but it is envisaged that the bulk of excess profits be rebated on a sliding scale, so that the percentage rebate varies with the level of excess profits. A subsequent numerical example embodies a sliding scale rising from a 52.5 per cent rebate on excess profits (when the 5 per cent maximum rate of return was only just exceeded) to a maximum rebate of 75 per cent of excess profits (when the total rate of return was greater than 11 per cent).

7.9 The Group's report does not specify precisely how the rebate is to be made. The report notes that 'unless paid directly to those who had been overcharged, regular rebates would be a further distortion of BT's revenues', so that it is envisaged that excess profits will be rebated on the same services as they occur. No conclusion was reached as to whether each customer gets the same rebate or whether the rebate is proportional to usage during the year just ended.

7.10 The Group recommended that the DGT would be empowered to seek changes in tariffs sufficient to prevent a recurrence of excess profits. He would thus have discretion as to whether or not to require a change in tariff. It is true that Clause 15 of the Bill gives the DGT discretion in the *enforcement* of all licence conditions, but exceeding the overall rate of return would not seem to be a *breach* of a licence condition, hence a greater degree of discretion seems to be envisaged here.

7.11 It is further recommended that it would be for BT to determine the specific changes in tariffs and to provide evidence that the proposed changes would suffice. The adequacy of a proposed tariff is therefore to be evaluated in the light of expected future conditions (e.g. of demand and cost), rather than with reference to past output.

7.12 No time limit for implementing tariff changes is specified. A limit of one year is intended if possible, two years if necessary. The Group's illustration suggests that action on international tariffs could be expected to remove the source of the excess profits over a two year period, but notes that as tariff reductions may take some time to be negotiated and introduced, particularly on international services, a further rebate on excess profits might be necessary in the subsequent year.

7.13 If BT does not reach its overall maximum, its tariff policy would be subject only to the normal provisions of competition policy. That is, BT would not be subject to rebates and enforced tariff reductions if it is not exceeding the specified overall maximum rate of return. Exceeding the maximum rate of return on individual services will not lead to rebates or tariff reductions if the overall rate of return constraint is not exceeded. These individual service maxima are used merely to indicate where rebates should be made. They may also facilitate the analysis of possible anti-competitive practices.

7.14 The operation of the 10 per cent flexibility element is described as follows in a subsequent DoI summary paper:

> 'If the overall maximum rate of return was fixed at, say, 6 per cent per annum on a CCA basis, the Director General could at the beginning of year one agree with BT that the maximum could be increased to 6.6 per cent if BT improved its performance by achieving, say, all of the following targets: reducing the average waiting time for a telephone line, reducing the number of dialling failures, reducing the average length of service call on domestic subscribers and reducing the costs attributable to each unit of output. These targets are illustrations only. Each performance target would have a weight so that achievement of all but one of the performance targets might allow BT to earn a maximum of say 6.4 per cent (instead of 6.6 per cent), failure to achieve two would yield say 6.3 per cent and so on.
>
> Similarly, a reduction in efficiency, say, a lengthening during year two compared with year one of the average time taken to install an exchange line, an increase in the rate of dialling failures or increased costs per unit of output would lead to a *reduction* in the maximum permitted rate of return equivalent to the increase in the maximum rate permitted when BT met its performance targets. It will be necesary for the Director General to negotiate precise performance targets before the start of each year together with methods of measurement and the weights to be attached to each target'.

8. Analysis of the Working Group's maximum rate of return scheme

8.1 It will be helpful to make a brief comparison between the Working Group's maximum rate of return (MRR) scheme and the approach adopted in the USA. (1) In the USA it is required to determine total revenue requirements (the general level of the tariff) by determining allowable expenses, the capital rate base and the appropriate rate of return. In the MRR scheme this will not be necessary as long as the achieved rate of return is below the overall maximum, but it will be necessary once the maximum is breached. (2) In both cases there is secondary concern for the structure of tariff; this is exercised in the MRR scheme via the specification of separate rates of return for each of three services which are to be used in determining rebates and tariff reductions. (3) The MRR scheme is applied annually, with no control on tariffs as long as the maximum overall rate is not exceeded. The US scheme involves hearings only when proposed new tariffs are filed, and 'escalator' clauses are increasingly being used to cope with inflation. (4) The MRR scheme involves rebates and tariff reductions in the event that the overall maximum rate is exceeded. The US scheme involves no such 'clawback' and no automatic tariff reduction: the company lives with the (favourable or unfavourable) consequences of the tariff decision until a new tariff is filed and accepted.

8.2 In some respects, the UK scheme emphasises *ex post* rather than *ex ante* control. However, my own impression is that the philosophies of the two schemes are very similar. Indeed, the MRR scheme seems rather *more* severe than the US approach (at least, as regards formal procedures), if the overall maximum is frequently breached. This seems likely to be the case unless the maximum return is set sufficiently above the minimum, to allow for forecasting error.

8.3 The theory and effects of regulation have been thoroughly studied in the USA, hence we can be more confident about the analysis of the MRR scheme than the ORPL scheme. It must be acknowledged, however, that much of the evidence has necessarily been drawn from industries other than telecommunications, since unregulated telecommunication systems have not been available for comparison.* It has also been argued that regulation works more satisfactorily in other countries (e.g. Canada).

8.4 Studies of regulation typically assume that the decision makers in any organisation (including directors, managers and other employees) have a variety of goals which they seek to achieve, subject to the constraints of limited resource availabilities, the possibly conflicting aims of their colleagues, and the nature of the environment in which the organisation operates. In a privately owned company, the actions of the decision makers are likely to be oriented towards the maximisation of the stock market value of the company, at least insofar as the shareholders (and potential take-over bidders) are able to exercise control. The regulation of profit reduces the incentive to adopt such wealth-maximising policies. Decision makers are likely to adopt policies which provide other kinds of reward, because the opportunity cost of doing so is less. That is, because profits are regulated, the adoption of another policy involves less sacrifice of profits than it otherwise would have done. As noted above, however, BT plc will be only 51 per cent privately owned, hence the effects of profit regulation may be less marked than in the USA.

(a) *Protection against Monopoly*

8.5 As regards pricing policy, a pioneering study of regulation in the US electric power industry compared prices and profits in states where electric utilities were regulated against states where prices and profits were not regulated. It found no significant effect of regulation on the level of prices, on relative prices for different types of user, or on company profits. Later evidence suggests that rates were slightly lower for regulated companies. One study estimates that regulated utilities charged about 5 per cent less than the wealth-maximising price.

8.6 Prior to the adoption of regulation, electric utilities in many cities were subject to active competition. It turns out that state regulation was promoted by the companies themselves in order to limit this competition. On this view, regulation should have led to an increase rather than decrease in prices and profits. Further evidence confirms this:

> 'The test results indicate that in 1912 electric utilities in early-regulated states had 46 per cent lower prices, 23 per cent higher output, and 38

*US evidence quoted in this section is taken by Louis De Alessi 'The Economics of Property Rights: A Review of the Evidence', *Research in Law and Economics*, vol. 2, 1980.

per cent lower gross profits than utilities in later-regulated states. By 1917, following the establishment of regulation in early-regulated states, the latter exhibited higher prices, lower output, and higher profits.'

Thus, prices were slightly lower in regulated than unregulated states, but significantly higher than if competition had been allowed to continue. The effect of regulation on price levels evidently depends crucially upon the extent to which competition is potentially viable and upon the policy adopted by the regulator with respect to entry.

8.7 There is some evidence that regulation tends to favour larger rather than smaller users i.e. industrial and commercial rather than residential users. This is consistent with the theory: the consumers with more wealth at stake have greater incentive to bring pressure to bear on the regulators.

8.8 Turning to the present proposal, the above theory and evidence suggest that applying the Working Group's MRR scheme would tend to lower the general level of prices of BT's monopoly services and increase output there, compared to a situation in which no explicit constraints were imposed. However, lower prices would only be expected in the long run if the MRR scheme did not at the same time tend to restrict the emergence of new competition (see paragraphs 8.39–42 below).

8.9 The MRR scheme seems to cover a much broader area than the area of concern with respect to monopoly. The MRR scheme covers the whole of the regulated business, whereas it is primarily local services (rentals and local calls) where concern has been expressed.

8.10 Insofar as larger users would exert more influence on the DGT, one would expect the main price reductions to be felt on such services as business rentals and private circuits (where, in any case, there is a growing element of competition).

8.11 There might be somewhat less incentive for BT to relate tariffs closely to costs. There would be less advantage in relating telephone call charges to the route characteristics and to time-of-day load patterns. Simpler, more uniform tariffs would be preferred. Cross-subsidisation would effectively become cheaper. Of course, BT's tariffs need not in any case be related closely to cost in monopoly services.

8.12 In this latter connection, it might be noted that the proposal to establish separate maximum rates of return for different services would, as intended, be likely to restrain rather than hasten the rate at which BT eliminates cross-subsidisation between local, trunk and international services — at least, if the separate rates are set at anything like the 1 per cent, 5 per cent and 15 per cent levels in the Working Group's illustration. The allocation of joint costs would need to be controlled to ensure that local service prices were held down.

(b) *Efficiency and Innovation*

8.13 A maximum rate of return constraint would undoubtedly reduce pressure on costs and efficiency. Since BT will almost always be earning profits sufficient to trigger intervention by the DGT, at least 50 per cent of any cost saving will have to be rebated to consumers, and continuing cost reductions will have to be matched 100 per cent by tariff reduction unrelated to commercial pressures. There is bound to be difficulty in convincing members of the organisation of the need for improvement. BT would be more receptive to increased wage demands, and less concerned to obtain the lowest possible input prices. Greater weight would be attached to a 'cosy relationship' with employees, suppliers and major customers. The 'cost-plus' syndrome would tend to prevail.

8.14 To overcome this problem the MRR scheme involves a 10 per cent flexibility element to encourage efficiency. A higher return is allowed for meeting performance targets specified in advance. However, it is not clear how these should be set and weighted, and there must be a danger that the DGT and BT will impose the standards they think reasonable to achieve, rather than the combination of price and performance which customers prefer. Whether 10 per cent is the right order of magnitude is not at all clear — will it be ignored as insignificant, or will it dominate BT's policy?

8.15 A typical investment decision involves weighing up a large capital expenditure now against a stream of prospective receipts in the future. If a maximum rate of return constraint is actually operative, it will reduce the magnitude of the stream of receipts. The extent and timing of this reduction cannot be precisely predicted at the time of investment. Nevertheless, an investment appears less profitable and more risky as a result of rate of return regulation. This cannot increase the attractiveness of investment; the crucial question is whether, or to what extent, investment is actually reduced as a result of regulation.

8.16 The typical defence of rate of return regulation on this score is that, if the maximum rate of return is set above the cost of capital, the lower return should not deter any desirable investment. If the cost of capital is 5 per cent, a project promising 15 per cent return should still be accepted even if a maximum return of 7 per cent is imposed. Whether this provides adequate allowance for risk is another matter. A project promising 15 per cent if successful and zero if unsuccessful could well be transformed from an attractive to an unattractive prospect by a 7 per cent maximum return.

8.17 It so happens that risk is a particularly important factor in modern telecommunications. Certainly the market as a whole is expanding rapidly, and is expected to continue to do so. Against this, the rapid development of new technology, the history of 'teething troubles' in introducing it, the emergence of new competitors within

Britain and the growing internationalisation of the market — all these factors mean that the risks associated with investment in telecommunications are very real ones for an individual firm such as BT. There must be a danger that severe limitations on profits will reduce investment and thereby jeopardise innovation.

8.18 Empirical evidence on this matter is difficult to come by and to evaluate. Regulatory agencies often take other actions to compensate the firm and encourage it to invest. For example, the risks of investment may be reduced by limitations on entry. Thus, the adverse consequences of regulation may show up in the form of higher prices and less appropriate technology, rather than in quantitatively lower investment.

8.19 One other consequence of regulation has proved easier to measure. If the maximum rate of return constraint is binding — that is, if the firm could otherwise earn a higher return — and if this maximum rate is higher than the firm's cost of capital, then profits can be increased by using more capital, thereby increasing the asset base on which the maximum rate is computed. This proposition is known as the Averch-Johnson over-capitalisation hypothesis.

8.20 Examples of over-capitalisation include choosing more capital-intensive methods of production despite higher total (operating plus capital) costs; buying equipment when leasing it would have been the commercial decision; providing higher quality or longer-lasting capital equipment than would otherwise be appropriate; engineering to higher standards, with larger margins for safety, uncertainty and growth, etc. Capital investments might be made in unprofitable activities in order to be able to increase profits (and prices) in other parts of the business. It is conceivable that equipment could be bought merely in order to lease it out, a device reputedly used by some companies to avoid Corporation Tax. Accounting policies could also be distorted — for example, by unnecessary capitalisation of expenses; reduced depreciation rates; the transfer of assets from unregulated to regulated sectors of the business; and various other forms of 'creative accounting'.

8.21 The evidence of over-capitalisation in the US power industry is claimed to be strong. One estimate is that actual production costs exceeded efficient production costs by about 12 per cent in 1962.

8.22 The Working Group expressed scepticism about the extent of Averch-Johnson effects in UK telecommunications. 'There is little immediate danger of BT providing excessive quality of service, of expanding output too far or over-investing in order to inflate the assets on which the allowable rate of return is calculated.' Against the first point, the claim made by MCI when attempting to enter the US long distance market was precisely that ATT's quality of service was too high, and that many consumers would prefer lower quality at a lower price. A similar argument might be made against BT. Second, it is certainly true that BT's access to capital has been severely limited in recent years, and one of the purposes of privatisation is to remedy this. But the rate of return constraint is to be imposed for the 25 year duration of the licence, well beyond the immediate situation of shortage. Finally, it is true that the over-capitalisation induced by rate of return constraints may work in the opposite direction to the risks of under-investment induced by these same rate of return constraints, as discussed in paragraphs 8.15 to 8.17 above. But there is no reason to suppose the two forces will precisely cancel out. We cannot say whether the *net* effect of rate of return constraints will be more or less capital investment, but we *can* predict that the *pattern* (and hence the quality) of investment will be distorted by regulation.

8.23 Research and development expenditure provides one measure of innovation. It is an admittedly weak measure insofar as it reflects at best a desire to innovate rather than success in doing so. One would expect regulation to discourage Research and Development (R&D). Evidence on this general point is apparently not available, but there is some evidence that more severe regulation deters R&D expenditure compared to less severe regulation. Specifically, in states in the USA which use historic cost depreciation and do not allow R&D to be capitalised, electric utilities undertake significantly less R&D expenditure than comparable utilities in states with a weaker regulatory climate.

8.24 The results discussed so far depend on the assumption that the maximum rate of return is set above the cost of capital. During the last few years, the allowed rate of return in several US regulated industries has been held *below* the cost of capital. This was perhaps inadvertent at first but the pressure of public opinion has prevented an increase in the allowed rate. Under these circumstances one would expect regulated firms to avoid new investment and contract their capital base. It is already reported that US electric utilities are questioning the 'obligation to serve' under such conditions, with a view to withdrawing as far as legally possible from the provision of uneconomic services. Whether or not the DGT and MMC are as sensitive to public opinion as US regulatory commissions is open to question, nonetheless errors in forecasting and lags in adjustment must be expected (see also paragraphs 8.33–8.35 below).

(c) *Burden of Regulation*

8.25 In order to carry out his allotted task, the DGT will have to determine which of BT's total expenses and revenues are appropriately allocated to the regulated sector; which operating costs are allowable in calculating rate of return; in particular, whether accounting policy (especially with respect to depreciation) is appropriate. The use of current cost

accounting would require him to approve the current value of assets. Furthermore, the DGT would have to carry out these calculations for each of the three services (local, trunk, international) taken separately. This would require him to approve the allocation of joint costs and revenues.

8.26 The DGT will need to calculate whether an excess rate of return has been earned overall and, if so, which particular services are responsible. He will need to specify or approve how the rebate is to be allocated to the different services, and monitor the repayment. He will then have to discuss with BT the question of reducing tariffs, and approve the proposals which BT puts forward. This will entail, *inter alia*, taking a view as to the likely (and justifiable) movement of costs and demand over the next year. The implementation of agreed tariff reduction has also to be monitored. This could well be a more or less continual process of involvement.

8.27 Since an element of flexibility is envisaged, the DGT has to decide each year whether BT's performance has been unsatisfactory, satisfactory or more than satisfactory. BT will be judged in the light of performance criteria laid down at the beginning of the year, but the setting and weighting of these criteria has to be done for the next year. This presumably requires taking a view as to the costs and desirability of particular improvements in performance and likely short-term and longer-run effects on BT; no doubt attention must also be paid to public opinion, and the views of employees, suppliers and major customers. These views will often conflict: e.g. New York utilities accused of poor performance have pressed for *increases* in rates to finance improvements.

8.28 This is a formidable list of tasks. It is, of course, in addition to the DGT's duties of issuing, monitoring and modifying licences, making references to the MMC concerning licence modifications, enforcing design standards on equipment, approving compulsory purchase of land, providing advice and information to the Secretary of State and Director General of Fair Trading, exercising certain of the latter's functions, and taking over some of the responsibilities of the Post Office Users' National Council.

8.29 The volume of information required to be provided by BT, checked and analysed by OFTEL, and debated between them, would be very considerable. The Bill estimates that the costs of OFTEL will be about £1.5 million per year, of which about £1 million will be met by income from licence fees set to cover the cost of issuing, monitoring and amending of licences. Presumably most of this will be accounted for by BT. For its part BT will incur substantial expenses in dealing with OFTEL. One would not expect the lengthy Court cases characteristic of US regulation, where costs in the hundreds of millions of dollars are not unheard of. Nevertheless, BT's expenses will undoubtedly be no lower than those of OFTEL — and, in BT's view, could be higher by tenfold. These expenses will be passed on to consumers. If, instead, these expenses are not allowable for rate of return purposes, the proceeds of sale will be reduced. In either case, they will not be absorbed by BT's shareholders.

8.30 Any regulatory scheme must take into account the adequacy of the information available, and the consequences of basing a regulatory framework upon 'information' which, by its very nature, can be little more than opinion or value judgement. MRR is relatively vulnerable here.

8.31 The limitations of BT's accounting system are often referred to. Their precise extent is difficult to assess. It should be possible to obtain those aggregate data of a kind which are subsequently recorded in the Annual Accounts *viz.* turnover, operating expenses, capital expenditure, depreciation etc. Whether such data are available for separate services is less clear: the accounts of BT International are separate but the division between local and trunk services could cause difficulties. Available, too, should be performance data which could be used in exercising flexibility on rate of return. Asset revaluations will initially cause problems.

8.32 As to predictions about the future, BT has a number of sophisticated demand forecasting models, and has accumulated substantial evidence concerning elasticities of demand for major services with respect to prices, incomes, gross domestic product, etc. Forecasting of costs and the forward planning of cash flows are in process at present — one would hope such crucial management planning and control services would soon become operational, but for some years their reliability and suitability for regulatory control will be open to question. There is always the question how far 'official' plans reflect true beliefs and intentions, and rate of return regulation provides an incentive to keep the two distinct.

8.33 Quite apart from the adequacy of BT's information system is the question of how reliable estimates about the future can ever be. Of course, every business has to make forecasts as best it can, and act accordingly, but it also needs to preserve the flexibility to change its plans in the light of changing predictions about the future. There is surely no doubt that a regulatory framework restricts this flexibility: BT has not merely to perceive and analyse changing conditions and revise its plans accordingly, it has to persuade the DGT of the need for change as well.

8.34 The level of the maximum rate of return is a case in point. Given the uncertainty about future

costs, demand, technology and competition, to what extent is it possible to say that a particular level of return is or is not adequate to stimulate the 'correct' level of investment or innovation? If BT considers that conditions have changed, making the current maximum too low, how long will it take to persuade DGT and MMC of this? A two year lag in modifying the licence would seem to be a minimum.

8.35 This raises the question of how the DGT will form a judgement on the various matters of fact and prediction. How far will he attempt to secure an independent source of expertise at OFTEL (e.g. on demand forecasting)? rather than largely rely upon BT's view? It is a difficult choice. Taking the first route, and rejecting BT's experience, puts him in an exposed position if his judgement turns out wrong. Taking the latter, safer, route rather puts him in BT's hands.

8.36 Finally, it must be noted that a number of decisions to be made by the DGT do not rest upon data at all, but upon value judgements. The allocation of joint costs is a notable example. It is well known that there is no solution, even in principle, to this problem. In US regulation, no one pretends that 'separations procedures' are anything other than a device for distributing benefits between different types of customers. This is typically done in the way likely to provoke least effective opposition. The DGT does not have to set tariffs, of course, but the MRR scheme does envisage that he will calculate rates of return for each service area (which requires allocating joint costs), and that rebates will be distributed in the light of these rates.

(d) *Promotion of Competition*

8.36 To what extent is the operation of MRR likely to encourage or discourage competition? Powers are taken elsewhere in the Bill to enable the DGT to refer to the MMC such anti-competitive practices as predatory pricing and full-line forcing. The main question here is whether maximum rate of return regulation is likely to limit or distort competition in any way. The emphasis in this section will be on possible restrictions on BT's competitors; the next section considers possible restrictions on BT itself as part of the evaluation of BT's prospects.

8.37 At first sight, regulation of BT's prices and profits is hardly likely to affect BT's competitors adversely, or to limit their desire and ability to compete. There are two potential dangers, however.

8.39 If BT sets prices for certain services which are below cost, or which generate an artificially low return on capital, this distorts the information conveyed to potential competitors and, more important, deters them from entering. Local telephone services are a case in point. The Working Group illustration involved an initial 1 per cent maximum return on local services. If this were enforced, a potential competitor with a prospect of operating at costs lower than BT's would be deterred from entry, unless he could beat BT's costs *minus* the cost of capital.

8.40 Second, OFTEL and the DGT may be 'captured' by BT and induced to advise against new entry. This could happen without deliberate design on BT's part, and without awareness by OFTEL and the DGT of what is happening. The root of the difficulty lies in the DGT's dependence on BT.

8.41 Consider how the DGT will obtain the information he needs to implement the regulatory scheme (see paragraph 8.35 above). To operate OFTEL, a staff of 50 and a budget of £1.5 million is envisaged. BT has a staff of 250,000 and a turnover of nearly £6,000 million. Surely the DGT could not sustain a serious challenge to BT with respect to information or forecasting nor could he justify a contrary view on the return on capital necessary to finance the supply of services?

8.42 In the light of the potentially serious consequences of 'getting it wrong', would the DGT *wish* to challenge BT? Once the DGT had accepted a particular forecast, and taken policy decisions based on it, surely he could not stand aside and see whether the forecast proved correct. Or he might be tempted to sweeten the pill of a low maximum return on capital by reducing the risks to BT. If the MMC decides that a particular return on capital is the appropriate level, there is an obligation on the DGT to ensure that BT achieves this level. This could involve recommending restrictions on the entry or growth of competitors.

8.43 Though BT is the major supplier of telecommunication services in the UK, it is no longer the only one. Other existing competitors will have a voice, and may protest at discriminatory treatment. Potential competitors are less easily represented. The possibility of capture by present incumbents, at the expense of future entrants, is relatively high insofar as MRR involves continual interaction and negotiation between BT and the DGT.

8.44 It is worth emphasising that present employees of BT would stand to gain from limitations on competition. Monopoly profits facilitate a larger wage bill and a quieter life. One would therefore expect the trade unions to join with BT in urging the DGT not to advise new entry.

8.45 To summarise, the DGT will find himself subject to severe pressures from within the industry. The greater his involvement in the details of profit regulation, the more pressure he will be under and the

greater the danger of 'capture', albeit unconsciously. The most serious consequence of capture is not the short-term increase in profits, but the long-term restrictions on entry and potential competition, and the likelihood that regulation will become steadily more entrenched rather than gradually phased out.

(e) *Proceeds and Prospects*

8.46 The transition from a nationalised industry to a private one will be traumatic for BT, whatever the regulatory framework. One argument for maximum rate of return regulation is that it could help to ease this transition, insofar as it provides the regime most similar to that of nationalisation.

8.47 The concept of rate of return regulation is also familiar to potential investors and to the City. There will, of course, be concern as to the precise method of regulation, and the rates envisaged. Nevertheless, a maximum rate of return scheme is thought to be predictable in operation and not, in itself, likely to deter investors.

8.48 The success of the initial flotation, and more specifically the revenue derived from it, will depend inversely upon the perceived severity of the regulatory scheme. The maximum rate of return scheme proposed by the Working Group, together with their illustrative numbers, looks rather severe: fairly low maximum rate of return, immediate 50 per cent rebates of excess profits, tariff reductions to eliminate future excess profits, directions as to the particular services on which these rebates and price reductions are to apply, flexibility in maximum rate which may be exercised downwards as well as upwards, and profits and performance subject to annual review.

8.49 On the other hand, it was argued earlier that such an unfavourable outcome is unlikely to be the longer-term result of rate of return regulation. The more scope there is for 'capturing' the DGT, the more likelihood that BT will do the capturing. All the US experience points in this direction. In this event, the longer-term prospects for BT are rather more favourable than the formal appearance of the regulatory scheme suggests.

8.50 This protection is bought at a price, however. There are the risks of uninformed regulatory decisions (notably with respect to the allowed return on capital); the burdens of MRR regulation measured in terms of expense, time and reduced flexibility of response; and the constant subjection to scrutiny (which is likely to be reflected in the interest taken by the media).

9. An output-related profits levy

9.1 As an alternative to the Working Group's rate of return scheme, Professor Walters put forward the idea of an output-related profits levy (ORPL). The objective was to encourage BT to keep prices down, expand output and reduce costs. The levy would have graduated rates, all less than 100 per cent, which varied according to the extent to which BT expanded output during the year.

9.2 More precisely,

(1) BT's licence would specify a 'norm' rate of growth of output over the first 5 year period, and a base rate at which a levy would be applied to total profit in each year if the norm rate of output growth were actually achieved in that year;

(2) the licence would also specify a schedule of rates at which the levy would be applied if achieved growth of output departed from the norm rate, with lower rates of levy the greater the achieved growth of output and higher rates of levy the lower the achieved growth of output;

(3) at the end of the first 5 year period, the DGT would specify the norm rate of growth for the next 5 year period, and so on;

(4) there would be no controls on prices or outputs in the licence.

After discussion with Professor Walters, we may fill in the following further details of this scheme.

9.3 As in the case of the Working Group's scheme, the ORPL is intended to apply only to those activities in which BT has a degree of market power.

9.4 BT is liable for Corporation Tax but does not currently pay it. As with many manufacturing companies, the one hundred per cent depreciation allowances on plant and machinery outweigh current net income. BT's 1981/82 Accounts (p.29) state that no liability for Corporation Tax is expected 'within the foreseeable future', although BT currently estimates that it might become liable within 3 to 5 years. In these circumstances, an ORPL based on varying the rate of Corporation Tax would have no immediate effect. The ORPL is therefore assumed to be charged (in principle) in addition to Corporation Tax; it would be an allowable expense for Corporation Tax purposes (it was not considered appropriate that ORPL should *replace* Corporation Tax). ORPL would be assessed by the DGT, not by Inland Revenue. It would be payable by BT direct to the Treasury, not rebated to customers.

9.5 Whether ORPL would apply to profits calculated on an historic cost or current cost basis is not clear. Illustrations of the working of the scheme have been prepared on a CCA basis, with the levy applying to profit after interest on loan capital and on the pensions fund liability.

9.6 The criteria for setting the norm rate of growth have not been specified. It seems to be intended that it should reflect both achieved growth rates during the previous five year period and likely market conditions in the future. Since BT's output grew at an average rate of approximately 7 per cent per annum over the period 1977–82, this is perhaps the order of magnitude that might be envisaged for the norm in the first 5 year period of the licence. BT would no doubt be consulted in setting the norm rate, but in the event of disagreement the DGT's view would presumably prevail.

9.7 As regards the calibration of ORPL, Professor Walters gave a simple numerical example involving a standard levy of 50 per cent at a norm growth rate of 5 per cent, with the levy falling to 40 per cent if 7 per cent output growth is achieved and rising to 60 per cent if only 3 per cent output growth is achieved. Other illustrations involve a standard levy of 52.5 per cent on a 7 per cent norm growth rate, with the levy falling in three steps to 30 per cent if the growth rate exceeds 11 per cent, and rising in three steps to 75 per cent if the growth rate is less than 3 per cent. Higher levies would not be envisaged, but lower levies could be considered, while bearing in mind that the standard levy would need to be sufficiently far above zero to allow scope for reduction on above-norm output rates, otherwise the incentive to expand would be missing.

9.8 Since BT produces a great number of different services, it is not immediately obvious how output and growth are to be defined. Two alternative methods have been proposed.

(1) The first method involves defining (an index of) output in any year as BT's total sales revenue divided by a price index of its services. To illustrate, BT's accounts report turnover in 1982

of £5,708.1 million and tariff index 359.0, hence the output index for 1982 is defined as 5,708 ÷ 359.0 = 15.9. The output index for 1981 is similarly calculated as 4,554.2 ÷ 299.6 = 15.2. The rate of output growth from 1981 to 1982 is thus 15.9 ÷ 15.2 = 1.046, or 4.6 per cent. BT's tariff index referred to here is a linked Laspeyres index, with prices weighted by the previous year's revenue. It is produced in a similar way to the Retail Price Index. There is a considerable degree of disaggregation e.g. trunk calls are classified by time of day, duration, distance, operator or direct dial, etc., giving about 40 types of trunk call. New services are generally included as they become significant; some services are not yet incorporated e.g. Prestel. Price changes during the year are reflected in a revenue-weighted average price. The compilation of this tariff index takes about 3 weeks each year. If this approach were adopted, it would be necessary to construct a modified tariff index for regulated services only. This would exclude the services produced by BT enterprises, and other services where competition was thought to be adequate.

(2) The alternative method is to define an index of output directly by specifying weights to be attached to physical outputs (e.g. number of business rentals, trunk calls, international telex messages, private circuits, etc.). This possibility is discussed later; for the present we assume the tariff index method is used to define output growth.

Depending upon the method adopted, the specific tariff index or the output weights to be used would be specified in the licence rather than left to the discretion of the DGT.

9.9 It is not envisaged that ORPL be applied to the different services produced by BT. If it were thought appropriate to encourage increases in output for those services where BT's market power is greatest, it would be necessary to utilise a weighted output index (method 2), and to allocate high weights to the services it was thought advantageous to expand. This possibility is also discussed in paragraphs 10.14 and 10.15. In principle it would also be possible to adjust the weights in the tariff index; this possibility has not been explored.

9.10 As originally formulated it was envisaged that the norm rate of growth would be applied in each year to the output actually achieved in the previous year. This offers the possibility of manipulation (paragraphs 10.6 and 10.9 below). To avoid this, BT could instead be judged against the cumulative target output (at the norm rate) in each year. This variation, which is preferred by Professor Walters, is considered but there has not been time to analyse it in detail.

10. Analysis of the output-related profits levy

10.1 The output related profits levy is a novel proposal, which does not appear to have been utilised or even examined before. Economists have often referred to the possibility of subsidising a monopolist to increase output, possibly coupled with an increased profits tax, but they do not seem to have discovered this particular scheme, let alone analysed its likely effects. There must therefore be a considerable degree of uncertainty as to how the ORPL scheme will operate in practice, and there is bound to be some hesitancy to adopt it for that reason alone.

10.2 It may be worth noting that ORPT has similiarities to the wage-inflation tax proposed by Professor Layard. His proposal is that firms should be taxed on that part of their wage-bill which corresponds to the growth of wages above a specified norm, with the tax proceeds being handed back to the firms in a rebate proportional to their total wage-bill. It is suggested that this will lower the demand for labour at high wages and raise the demand at low wages. In effect, the tax tips the demand curve for labour, making it more realistic and therby reducing the monopoly power of the unions. The wage inflation tax has attracted some support but has not yet, of course, been put into practice. It has also been suggested to me that the new regime for local authority finance has similar characteristics.

10.3 Appendix 1 to this Report contains a formal economic analysis of the ORPL scheme under very simplified assumptions designed to facilitate the analysis. The principle conclusions from this analysis are summarised in the following paragraphs. It should be noted, however, that the model examined in the Appendix assumes a profit-maximising producer of a single output. BT has not pursued the sole aim of profit-maximisation while under public ownership, and there is some doubt as to how far this objective will be its sole aim under private ownership. In addition, BT produces a large number of different but related services. Consequently, the theoretical findings from the Appendix will need to be assessed in the light of BT's likely situation. This is done after summarising the theoretical results.

10.4 An elementary result in economic theory is that a profit-maximising producer of a single product will expand output as long as the marginal (or incremental) revenue exceeds the marginal cost. Marginal revenue consists of the price received on the incremental unit less the reduction in revenue on all intra-marginal units if the selling price has to be reduced in order to sell one more unit. Thus, up to a certain point it is worth accepting a reduction in 'existing' profits in order to gain the profit on an additional sale, and the optimum output is where these two considerations just balance out, so that the net change in total profit is zero.

10.5 A flat-rate profits tax has no effect on output (since the output that maximises total profit also maximises a constant fraction of it). ORPL, in contrast, offers the firm a lower tax rate if output is expanded. The firm may thus make a lower pre-tax profit but a higher post-tax proft. Output will therefore be expanded beyond the profit-maximising level as long as the reduction in pre-tax profit is more than offset by the increase in post-tax profit. Price will be correspondingly reduced.

10.6 There is, however, a third consideration. Other things being equal, an expansion in this period's output will reduce the rate of growth achieved in the next period, and will therefore *increase* the tax rate in the next period. This reduces the profitability of expansion and could, in principle, make contraction of output temporarily profitable (see below). However, if ORPL were related to target output instead of previously achieved output, this consideration would seem not to apply.

10.7 ORPL may be thought of as 'stretching' the elasticity of demand. The firm sets its price 'as if' it were faced with a more elastic demand than actually exists.

10.8 It has been suggested that ORPL will only be effective where demand is elastic. The model analysed in the Appendix does not enable us to assess this claim, since the profit-maximising model assumes that all demands are elastic at optimum output. What it does show, somewhat surprisingly, is that an opposite result holds within the realms of elastic demand. That is, the proportional change in price and output will be greater the less elastic is demand.

10.9 ORPL related to previously achieved output will encourage expansion of output provided that the firm's profits are not growing faster than the discount rate; in the latter eventuality output will be decreased. This suggests that output will be expanded at the peak of a boom, during the ensuing decline, and in the trough of a slump, but output may be contracted during the upward part of the cycle. Conceivably, ORPL will tend to accentuate rather than dampen the impact of the business cycle on BT's output, but it may merely 'shift' it slightly. The analysis is not clear on this point.

10.10 This last analysis does seem to depend rather strongly on the assumption that the firm knows what part of the business cycle it is on, hence can calculate accurately whether expansion or contraction of output is called for. If a firm is uncertain about future profits, it may well decide to give more weight to the 'bird in hand' of lower taxes now, since the danger of higher taxes next period may not in fact materialise. Bearing in mind also the alternative of basing ORPL on target output, the danger of deliberate contraction should not be stressed.

(a) *Protection against Monopoly*

10.11 ORPL is specifically designed to counteract monopoly power, by providing an incentive for BT to increase output and lower price. As noted above (paragraph 10.3), it is not clear how far the simple profit-maximisation model will apply to BT plc. The best guess seems to be that, since BT will undoubtedly be concerned about profit, it will respond to ORPL in a similar way to that predicted by the profit-maximising assumption — that is, by reducing price and increasing output — though probably not to the same extent. There is inevitably considerable doubt concerning the precise nature of the response.

10.12 There are other important reservations. Will the DGT be able to set the norm growth rate and calibrate the tax in an adequate way? The growth rate which BT would otherwise achieve cannot be observed; it has to be conjectured, and the most informed source is BT itself. If the norm were set too low, it is conceivable that BT would merely operate at about the same price and output rates as it would have done in the absence of the tax.

10.13 If aggregate output is defined by means of an overall revenue-weighted tariff index, there is no particular inducement to expand those services where it has most monopoly power. The theoretical result that the relative changes in output and price are greater when elasticity is lower suggests that the monopoly services *may* be expanded, but without analysing such a model in detail one cannot be sure that BT would *choose* to expand these services. It is also possible that BT would find it profitable to expand some services and contract others.

10.14 If, instead, an aggregate quantity index is defined as a weighted average of the output of various services, it would be possible to attach greater weights to the monopoly services, or to the ones with lowest elasticity. This would encourage especially large increases in output for those services whose outputs are likely to have been most restricted. The device could also be used to influence the pattern of cross-subsidisation.

10.15 However, several problems arise: (1) It is not clear what criteria should be used for setting these weights. Weights proportional to unit profits, which reflect elasticities of demand, may be indicated, along the lines of the 'Ramsey pricing' approach. (2) It may be difficult to ascertain or calculate the 'appropriate' weights, particularly if elasticities and cross-elasticities are explicitly involved. (3) Distortions may arise through aggregation. (4) The DGT may find it necessary or desirable to encourage the output of services other than the monopoly ones (e.g. in response to pressure from large rather than small users). (5) Given the uncertainty about elasticities, future demand and BT's objectives, it is not clear *ex ante* what effect these weights will have, or what would constitute 'low', 'reasonable' or 'high' rates. The weights might be adjusted over time, in the light of experience, but this involves greater reliance on discretionary power, and it is not clear how far past experience provides a reliable guide to the future.

(b) *Efficiency and Innovation*

10.16 Any levy on profits is likely to have some disincentive effect. The precise level at which ORPL will operate will depend upon the calibration of the tax and the response of BT. If the norm growth rate is typically exceeded, the effective tax rate could well be between 25 and 50 per cent. The lower end of this range would not be unduly onerous, but the upper end could begin to have more serious consequences, as described in paragraph 8.13 for the MRR scheme.

10.17 Insofar as ORPL generates higher output and faster growth, it is likely to stimulate investment. BT may find it advantageous to expand services using underutilised equipment e.g. via peak-load pricing, but this increased utilisation eventually increases the attractiveness of that kind of investment.

10.18 The incentive to reduce costs is increased insofar as cost reductions enable prices to be reduced, output increased and the levy thereby reduced. The effect is thus felt on operating rather than capital costs, but the latter are the more significant for BT.

10.19 Would the provision or expansion of new services be discouraged insofar as they would not show up in the quantity index until it was redefined? This does not seem a serious objection: BT would know in advance which new services it intended to

introduce, and arrangements could doubtless be made to incorporate them. If the tariff index approach were used, one could simply omit revenue as well as price of new services until it was convenient to incorporate them.

10.20 The imposition of a levy on profits reduces the attractiveness of any investment project, for the reasons given earlier in the discussion of the rate of return scheme (paragraphs 8.15–8.17). This might be particularly serious for BT insofar as R&D, innovation and investment in new technology are relatively risky and are usually financed to a greater degree from retained earnings.

10.21 ORPL would probably make BT more vulnerable to business cycle fluctuations. The demand for telecommunications is widely believed to be very dependent upon gross domestic product and the level of service sector activity, and there is empirical evidence to support this. Such factors are largely outside BT's control. An unexpected downturn in demand would reduce BT's output and profits, and simultaneously increase its levy rate. The cycle of after-levy profits would thereby be accentuated. BT's vulnerability to wrong forecasts would be greater if a 'cumulative target' were set (paragraph 9.10).

10.22 Against this, it might be argued that BT would have the incentive to respond constructively by cutting prices and expanding despite the slump. This is true, but BT has a similar incentive to expand at all times; the relevant question is whether BT has a greater incentive to expand in the slump than at other times. The theoretical analysis does not suggest that it would.

10.23 The likely increased vulnerability to the business cycle would lower the quality of BT's earnings stream. This would increase the difficulty of self-finance. It would also make BT a more risky investment, thereby increasing BT's cost of capital. Both these factors would tend to deter investment and innovation, though the magnitude of this effect would be difficult to asses.

10.24 Since Clause 3 of the Bill refers explicitly to achieving a sufficient return on capital, this would need to be taken into account in calibrating the ORPL and, if necessary, modifying it. This could alleviate some of the problems related to investment.

(c) *Burden of Regulation*

10.25 Implementing ORPL would require annual information on turnover, profits, tariff index or outputs of specified services. The problems of calculating profit are the same as for the rate of return scheme, except that the rate of return itself it not required to be calculated. Clause 3 of the Bill requires the Secretary of State and the DGT to bear in mind the need for BT to achieve a sufficient return on capital, but this would not necessarily require detailed annual calculations. Turnover, tariffs and output are relatively straightforward to obtain, though it should be borne in mind that an element of sampling and judgement is inevitably involved.

10.26 The DGT would have the task of periodically revising the growth norm. As noted earlier, the criteria for doing this are by no means clear: is the DGT supposed to estimate at what rate BT would grow in the absence of any regulation, or is he supposed to decide what growth rate would be desirable? In either case, how is the appropriate number to be obtained?

10.27 The licence is supposed to specify output weights (unless the tariff index approach were adopted). This would probably require measurement of profits and elasticities if it were not to be done in an entirely arbitrary way. Some judgement would also need to be made of BT's likely response to these weights. These are not the DGT's responsibility initially, and the MMC would be responsible for recommending modifications, but in practice the DGT would probably have to deal with this problem.

(d) *Promotion of Competition*

10.28 There is a danger that BT may be encouraged to set price below cost for some services in order to expand output. This could distort the allocation of resources, and deter the entry of competitors. In fact, lower prices make entry less attractive, even if they are not below cost. There is thus a potential conflict between the aim of expanding output and the desirability of encouraging competition and preventing anti-competitive practices such as predatory pricing.

10.29 The DGT might be perceived by BT's competitors as unfairly committed to expanding the output (hence the market share?) of BT at the expense of themselves. Potential entrants might feel at an even greater disadvantage.

10.30 There is a similar danger of BT 'capturing' the DGT as with the rate of return scheme. The level of the norm growth rate is so crucial to BT's viability and success that BT could scarcely avoid pressing its case strongly. The DGT is in a very difficult position: a low norm will not constitute any protection against monopoly, but a high norm will jeopardise competition.

10.31 There would be pressure to revise the norm levels more frequently than 5 yearly, as market prospects fluctuated. The DGT would again depend on BT for information. As before, he would find it hard to justify a contrary view to BT with respect to future growth. Once he had committed himself to a norm rate of growth, there would be an obligation to ensure that BT was not prevented from achieving it by actions on his part. For

example, the licensing of a new competitor without due consultation could be argued by BT to justify a resetting of the norm.

10.32 The sudden removal of ORPL could disturb the market, depending upon the effect that ORPL had had — but this would be difficult to assess before terminating it. The alternative would be to wind down the scheme slowly, by gradually reducing the standard levy, but a low standard rate tends to destroy the effectiveness of the whole scheme.

(e) *Proceeds and Prospects*

10.33 BT would be subject to a substantial levy that its competitors would not have to bear. This would eventually be perceived by BT as inequitable, especially as competition began to develop, and would distort the allocation of resources between BT and its competitors. BT would be at a particular disadvantage with respect to investment out of retained earnings.

10.34 ORPL is likely to increase BT's vulnerability to the business cycle, and to developments in the market which are unforeseen or outside BT's control. This increased risk will adversely affect BT's credit rating and cost of capital.

10.35 Financial advisers have emphasised that uncertainty about the operation and effects of the ORPL scheme would either reduce the share price at flotation or necessitate a substantial delay before privatisation was envisaged. In this connection, it is not so much the actual effects of ORPL as the City's *beliefs* about the likely effects that are crucial.

10.36 BT could attempt to secure some protection against risk, and some compensation for the levy payments, by seeking limitations on new competition. The DGT might feel obliged to support such requests. This is unlikely to be adequate compensation for BT in the long term, unless a reduction in the rate of levy can be ensured.

11. An interim evaluation

11.1 Having examined each scheme separately in some detail, we now attempt to summarise and compare them, again on the basis of the five criteria identified earlier.

(a) *Protection against Monopoly*

11.2 There are reasonable prospects for competition in several areas of telecommunications, notably heavy density trunk routes and services for larger businesses. BT is likely to retain a dominant position in local services for some years to come. Despite the possibility of reference to the MMC, the absence of explicit constraints on prices or rates of return is unlikely to be perceived as adequately controlling this monopoly power in the short-term. However, insofar as ORPL facilitated a pro-competitive stance by the DGT, and did not deter entry by lower prices, this scheme could be effective in the long run.

11.3 The Working Group's maximum rate of return scheme tackles the problem of monopoly pricing by rebates and tariff reduction. There is some evidence from the US electric power industry that rate of return regulation leads to lower prices — provided that the alternative would be an unregulated monopoly. However, there is also evidence that the introduction of rate of return regulation in this industry was associated with the development and protection of monopoly positions, and in fact led to *higher* prices than previously existed.

11.4 The Working Group scheme covers a much broader area than the area of monopoly concern. The specificiation of separate rates of return recognises the variations in monopoly power between services. However, there is a danger that the specification of separate rates of return will perpetuate cross-subsidation unnecessarily. Expansion by BT and new entry by competitors may also be discouraged in the low-return services.

11.5 Professor Walter's ORPL tackles the problem of monopoly pricing by providing an incentive to increase output (hence, to lower prices). Given the lack of previous experience with this scheme, it is difficult to predict the likely magnitude of BT's response. On average, output is likely to be higher than the norm growth rate. However, BT is bound to be influential in the setting of this norm. Consequently, one cannot be entirely confident that prices would be lower than in the absence of ORPL.

11.6 The simpler form of ORPL, based on a tariff index, makes no specific reference to variations in monopoly power. In principle, the problem could be tackled by attaching weights to each type of output, but this is liable to be complex and arbitrary, leaving wide scope for political and other pressures to influence the outcome. With ORPL, as with MRR, lower prices may discourage new entry.

11.7 Assessing the extent to which each of these schemes provides protection against monopoly power is probably the most difficult task of all, since it is not clear that either scheme would work 'as intended'. In the short term, ORPL might be slightly superior to maximum rate of return regulation, which in turn would be more effective than the absence of regulation. But bearing in mind the increasing danger of regulatory 'capture' and the disincentive to new entry, one cannot by any means be confident that either of the first two schemes provides adequate protection against monopoly in the longer term.

(b) *Efficiency and Innovation*

11.8 BT will become 51 per cent privately owned over the next few years. One would not expect it immediately to become as efficient as a comparably large organisation already in the private sector, but it will gradually respond to the normal commercial incentives to eliminate inefficiency and take a realistic approach to wage negotiations. With no explicit constraints on profit, these incentives are not blunted. The same applies to investment and innovation.

11.9 Rate of return schemes have a very poor track record on efficiency. If, as seems likely, the maximum rate of return constraint is almost always binding, there are likely to be severe disincentive effects and a relaxed approach to wage bargaining. The discretionary 10 per cent flexibility on rate of return is an attempt to compensate for this failure but one cannot be confident either that it would provide a significant stimulus to BT or that the stimulus would be in the direction preferred by consumers.

11.10 ORPL lies somewhere in between the other two schemes: a profit levy effectively in the 25 to 50

per cent range does provide some disincentive. This might be slightly offset by the inducement to lower operating costs in order to increase output and reduce the levy.

11.11 If the maximum rate of return constraint is effective, it will reduce the profitability and attractiveness of investment, and also reduce the availability of funds (from both internal and external sources) with which to finance the investment. Innovation is likely to be reduced. There is also evidence from the USA of 'over-capitalisation'. The precise pattern of distortions due to MRR is difficult to predict, but the quality of investment is likely to be reduced, leading to higher overall costs and less effective provision of services.

11.12 Insofar as ORPL stimulates higher output, investment will also be stimulated. There is some incentive to innovate in order to exceed the norm growth rate. However, the levy could severely reduce the availability of internal finance. The pro-cyclical effect of ORPL (whereby a higher proportional levy is likely to be extracted in precisely those years when there is a downturn in market conditions) increases the degree of risk. The lower quality of BT's earning stream will increase the costs of external finance. The net effect is likely to reduce BT's ability to invest and innovate.

11.13 Both rate of return and ORPL are unsatisfactory with respect to investment and innovation; they could both be expected to lead to pressure on the DGT to provide protection against competition in order to compensate for lower profits by reduced risk. Taking this sub-heading as a whole, it is difficult to decide a ranking between MRR and ORPL. The absence of constraints involves no disincentive effects, and is clearly preferable to both.

(c) *Burden of Regulation*

11.14 With no explicit constraints, the burden of regulation is negligible. There are moderate costs to an MMC investigation, but this would presumably be at infrequent intervals. The DGT would need to monitor BT's performance in order to decide *when* to refer, but this need not require continual and detailed investigation. The DGT would not require extensive information from BT. Information on possible anti-competitive practices would need to be collected, but this would be true under any scheme; consumers and competitors who believed themselves adversely affected could be relied upon to identify problem situations.

11.15 The Working Group scheme involves the annual collection and appraising of a great deal of information, notably on revenues, operating costs, and rates of return by individual service. Important judgements have to be made by DGT concerning the allocation of costs, the distribution of rebates and the reduction in tariffs. The MMC has to consider the appropriate level of the overall maximum rate of return and the desirable maxima on individual services. Monitoring BT will be a continual task, since the maximum return constraint is likely to be binding in most years. This will be costly, time-consuming and potentially restrictive. The DGT will be heavily dependent upon BT for information and advice, and is unlikely to be able to sustain a credible view which is inconsistent with BT's.

11.16 ORPL requires the DGT to obtain similar information on revenue, operating costs and profits as does MRR. A tariff index could be made available without significant difficulty, so too could the outputs of each service. The determination of weights to be attached to such outputs is likely to be a complex and arbitrary procedure, initially embodied in the licence. The DGT will need to revise the norm growth rate, in which respect he will inevitably be heavily dependent on BT for forecasts. It is intended that weights and norms should be revised at infrequent (say 5 year) intervals, in which case the annual burden would be rather low, but it seems likely that there will be great pressure to revise these parameters more frequently insofar as conditions change unexpectedly; here the MMC and the DGT will need to exercise substantial discretion.

11.17 On balance, the burden of regulation seems very heavy under the Working Group scheme, nearly as heavy under ORPL, and negligible in the absence of explicit constraints on profits.

(d) *Promotion of Competition*

11.18 Control over entry rests with the Secretary of State. However, the alternative schemes may affect the incentives of new firms to enter and also the advice given by the DGT to The Secretary of State. The absence of constraints does not reduce the incentives represented by high profits and prices in monopoly areas, nor does it encourage the DGT to advise against entry, except insofar as the Bill requires a sufficient return on capital.

11.19 If rate of return regulation merely limited BT's profits, competitors would more likely be favoured than harmed. However, insofar as prices in monopoly areas are reduced, and even held below cost, this will deter new entry and expansion by existing competitors. Furthermore, the history of regulation in the USA shows that the regulatory agency is very susceptible to capture by the dominant supplier. The DGT will be obliged to ensure that market conditions do not prevent BT earning the specified rate of return, and there will be pressure to reduce market risks to compensate for reduced profitability. The DGT's advice to the Secretary of State on the desirability of new entry is likely to

favour BT (and indeed all incumbent operators) at the expense of potential competitors.

11.20 ORPL is subject to similar limitations. The DGT will have substantial power to influence BT's growth and market share, and it is not clear how this power will be used. There is a danger that the DGT will become committed to increasing BT's output at the expense of existing and potential competitors; whether or not this is true, potential competitors might *feel* at a disadvantage, and be deterred from entry.

11.21 If BT does manage to 'capture' the DGT, there is a strong possibility that regulation will become steadily more entrenched, and less likely to fade away as competition increases. Both schemes are thus potentially inimical to competition. ORPL is perhaps less vulnerable insofar as BT's prospects are less favourable under it, hence BT is more likely to press for the abandonment of the scheme.

(e) *Proceeds and Prospects*

11.22 'No explicit constraints' offers BT excellent prospects, and this would be reflected in the proceeds of sale. BT's success will ultimately depend upon its own ability (within the licensing framework), and it should have no reason to fear this outcome. BT would be subject to reference to the MMC, just as any other large firm. There is a danger that consumers, politicians and public opinion might take a more critical view, and eventually insist on the imposition of a more severe regulatory scheme after privatisation, but there is less scope for a hostile DGT to exercise discretion against BT.

11.23 If the Working Group scheme operates with some degree of severity, the prospects for BT do not look particularly exciting. A 'reasonable' rate of return will be earned, but limitations on profits will probably restrict growth and innovation. Employees will benefit from the reduced concern for efficiency; restrictive practices may prevail. Because of lower prices, and to the extent that the DGT and the Secretary of State are persuaded to sympathise with BT, the risks of competition may be diminished. As an investment, BT's shares will be safe but dull. Proceeds of sale will be moderate.

11.24 ORPL in principle encourages BT to grow, and places no restrictions on its pricing and investment policy. However, the operation of the levy is likely to reduce the availability of internal funds and increase the riskiness of the business; the result is likely to be lower growth and uncertain prospects. BT will be dependent on the DGT's growth norm, but even if this is acceptable the levy still has to be paid. Finally, but by no means least important, the novelty and complexity of the ORPL scheme may deter investors and their advisers. This will mean either significantly lower proceeds upon flotation or delaying privatisation for several years, neither of which is in BT's interests.

11.25 ORPL is undoubtedly the least acceptable scheme with respect to BT's prospects, both immediate and long term. Maximum rate of return would damage BT's prospects if it were operated strictly; the damage could be ameliorated to the extent that BT managed to 'capture' the DGT, but even so the prospects would not be exciting. 'No explicit constraints' offers the most attractive prospect for BT.

Conclusions

11.26 With 'no explicit constraints', the degree of direct control is small. Consequently, there are hardly any adverse consequences for efficiency, investment and innovation; the burden of regulation is negligible; competition is not jeopardised; and BT's prospects are excellent. The serious disadvantage of this scheme is that in the short run it does not seriously limit the exercise of BT's monopoly power. This alternative is likely to be perceived as insufficiently effective.

11.27 The chief merits of the Working Group's rate of return scheme are that it would be widely perceived as dealing with the important problem of controlling monopoly; prices would be lower; the scheme is familiar to investors; BT would have reasonably safe if unexciting prospects. A serious attempt has been made to overcome the acknowledged defects of US regulation; nevertheless the characteristic disadvantages of this approach remain: the disincentives to efficiency and innovation; the distortions in investment patterns; the heavy burden of regulation; the disincentive to new entry and long-term threat to competition given the likelihood of 'capture'; and the uninspiring prospects for BT.

11.28 The attraction of ORPL is that it tackles the problem of monopoly power in an imaginative way, by giving BT a positive incentive not to exercise this power; as a result, output could be higher and prices lower. This scheme has serious disadvantages, however the precise effects on prices and output are uncertain. Existing and potential competitors may be deterred. In order to put the scheme into effect, a new and substantial levy must be imposed on BT's profits. This could reduce both the incentive and ability to invest and innovate. Operating the ORPL scheme will impose a greater burden than at first apparent and there is considerable scope for capture, to the detriment of competition. The novelty and complexity of the scheme make the prospects for BT very uncertain, and it would be difficult to persuade investors otherwise. When floating a company of BT's size (£6,000 million turnover) the confidence of the City is vital.

11.29 The ranking of the schemes as discussed above is set out in the accompanying Table. This is admittedly a crude repesentation, since mere numerical ranking cannot convey the complexities of the comparisons or the 'distance' between the alternatives. Nevertheless, two broad conclusions emerge quite clearly.

Table 1: *Interim ranking of schemes for regulating BT's profitability*

	No Explicit Constraints	Working Group MRR	ORPL
Protection against Monopoly	3	2	1
Efficency and Innovation	1	2=	2=
Burden of Regulation	1	3	2
Promotion of Competition	1	3	2
Proceeds and Prospects	1	2	3

11.30 The first major conclusion is that it is extremely difficult to decide which of the MRR and OPRL schemes is better (or worse) than the other. ORPL scores slightly higher on three of the sub-headings, though there is some room for difference of opinion here, but scores significantly lower with respect to Proceeds and Prospects for BT.

11.31 The second major conclusion is that on four out of the five criteria, both MRR and ORPL are significantly worse than 'no explicit constraints'. The argument against this scheme is that it does not seem to provide protection against monopoly power. Even here it is by no means certain that either of the other two schemes provides as adequate protection in the longer run.

11.32 If attention is confined to ORPL versus the MRR scheme, the choice would be between a scheme that is largely unknown and a variant of one that is known to be unsatisfactory. Neither can be recommended. The absence of constraints is superior in almost all respects, and could be strongly recommended if it were not for the apparent short-term failure to limit monopoly power.

11.33 This conclusion suggests that an attempt be made to find an alternative scheme which preserves most of the virtues of 'no explicit constraints' while incorporating a conspicuous element of control over short-term monopoly power.

12. A profit ceiling scheme

12.1 One of the major defects of conventional rate-of-return regulation is that it makes no provision for distinguishing between the different sources of profit: superior performance, monopoly and luck. As a result, superior performance is discouraged, and monopoly power is marked by inefficiency and high costs. The Working Group attempted to meet this point by introducing the 10 per cent flexibility element, but this was a relatively minor part of the scheme, and subject to difficulties of its own, as noted earlier. The fundamental constraint still remained, that rate of return should not exceed the cost of capital.

12.2 Suppose, instead, that the maximum rate of return were set at a higher level. Fewer monopoly profits would be caught, but by the same token efficiency would less often be discouraged. We are thus led to the notion of a 'ceiling' rate of return, which should not be exceeded, but which in no sense represents a 'target' or 'desired' or 'expected' rate of return. The level of the ceiling would not be an economic decision, which can be set on a rational basis after detailed comparisons with rates earned elsewhere in businesses of comparable risk. It would be a purely political decision concerning the level which consumers, voters and ministers will find tolerable. The aim of the approach is not to identify a 'reasonable' rate of return but to identify 'unreasonable' ones.

12.3 With a ceiling scheme in operation, no regulatory action would be taken on the *general* level of prices and profits as long as the ceiling were not exceeded. However, a reference could be made to the MMC if *specific* prices or practices appeared to be anti-competitive. If the ceiling were exceeded, an immediate price reduction would be required, as a short-term remedy. If the ceiling were *persistently* exceeded, more serious investigation by the MMC would be required to ascertain the reasons for this, and to recommend longer-term remedies (e.g. raising the ceiling or imposing price or profit control, as appropriate).

12.4 There is, of course, a danger that high profits due to superior performance instead of monopoly will trigger orders to reduce prices. Against this is the general presumption that discretion is, on balance, more likely to be harmful than beneficial.

12.5 The following provisions in the licence would give effect to the foregoing philosophy. Comments on these provisions follow afterwards.

(i) BT's licence should define a ceiling rate of return on capital.

(ii) If in any year BT's achieved rate of return on capital exceeds the ceiling, prices should be reduced within 4 months so as to eliminate the profit in excess of the ceiling. Prices should not be increased until achieved rate of return falls below the ceiling.

(iii) The extent of the price reduction required should be judged by reference to output and costs in the year just completed (rather than by reference to expected output and costs in the subsequent year).

(iv) If the ceiling is exceeded three or more years in any six-year period, it would be understood that the DGT would refer BT to the MMC.

(v) Provisions (ii) to (iv) should apply separately to BT Inland Division and BT International.

(vi) Provisions (i) to (v) should apply to the first 5 years of the licence only.

12.6 It has already been emphasised that the ceiling is in no sense a 'desired' level which BT 'ought' to achieve. In particular, it is *not* 'the return on capital sufficient to finance the supply of [telecommunications services] and the development and use of new techniques' which is referred to in Clause 3 of the Bill. The level of the ceiling will require further discussion, but if a level of the order of 5 per cent (in real terms) is thought to be a 'normal' rate of return, which reflects the cost of capital, then the ceiling might be roughly twice as high, say 10 per cent. As already noted, this level is primarily a matter of political judgement, though account should be taken of the increasing burdens, disincentives and distortions as the ceiling is lowered.

12.7 Whether the ceiling would be specified using CCA or historic cost would depend upon which method of accounting a privatised BT chose to adopt. Accounting rules would need to be agreed e.g. as regards depreciation, but detailed monitoring by OFTEL would not be required unless the achieved return was close to the ceiling. If this should happen frequently, it would indicate that the ceiling was set too low.

12.8 The purpose of specifying that price reductions should be judged against past output and cost rather than against future conditions is partly to simplify and speed up the procedure, and partly to avoid the need for discretion (and persuasion). Checking that an adequate price reduction has been made is then merely a matter of arithmetic. (If inflation were severe, some adjustment would need to be made — perhaps adjusting total revenue by the RPI). The term 'price reduction' is not meant to preclude the increase of some prices (e.g. in 'rebalancing' or 'de-averaging') provided that total revenue (in terms of the previous year's actual output) falls sufficiently to bring the rate of return below the ceiling.

12.9 It would be possible to specify price reductions to eliminate only a proportion (less than 100 per cent) of the excess return, but this would be less simple and appealing, and there might not be sufficient disincentive to exceed the ceiling.

12.10 The inter-relations between BT's Local and National Network Divisions are so close that any attempt to identify separate rates of return would seem fruitless. There is a much sharper split between UK and international business. In addition, the rate of return on international services, currently 26 per cent on allocated costs, has been persistently high over many years, reflecting BT's monopoly position. This is not to suggest that all the international profits are due to monopoly — BT is in active competition with other international switching centres for the overseas business of PTT's and multinationals — but some explicit monitoring and control seems appropriate.

We now briefly appraise the profit ceiling approach against the five criteria used before.

(a) *Promotion of Competition*

12.11 A profit ceiling would prevent the emergence of high total profits. However, it would not focus explicitly on the services of greatest monopoly concern. The imposition of separate ceilings on inland and international businesses would bite most severely in the latter area, but it is plausible that these could be dealt with by allowing competition if public policy so indicated.

(b) *Efficiency and Innovation*

12.12 Provided that the ceiling were set high enough so as not to be operative most of the time, there would be little disincentive to efficiency and innovation. However, there is the '100 per cent tax' problem when the ceiling does operate.

(c) *Burden of Regulation*

12.13 The burden of regulation would depend crucially upon the level of the ceiling. As long as BT was operating below the ceiling, very little monitoring would be required; the bulk would be on the international side, especially concerning the allocation of joint costs. If the ceiling were breached, there would be problems of calculating the precise rates of return, which would necessitate calculating and agreeing the rate base and allowable expenses. For this reason, it would probably be necessary to investigate and agree the accounts even in years when the ceilings were not in question. Once allowed total revenues have been agreed, implementation of the tariff reduction is quite straightforward and requires no discretion on the part of the DGT.

(d) *Promotion of Competition*

12.14 Insofar as the ceiling lowers BT's prices, it will reduce the prospects of competition, but the disincentive effect is likely to be slight. The DGT clearly has no obligation to ensure that BT achieves the ceiling and the likelihood of capture is relatively small since the DGT may not be involved too frequently and his discretion is limited. Consequently, the ceiling scheme provides no basis for advising the Secretary of State against entry.

(e) *Proceeds and Prospects*

12.15 Prospects and proceeds are good, provided that the ceiling is not set too low and is not expected to be reduced by the MMC or modified by further constraints.

12.16 Overall, the profit ceiling scheme ranks between 'no explicit constraints' and the other two schemes. It does not seem to cope with monopoly as well as the MRR scheme, at least in the short-term, but has less of the MRR's defects on other criteria.

12.17 The level of the ceiling is absolutely crucial. If the ceiling is high, as assumed so far, the scheme will operate in a way comparable to the absence of explicit constraints on profit: the complex rate of return machine will merely have to be kept ticking over ready for use. However, if the ceiling is low, this machine will have to be used fairly frequently, and the scheme will operate like conventional rate of return regulation (or like the MRR without the flexibility element).

12.18 A political difficulty with the ceiling scheme must be noted. If the Secretary of State were to set a ceiling of, say, 10 per cent on the basis that profits above that would be unreasonable, he is open to the allegation that he therefore believes a profit of 9.9 per cent *is* reasonable. The rationale of the ceiling does *not* imply this — but this is not the way it would appear. For this reason, the Secretary of State would probably be obliged to set a low ceiling, much closer to the (claimed) cost of capital — perhaps 7 or 8 per cent. At such a level, however, the scheme would have all the defects of traditional rate of return control, and could not be recommended.

13. A local tariff reduction scheme

13.1 Rate of return control, whatever the variant, suffers from two major defects. First, it is burdensome and costly to operate, reduces the incentive to efficiency and innovation, and distorts the pattern of investment. Second, it covers the whole of the business, or a large part of it, and it does not focus explicitly on the particular services where monopoly power and public concern are greatest.

13.2 In the case of BT, (i) rate of return constraints applied to the licensed business will necessarily apply also to international services (where public concern is not strong and in certain respects there is a degree of competition already, and further competition could probably be allowed), to private circuits and to heavy density trunk routes (where it is hoped that Mercury will provide significant competition); (ii) rate of return constraints do not prevent rises in the price of certain services provided they are compensated by reductions in other prices, and there is no guarantee that the rises will not be in the services of particular concern (specifically, inland versus international, rentals versus calls, domestic versus business, local versus trunk); (iii) rate of return constraints do not prevent price rises due to increases in costs (wherever these costs occur and whatever their magnitude).

13.3 The MRR scheme attempts to cope with these problems by means of the 10 per cent discretionary flexibility and the specification of separate rates of return for particular services. We have already indicated the drawbacks of these devices. Most importantly, specifying separate rates of return does not trigger action if one is exceeded, does not influence tariff structure, depends upon the arbitrary allocation of joint costs, and provides no protection against cost increases.

13.4 An alternative approach is to focus explicitly upon tariffs which are the source of the main concern. As argued in Section 4, ultimately the only effective way of combating monopoly power is by competition. However, regulation can help to assure consumers that the situation will not 'deteriorate'. Specifically, it is possible to insert conditions in BT's licence to prevent prices of monopoly services being increased faster than the rate of inflation, or perhaps to reduce them in real terms. An additional merit of a local tariff reduction scheme is that it can focus precisely upon those services of particular concern.

13.5 When the 'Buzby Bond' was under discussion, the proposal was that BT's prices should not increase by more than RPI — X per cent, where X was a specified number. This idea could be adapted to present circumstances, by incorporating a condition in BT's licence requiring it not to increase tariffs on monopoly services by more than RPI — X per cent, i.e. to reduce these tariffs by X per cent in real terms. There are several details to be settled: to which services should tariff reduction apply? Should the guarantee apply to each service separately or to a basket of services? At what level should X be set?

13.6 As noted earlier, the services where BT has significant monopoly power which are also of public concern are essentially rentals and local calls. An estimate of the revenue associated with these services would be: residential rentals £795 million, business rentals £292 million and local calls £1,011 million, totalling £2,098 million (see 1981/2 Annual Report page 44). This represents 37 per cent of BT's total turnover, or 45 per cent of their inland revenue. To some extent this overestimates the extent of monopoly. Large businesses will be able to utilise Mercury and cellular radio to reduce their volume of local calls and number of lines from BT. It is also reported that many US residential subscribers are finding it profitable to subscribe to MCI — a break-even telephone bill of about £18 per month has been suggested.

13.7 On the other hand, Mercury will initially provide competition for trunk calls between about eight major cities, but trunk calls between smaller towns will be provided only by BT. Apparently the busiest 100 trunk routes on which BT has recently cut prices accounted for a revenue of £300 million out of £1,551 million, but there are other direct heavy density lines where costs might justify similar price reductions. To ensure that Mercury's competition is felt even more widely, it would seem appropriate to incorporate non-discrimination clauses in BT's licence (see paragraph 13.15 below). For the present it seems simpler to leave trunk calls out of any tariff reduction scheme.

13.8 Should the RPI — X per cent constraint apply separately to business rentals, residential rentals and local call charges? Or should RPI — X per cent apply

to a basket of local services containing these three elements, as reflected in a specially-constructed Local Tariff Index? The advantages of separate constraints are (i) it is easier for the subscriber to understand, because the constraint applies to a 'real' price with which he is familiar; and (ii) each subscriber has a guarantee about the particular service(s) of relevance to him, because separate constraints prevent 'rebalancing' within the basket — thus, a domestic subscriber need not fear that the price of the bundle will go down but domestic rentals will be increased while business rentals fall.

13.9 The advantages of a basket of services are (i) a larger number of local services could be included which it would be tedious (and undesirable, for reasons noted below) to write into the licence individually, e.g. connection charges for business and rental subscribers, connection charges and rentals on shared lines, peak, standard and cheap rate calls, operator connected calls, directory and special services, etc. (ii) new tariff variations could be introduced without revising the licence (e.g. 'de-averaging' of tariffs or rentals by geographical area); (iii) 'rebalancing' is possible, and relative prices are not constrained to stay the same over (say) 5 years regardless of movements in relative costs; (iv) BT has more flexibility in deciding where to make the required tariff reductions.

13.10 Put rather crudely, the balance of 'political' advantage may lie with the first alternative, but the balance of the 'economic' advantage lies with the second. The 'tariff basket' is recommended here.

13.11 As to the appropriate level of X, the 'Buzby Bond' envisaged a figure of 2 per cent for BT as a whole. At that time, significant reductions in BT's costs were expected. BT's performance target has in fact been set at 5 per cent in 1981/2 and 1982/3; 2.1 and 4.8 per cent have been achieved. The Chairman's statement in the latest published accounts, after referring to the need for rebalancing of tariffs and the tendency for price increases for domestic to be higher than for business customers, states that 'Overall, we are aiming to keep the average of tariff increases, for both business and domestic customers, below the general level of price increases'. The precise figure is a matter for negotiation between BT and DoI.

13.12 To avoid public misunderstanding, it should be clear that a price reduction of X per cent in real terms is consistent with a price increase in nominal terms, unless X is greater than the rate of inflation. It would presumably be politically attractive to guarantee no increase in nominal terms, but this would require BT to take an unjustified gamble with respect to the rate of inflation.

13.13 Should performance targets be set to accompany these tariff reductions? As noted in the discussion of the Working Group's flexibility proposal, the danger is that the DGT and BT will impose on consumers their own view of what consumers ought to want. Nevertheless, it would seem sensible to ensure that quality of service did not deteriorate as a result of the tariff reduction scheme. For example, there may be a danger that BT will delay in connecting new subscribers in areas where connection costs have risen over the allowed level of connection charges, or the grade of service for local calls may be allowed to deteriorate. There are so many possible attributes of quality that it seems difficult to write these into the licence in any specific way, but a clause committing BT not to reduce quality on the monopoly routes would seem useful. The DGT would be required to monitor quality of service, paying special attention to consumer complaints, and if necessary a reference could be made to the MMC.

13.14 In any event, an automatic reference to the MMC after, say, five years seems appropriate. By that time the extent and strength of competition should have become more apparent, and it may be appropriate to extend or restrict the scope of the 'monopoly basket'; to change the value of X or to rebase the calculation; to abolish the tariff reduction scheme altogether or to impose additional constraints.

13.15 An important accompaniment of this scheme would be conditions in the licence designed to ensure (a) that BT does not deter or drive out competition by predatory pricing or some variant thereof, and (b) that any tariff reductions designed to meet competition are passed on to as many consumers as possible. The principal requirement would seem to be a condition that would prevent BT from charging different prices for calls on routes having similar cost structures, so that for example BT could not cut trunk tariffs merely on the routes actually served by Mercury. Such a non-discrimination condition could also be used to ensure that 'transit calls' also benefited: for example, if prices on the route from A to B were cut, non-discrimination could require that the price of a call from A to C which typically transited through B should not exceed the price of AB plus the price of BC. Thus, it may well be that non-discrimination would require a new set of transit routes to be charged at an intermedial rate between standard and low-cost trunk routes. The details of this should be left to BT, and not incorporated into the 'monopoly basket'. However, if BT fails to respond in these directions, and there are allegations and evidence of price discrimination, the DGT will be able to take action for breach of licence.

13.16 To aid in enforcing these licence conditions, BT should be required to publish its tarrifs. This would also facilitate competition. Normally such a requirement for a commercial firm would be

inappropriate, but BT is in an abnormally dominant position, and it is in the public interest to facilitate competition as far as possible.

13.17 The following provisions would seem to give effect to the Local Tariff Reduction scheme just described:

(i) BT's licence would define a Local Tariff Index (LTI) comprising rentals, local calls and other services of particular concern (e.g. call boxes);
(ii) BT would be required to set its tariffs in such a way that the LTI did not increase faster than RPI — X per cent, where X is a number to be negotiated;
(iii) BT would be required not to allow the quality of service to deteriorate on the services contained in the LTI;
(iv) BT would be required not to discriminate anti-competitively in setting its tariffs;
(v) BT would be required to publish its tariffs;
(vi) Clauses (i) to (iii) would apply for the first 5 years of the licence only;
(vii) after the fourth year of the licence there should be an automatic reference to the MMC to consider, in all the relevant circumstances and in the light of experience to date, what if any modifications to the licence would be appropriate.

We may now evaluate this scheme against the five criteria.

(a) *Protection against Monopoly*

13.18 Tariff reduction is focused precisely on the services of monopoly concern, and consumers have a guarantee of improvement. Non-discrimination provisions and the knowledge of a licence variation reference to the MMC will provide additional protection on trunk services where competition is likely to be slow to develop. Guaranteed price reductions do reduce the incentive to new entry and perhaps expansion by existing competitors, but the DGT will not be so closely involved with BT as to recommend against granting new licences. It is most important that the X per cent tariff reduction should not be so severe that BT can use it as an excuse to argue against competition in other parts of its business.

(b) *Efficiency and Innovation*

13.19 The local tariff reduction scheme provides no disincentive to efficiency or innovation — indeed, the knowledge that a target has to be met each year may prove a spur to efficiency. Any cost reductions exceeding the agreed target are kept by the company. Since the company plan is to reduce local tariffs in real terms, there is little *additional* reduction in revenue which might hamper investment.

(c) *Burden of Regulation*

13.20 The composition and definition of the LTI will need to be agreed, but BT has already constructed and calculated several indices of this kind. (For example, the Average Residential Bill Index gives weights of 0.406 to rental, 0.261 to local calls, 0.263 to trunk calls and 0.070 to international. There are similar indices for Business and Farm Bills). Monitoring of the LTI would impose a negligible burden. If the RPI — X per cent constraint is violated the DGT will need to ascertain the reason for this and remedial action may need to be taken; but a simple tariff reduction will suffice. The DGT does not have to make any judgements or calculations with respect to capital, allocation of costs, rates of return, future movements of costs and demand, desirable performance, etc. He will need to monitor the non-discrimination clause, but he would need to do so anyway as part of his duties with respect to anti-competitive practices.

(d) *Promotion of Competition*

13.21 Lower prices reduce the incentive to new entry in local services, but the incentive to enter trunk services is not impaired. The DGT would not be more susceptible to capture as a result of this scheme, and hence would not be specially influenced to advise against the licensing of new entry. The non-discrimination and tariff publication clauses, and the knowledge of automatic reference to the MMC, give competitors a better chance of success.

(e) *Proceeds and Prospects*

13.22 The concept of local tariff reduction is consistent with the Chairman's statement quoted in paragraph 13.11 and the tariff constraint leaves BT free to increase profits by reducing costs. BT's prospects should not be impaired and proceeds of sale will be maximised. BT has recently given assurances that tariffs will not be increased, and insofar as public opinion finds the scheme familiar and an acceptable restriction on BT's monopoly power, BT's long-term prospects could be even better than if no constraint at all were imposed.

14. Final evaluation and further recommendations

14.1 In order to compare the Profit Ceiling and Local Tariff Reduction schemes against the other proposed schemes, it will be helpful to extend the table of rankings developed in paragraph 11.30.

Table 2: *Final Ranking of Schemes for Regulating BT's Profitability*

	No Explicit Constraints	Working Group MRR	ORPL	Profit Ceiling	Local Tariff Reduction
Protection against Monopoly	5	3	2	4	1
Efficiency and Innovation	1=	4=	4=	3	1=
Burden of Regulation	1	5	4	3	2
Promotion of Competition	1	5	4	2=	2=
Proceeds and Prospects	1=	4	5	3	1=

14.2 As noted earlier, the MRR and ORPL schemes have merits in providing protection against monopoly, but are subject to serious deficiencies in other respects. Imposing no explicit constraints on profits scores highest on four criteria, but fails to provide adequate short-term protection against monopoly. A profit ceiling avoids the worst disadvantages of the MRR and ORPL schemes but provides less adequate protection against monopoly.

14.3 The local tariff reduction scheme scores very highly on all criteria. It is significantly better than all other schemes with respect to immediate protection against monopoly power in the services which count, for domestic and small businesses. Performance on all other criteria is as good, or nearly as good, as in the absence of explicit constraints. It must therefore be the recommended scheme.

14.4 This is not to say that the scheme has no defects. Imposing real price reductions for five successive years on services with a turnover exceeding £2,000 million, representing nearly half BT's UK telephone business, is no small matter. It represents a greater degree of intervention than would normally be acceptable in a private sector company. Some might regard it as 'the thin end of the wedge'. It could also delay the development of competition which would benefit the very customers the scheme is designed to protect — partly because new entry would be less attractive to potential competitors, and partly because the government might see less need to authorise it. Finally, there is a danger that BT will be able to persuade the government not to licence new entry in other services as a quid pro quo for accepting local tariff reductions. However, no scheme is ideal. All the other schemes we have examined have even more severe disadvantages. Despite its defects, the local tariff reduction scheme is significantly preferable to the available alternatives.

14.5 It is worth noting that profit regulation elsewhere seems to be moving in this direction. In the USA, ineffective but time-consuming annual hearings to establish how far price increases are justified by cost increases are being replaced by 'escalator clauses' which allow automatic price increases up to the amount of some index. The crucial feature is that this index is outside the control of the regulated company (e.g. input prices in the industry or economy as a whole), so that the company has the incentive to reduce costs and keep the difference. In the UK, the MMC has recently recommended abandoning the attempt to monitor the rate of return on contraceptive sheaths achieved by LRC Products (a division of LRC International),* not least because of the difficulty of allocating joint costs between the products of monopoly concern and the rest of the business, and has instead suggested a requirement that product prices not be increased each year by more than an index of costs less 1.5 per cent; this is to last for five years. Such controls are easy to understand, relatively cheap and simple to monitor, they preserve the incentives to efficiency, and they can be focused precisely on the areas of concern so as not to restrict the operation of the business in other respects.

14.6 It might be asked whether there is any advantage to be gained from combining the profit ceiling and local tariff reduction schemes. They seem to complement each other insofar as one focuses on overall profit and the other on particular prices. Indeed, if one were to start with a ceiling scheme, there would be something to be said for adding a

*Report on the supply in the United Kingdom of contraceptive sheaths. MMC, November 1982. Cmnd. 8689.

local tariff reduction scheme to make it more effective. But the converse is not true. If one starts with a local tariff reduction scheme there is no need for a profit ceiling because tariff reductions are designed to protect precisely those services where competition is thought to be inadequate. Even if it is seldom operated, a ceiling scheme still involves the burden of allocating joint costs and calculating rates of return, while if the ceiling is set so low that it is frequently breached, all the disincentives to efficiency of traditional rate of return regulation are introduced. Thus, to impose a profit ceiling on a local tariff reduction scheme is both unnecessary and undesirable.

14.7 If it is still possible to amend the terms of the Telecommunications Bill, three modifications might be considered which would make the proposed regulatory scheme more effective.

(1) Clause 3(1)(b) of the Telecommunications Bill requires the Secretary of State and the DGT to take into account the need for suppliers of telecommunications services to achieve a sufficient return on capital. This is presumably intended to prevent the imposition of too low a maximum rate of return. However, such an obligation invites regulatory capture, and there is a danger that it may be used to restrict entry or competition in order than an incumbent achieve this 'sufficient rate of return'. Such restrictions would seriously weaken the consumer's protection against monopoly. Many of the arguments against a maximum return apply equally to a minimum return. Consideration should be given to removing or modifying this sub-clause.

(2) It is envisaged that BT's licence will require it to provide 'public call box services, emergency services and services in rural areas'. There is no question but that these services ought to be provided. However, the implicit requirement that these services should be partly financed by cross-subsidisation raises the danger that the cost of provision (which will not become apparent) may be used as another argument to restrict competition or entry (the 'cream-skimming' argument) but it is not suggested that BT is to make this argument. However, to avoid this danger, provision could be made for explicit public subsidy if an adequate case can be made out by the potential beneficiaries. Clause 42 of the Bill allows local authorities to do this, but there is no provision for the Secretary of State to do so. Admittedly, it might look odd to subsidise the highly profitable BT, but the alternative of restricted competition would be worse. Furthermore, the subsidy need not be limited to BT, hence it might be used to facilitate new entry and cheaper provision (e.g. electricity boards might lay telephone cable to remote rural areas and outlying houses).

(3) Since the MMC is to play a significant role in regulating BT, particularly with respect to modifications in the licence, it is important that a consistent and constructive approach be taken. Clause 11 of the Bill requires the MMC to report on whether any matters operate against the public interest, where this will include regard to the considerations in Clause 3. Now the MMC has come under some criticism for the unpredictability of its verdicts on mergers, especially in the last two years. The main source of concern has been the varied interpretation of the phrase 'public interest'. It would seem preferable if, in the context of licences for telecommunication operators, the MMC were required to report on whether any matters were likely adversely to affect competition. Alternatively, their criteria might be Clause 3 itself. In either case, the ambiguous phrase 'public interest' would be better omitted.

14.8 It has been argued throughout this Report that effective regulation requires increasing competitive pressure. Without it, the regulator as well as consumers are at the mercy of a dominant supplier. It may be helpful here to review some of the ways in which competition could be encouraged.

(1) The Department's provisional view that switching of interactive services between cable TV networks should be done by BT or Mercury might be modified to allow the cable companies themselves to compete with BT and Mercury; their incremental costs of providing some local telephone service might be rather low. Other potential networks should also be allowed to compete with BT and Mercury for the business. Nationalised industries and other companies owning suitable rights of way should be encouraged to participate.

(2) The extent of competition from mobile radios, cellular radio and microwave networks is limited by the amount of spectrum made available for these uses. Of course, there is an overall scarcity of suitable spectrum, and there are other uses for it, but if more could be made available for telecommunications it would enable more effective competition to take place and facilitate additional public networks besides Mercury. The interim recommendation of the Merriman Committee, that spectrum formerly used for 405 line TV be reallocated to mobile radio, is a step in the right direction.

(3) There should be positive encouragement for market entry by network operators exploiting alternative terrestrial and space technologies to those being used by BT and Mercury. An important example would be a domestic satellite network combining data and video transmission with telecommunication services.

(4) A number of large companies have extensive private networks which they are not presently allowed to make available to other interested parties (such as their dealers). Allowing shared use of private networks (among a closed user group) would provide more competition.

(5) Continuation of BT's monopoly of the first instrument will restrict competition in sales of equipment. Consideration should be given to ending this monopoly at an early date.

(6) Most important of all, unrestricted resale of BT's circuits for voice telephony would bring a significant reduction in prices of trunk calls to more closely align them with the price of private circuits. BT's licence should therefore require it to allow resale for voice. Since BT might respond by raising circuit prices, it is all the more important that Mercury and other competitors are allowed to provide circuits, and that BT should be prevented from price discriminating between routes subject to direct competition and other routes where it has a monopoly.

(7) Competition should be particularly encouraged on international business. There are international agreements which must be respected, and no doubt there are also questions of national interest to be considered. Nonetheless, the arrangements which existed when BT was a nationalised monopoly will not necessarily be appropriate after privatisation. Competition for BT is presently restricted. Mercury is able to lease circuits to other countries, but the terms and standards of these leases are effectively negotiated by BT, and Mercury is prohibited from access to public switched networks abroad i.e. it can only link with individual customers. Alternative negotiating arrangements should be explored, perhaps using OFTEL or an association of telecommunications operators (with unrestricted membership). Arrangements could probably be made for linking with switched networks in the USA and perhaps with networks in other countries, provided that UK government approval and encouragement were given. The prospect of access to international business would be a significant factor in encouraging other potential entrants into the domestic market. Finally, the logic of the argument for unrestricted resale of leased lines applies with equal force to international as to domestic markets.

14.9 The Secretary of State expressed a desire for regulation with a light rein. The present study suggests that the most effective way of achieving this is by facilitating the entry of new competitors, inserting clauses in BT's licence to extend the benefits of existing competition, and introducing a local tariff reduction scheme to protect domestic and small business subscribers until adequate competition develops.

APPENDIX 1: Theoretical analysis of an output-related profits levy

1. This appendix presents a brief technical analysis of ORPL. The aim is to increase our understanding of how ORPL is likely to work — in particular, what determines a firm's response to the imposition of such a levy.

2. Large-scale computer models of a particular organisation could be envisaged as a means of exploring the effects of ORPL — from the perspective of the firm itself or the regulator. Such a model of the Bell System has been used to explore the effects of alternative depreciation policies. However, the construction and application of such a model could take several years. For present purposes we need something that can be analysed in a matter of days.

3. The model assumes a profit-maximising producer of a single product; simple cost and demand functions involving no links over time (e.g. no capital equipment) and perfect information about the future. This is undoubtedly a crude and over-simplified model, and its significance must not be over-rated. Nevertheless, it does provide certain useful insights.

4. In particular, the model enables us to examine two fundamental propositions that have been taken for granted: (1) that ORPL will increase output, and (2) that the extent of the firm's response to ORPL will be greater the higher is elasticity of demand. The model shows that the first proposition is not necessarily true, and the second is false — in fact, the converse is true (within the context of the model).

5. Intuitively, ORPL has three main effects on the firm. If this year's output is increased (past the point of profit maximisation) then, other things being equal, there will be (i) a *reduction* in this year's pre-levy profits; (ii) a *reduction* in the rate of levy applied to this year's profits; and (iii) an *increase* in the rate of levy applied to next year's profits (because increasing output this year *ipso facto* reduces growth next year). Thus, increasing output will be profitable if the levy falls enough to yield higher after-tax profits on lower pre-tax profits, *provided* that this gain is not outweighed by the reduction in post-levy profits in the next year.

6. To make all this precise, it will be convenient to use a continuous-time model. For purposes of numerical computation and forward planning, a discrete-time multiperiod model would be preferable, but our aim here is to gain some qualitative insights.

7. Let x(t) denote the level of output over time t. Let $\pi(x,t)$ denote (expected total profit as a function of output. Let $\theta(\dot{x}/x)$ be the proportion of total profit retained after the imposition of the levy.* This is an increasing function of the proportional rate of growth of output, hence $\theta'(\dot{x}/x) > 0$.

8. Assume that the firm's aim is to choose its pattern of output to maximise the (expected) present value of profits at discount rate r over a finite (but distant) horizon T. Formally, the problem is to choose the function x(t) to

$$\underset{x(t)}{\text{maximise}} \int_0^T e^{-rt}\, \theta(\dot{x}/x)\, \pi(x, t)\, dt \qquad (1)$$

9. After some manipulation, the Euler optimality condition for the maximisation of (1) can be written (suppressing t for simplicity)

$$\pi'(x) + \frac{\pi}{x} \cdot \frac{\delta\,(r-g)}{h} = 0 \qquad (2)$$

where $\delta = \frac{\theta'}{\theta} \cdot \frac{\dot{x}}{x}$ is the elasticity of post-levy profit retention rate with respect to output growth, $g = \dot{\pi}/\pi$ is the rate of growth of profit and $h = \dot{x}/x$ is the rate of growth of output.

10. In the conventional tax system, in which levy rate does not vary with output growth, we have $\delta = 0$ hence $\pi'(x) = 0$. This is the familiar result that a profit-maximiser chooses output such that marginal profit is zero.

11. With ORPL, positive growth reduces the tax rate, hence $\delta > 0$. Assuming that output is growing ($h > 0$), the second term in (2) is positive or negative according to whether $(r - g)$ is positive or negative, consequently the first term $\pi'(x)$ is negative or positive according to whether $(r - g)$ is positive or negative. Now $\pi'(x)$ negative indicates an output

*A dot above any parameter indicates differentiation with respect to time, a prime will denote differentiation with respect to output or growth.

beyond the profit-maximising level, and $(r-g)$ positive means that profits are growing at a lower rate than the discount rate.

12. Thus we have *Proposition 1*: The imposition of ORPL leads to an expansion or contraction of output according to whether the growth rate of profits is less than or greater than the discount rate. Under 'normal' circumstances, when pre-levy profits are growing at a rate not exceeding the discount rate, ORPL will lead to an expansion of output as expected. But in the event that profits are growing faster than the discount rate, it is advantageous to restrict current output so as to expand future output and lower the future levy rate. Roughly speaking, it is advantageous to arrange for the lowest levy to be paid on the highest profit.

13. If we consider the effect of ORPL at different points on the 'profit cycle', the firm will be induced to (i) expand at a moderate rate at the height of the boom and the depth of the slump (when $g=0$), (ii) expand at a faster rate during the post-boom down-swing (when $g<0$), and (iii) expand at a slower rate, or even contract, during the post-slump upswing. At the same time, however, there seems to be a built-in 'stabiliser'; as output growth (h) increases, the adjustment is reduced, and as output growth declines, the adjustment (h) is increased, thereby tending to offset the profit cycle effect.

14. Now suppose that total cost is directly proportional to output, so that profit may be written

$$\pi(x) = [p(x) - c]\,x \tag{3}$$

where $p(x)$ is the inverse demand function and c is constant marginal cost. Then

$$\pi'(x) = (p-c) + x\,p' = (p-c) - \frac{p}{e} \tag{4}$$

where $e = -p/xp'$ is the absolute price elasticity of demand. Substituting (3) and (4) into (2) and rearranging yields

$$\frac{p-c}{p} = \frac{1}{ke} \tag{5}$$

where

$$k = 1 + \frac{\delta\,(r-g)}{h} \tag{6}$$

15. ORPL evidently serves to multiply the firm's perceived price elasticity of demand by the factor k, hence—

Proposition 2: The effect of ORPL is greater (i) the greater the elasticity of the levy schedule (i.e. the greater the reduction in levy for a given output increase); (ii) the greater the discount rate (i.e. the less important it is to worry about effects on future profits); (iii) the lower the growth rate of profit; and (iv) the lower the growth rate of output.

16. Finally, consider how the effect of ORPL varies with the level of price elasticity of demand. Recall, however, that a profit-maximiser will always operate where demand is price elastic, hence one can only compare different degrees of price elasticity, rather than elastic and inelastic demands. From (5), we have the explicit expression for price

$$\frac{p}{c} = \frac{ke}{ke-1} \tag{7}$$

Proportionate change in price after imposing ORPL is given by—

$$\frac{p-p_o}{p_o} = \left(\frac{ke}{ke-1} - \frac{e}{e-1}\right) \div \frac{e}{e-1} \tag{8}$$

$$= \frac{1-k}{ke-1}$$

For $k>1$, that is for the 'normal' case where $g<r$, this is a decreasing function of e. Proportionate change in quantity is given approximately by

$$\frac{x-x_o}{x_o} \doteq -e.\ \frac{p-p_o}{p_o} = \frac{(k-1)}{ke-1} \tag{9}$$

which is also a decreasing function of e. That is;

Proposition 3: the higher the elasticity of demand, the *lower* the proportionate change in both price and quantity as a result of introducing ORPL.

APPENDIX 2: On constructing a practicable scheme for ORPL

1. Because ORPL is a novel idea, which had not yet been examined, the terms of reference required a practicable scheme to be developed before evaluating it against alternative schemes. The material in Section 9, and to some extent in Section 10, specify the main practical details of a possible scheme. Section 10 and this Appendix analyse some of the properties of this scheme. The Appendix is admittedly limited to a simple and unrealistic case (unconstrained profit-maximisation with perfect knowledge), but nonetheless it provides certain cautionary insights (see paragraph 4 in Appendix 1).

2. Some numerical calculations were also carried out, extending the example mentioned in paragraph 9.5 to include the response of pricing and output policy to the imposition of ORPL. These examples were based on BT's accounts for the last six years. However, the elasticities of demand and company objectives upon which these calculations were based were purely illustrative, and it was thought that to include these examples in this Report would be misleading. There was not sufficient time to make more realistic calculations.

3. If a government were contemplating introducing a variant of ORPL, it would clearly be vital to have a reasonable idea of how the company would respond with respect to price and output. This would also be necessary in order to calibrate the levy. Ideally, a 'pilot scheme' would be run, albeit on paper.

4. The difficulties of such an undertaking should not be underestimated. At a minimum it is necessary to specify (a) the objectives of the company (b) the elasticities of demand and cost which the company is facing (and those which it *believes* it is facing, if these are different). Account must be taken of uncertainty concerning the future, the problems of motivation and the effects of decentralised decision-making. The company's response, and the means of analysis, will depend upon whether an aggregate tariff index is adopted or a disaggregated set of quantities. In either case it is necessary to consider how the pattern of output, not merely the 'total', will change.

5. Despite these difficulties, further study would be worthwhile insofar as there could well be other situations more favourable to the adoption of ORPL. Circumstances here could hardly have been more adverse: a change in company ownership and objectives, the biggest company flotation by an order of magnitude, denationalisation under political opposition, rapidly changing technology and market conditions, no effective existing tax, considerable public concern, and pressure of the parliamentary timetable. In more propitious circumstances, the conclusion might be quite different.

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