



Applying the EU Regulatory Framework in microstates

**A report to the CYTA, EPT and Maltacom
by Ovum and Indepen
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Executive summary

I Study Objectives

The microstates¹ of the EU are one hundred times smaller than the four biggest macrostates². This report considers how these major differences in scale impact competitive and market conditions for the telecommunications industry. It then goes on to look at the implications of different market and competitive conditions for effective applications of the EU regulatory framework for telecommunications of July 2003.

II Competition Issues in Microstates

Problems of small scale are not confined to the telecommunications industry. Research by the OECD and Dr Michal Gal suggests that small scale requires a different approach to the application of competition policy in general. In particular there is a need in many industries to balance productive efficiency against the level of competition. Often this problem can be dealt with through international trade. But in the case of telecommunications the need to produce telecommunications locally limits the effectiveness of this remedy.

III Microstates versus Macrostate Market Conditions

A comparison of market conditions in the telecommunications industry of the microstates with those in the four biggest macrostates produces some surprising conclusions. On average the telecoms industry in the EU microstates:

- charges lower prices than those in competitive macrostates
- has achieved higher take up of the major basic services
- is more efficient
- has rebalanced prices for basic telephone services more closely to costs³.

It is important for national and EU regulatory authorities to keep this comparison of outcomes in mind when developing regulation for microstates.

IV Economy of Scale Effects

The available evidence suggests that:

- there are major economies of scale in the provision of core network services for both fixed and mobile operators
- there are additional economies of scale in the provision of access networks for mobile services but not for fixed services⁴

¹ We define a microstate as an EU state with a population of less than one million. Following enlargement there are three such states in the EU - Cyprus, Luxembourg and Malta

² France, Germany, Italy and the UK

³ With the exception of residential fixed line services in Malta

⁴ Fixed access networks raise issues of non-replicability and show economies of density. But they do not show significant economies of scale

- there are diseconomies of scale in the provision of retail functions. This largely reflects the strategy of microstate operators to provide only those products developed by macrostate operators for which there is significant demand
- we can expect to see increased economy of scale effects at the retail level in the future as operators incur the fixed costs of developing value added and content based services to offer over fixed and mobile next generation networks
- we might see a reduction in the impact of economies of scale on the supply of core network services as operators outsource key functions, such as switching and customer support, to foreign, larger, countries. But, given the fixed costs of outsourcing, it is less likely that this trend will apply to small operators such as local entrants and incumbents in microstates.

These effects have important implications for regulation in microstates:

- they increase the importance of microstate regulators making an appropriate trade off between competition and other factors in maximising economic and social welfare. In particular there is a much stronger need to balance competition against productive efficiency
- they limit the number of mobile operators which it is efficient to license. Our analysis indicates that the current number of mobile licences in microstates strikes a good balance between maximising competition and maximising product efficiency
- they limit the prospects for competitive entry at efficient access prices in microstates more than in macrostates
- they increase the importance of discouraging inefficient entry. A microstate incumbent's ability to meet its universal service obligation and to invest in new technologies is more vulnerable to inefficient entry than that of a macrostate incumbent
- they increase the importance of ensuring that microstate incumbents have the necessary investment incentives to build a nationwide next generation network
- it is especially important to build economy of scale effects into regulated access prices in microstates.

V Market Entry in Microstates

We expect to see strong competition in the corporate sector of microstates but limited competition in the mass market for fixed services:

- large foreign companies find entry unattractive because of the limited size of the microstate mass market – even though the balance of power between the incumbent and the large foreign entrant is more equal in microstates than macrostates
- small local entrants will struggle to create a successful business at efficient access prices, partly because of economy of scale effects and partly because microstate incumbents charge relatively low prices which are largely rebalanced to cost.

VI The Costs and Benefits of Regulation

There is a significant problem in regulating the competitive telecommunications industry of a microstate. The costs of developing, implementing and enforcing regulation varies relatively little with the size of the market being regulated while the benefits are typically proportionate to the size of the market. Given these differences in the way costs and benefits vary with market size it is possible that regulatory approaches and remedies which are appropriate in macrostates lead to economic losses in microstates.

To deal with the problem:

- it is especially important that microstate NRAs use **regulatory impact assessments** to ensure that standard regulatory measures imposed in macrostates continue to make economic sense in microstates
- there is a need to develop a **simpler approach** to regulation in microstates than macrostates so as to keep the cost burden of regulation to reasonable levels. Microstate NRAs cannot simply copy remedies and approaches from macrostates. Nor can they regulate in the same way as a macrostate NRA. This would require similar levels of regulatory resources which would raise end-user prices by over 50%.

VII Proposals for Action

We suggest a number of measures to deal with the key differences identified above.

First microstate **incumbents** will need to develop new business models to deal with the major new economy of scale effects inherent in the development of value added and content based services running over next generation networks

Secondly it would be helpful to microstate NRAs if the **ERG** were to develop guidance on remedies which takes specific account of market scale. It would also be helpful to microstate NRAs if the **European Commission** were to take account of scale differences in monitoring implementation of the EU regulatory framework and in developing future regulatory policy. For example it might:

- judge the success of regulation in microstates by comparing key outcomes with those in competitive macrostate and by assessing the contestability of markets rather than by comparing the industry structure in macrostates with that in competitive microstates
- focus the Article 7 Task Force's review of the remedies proposed by microstate NRAs on evidence that the benefits of each remedy outweigh its costs
- take account of issues of market scale when it reviews the current regulatory framework and when it issues general guidance to member states.

Finally we propose that, whilst the ERG is developing appropriate guidance, microstate NRAs might wish to consider the following factors whilst developing remedies under the EU regulatory framework:

- microstate economies are different from macrostate economies. A microstate regulation cannot simply copy regulatory approaches developed in macrostates
- it is especially important in microstates to maximise economic welfare rather than competition and if an efficient telecommunications industry is to develop. This requires trade offs between competition and other factors
- it is important to take account of the economy of scale effects set out in Section IV above when developing remedies in microstates and to build these effects into access prices
- competitive entry is less likely in microstates than macrostates at efficient access prices. Microstate NRAs will come under pressure from struggling entrants to reduce access prices. It is important that they resist such pressure for economic efficiency
- if entry is limited it is important that markets are at least contestable so that the microstate incumbent is always under the threat of entry
- regulatory impact assessments are of particular importance in microstates to check that the benefit of any regulatory measure which is standard in a macrostate outweighs the cost
- a simpler, lower cost, approach to regulation is required in microstates so as to prevent substantial increases in end users prices. For example microstate NRAs might wish to:
 - focus their efforts within the market review process on developing proportionate remedies



- impose simpler, lower cost remedies than those imposed on macrostate incumbents – rather as Ofcom has done when it has regulated Kingston Communications in the UK
- simplify the microstate wholesale product set to that which makes all markets contestable
- use a simpler approach to setting access prices than that used in a macrostate. For example, given the economy of scale effects in a microstate, its NRA might base access prices on the incumbent's actual costs whilst checking its cost efficiency in other ways
- screen complaints from entrants by requiring a minimum standard of supporting evidence before any investigation starts
- put more emphasis on negotiation and arbitration to resolve disputes between operators.

1 Introduction

1.1 Background and Study Objectives

The EU regulatory framework of July 2003 has introduced substantial changes to the way national regulatory authorities (NRAs) regulate the telecommunications industry in each of the 25 member states. When this framework was developed at the beginning of the Millennium, the average member state had a population of 25 million and the smaller member states, with the exception of Luxembourg, a population of over three million. Today, following enlargement there are three member states with a population of less than one million:

- Cyprus with a population of 0.7 million
- Luxembourg with 0.4 million
- Malta with 0.4 million.

To date neither the main directives of the EU regulatory framework, nor the guidance which accompanies them, make explicit reference to the scale of markets. But the question naturally arises as to whether the framework should be applied in the same way to **macrostates**⁵ and to **microstates**⁶, given that the microstates have populations which are **one hundredth** those of the macrostates.

With these thoughts in mind the incumbent operators of the microstates, CYTA in Cyprus, EPT in Luxembourg and Maltacom in Malta – have commissioned Ovum and Indepen to carry out a study to:

- identify the main differences in market, competitive and regulatory conditions between the micro and macro states
- consider, using economic analysis, the implications of these differences for the development of effective regulation
- make recommendations to regulatory authorities on how to apply the EU regulatory framework in microstates so as to best meet the overall objectives set out in Article 8 of the Framework Directive (2002/21/EC)⁷.

The focus of our work is to look at regulatory issues which arise because of differences in market scale. We do not consider other, more general, problems of telecommunications regulation which arise for other reasons⁸.

1.2 The Basis for our Findings

The study findings presented in this report are based on four main inputs:

- a review of the literature on microstate economies
- a brief review of the main market differences between the three microstates and the four big macrostates of the EU

⁵ Such as France, Germany, Italy and the UK

⁶ Cyprus, Luxembourg and Malta

⁷ Which requires NRAs to act to promote competition, to promote the interests of EU citizens and to promote a single EU market.

⁸ For example the problems of how to regulate next generation networks

- an assessment of the evidence on economies of scale in telecommunications. This includes an assessment of the qualitative and quantitative evidence on the impact of procurement power, fixed costs and network utilisation on economies of scale
- 14 interviews with relevant and interested parties, which are listed in Figure 1.1.

Figure 1.1 Study interviews

Organisation	Focus of interview
European Commission (x3)	Views of Article 7 Task Force Views of telecoms policy branch of Information Society Directorate Views of telecoms regulatory implementation branch of Information Society Directorate
Kingston Communications	Views of a small incumbent
Ofcom	Views on regulating both small (Kingston Communications) and large (BT) incumbents
ERG member	Attitude of ERG to impact of market scale on remedies
Eircom	Views of a small incumbent
Consultant to entrants	Views of impact of market scale on entry strategies
OCECPR (Cyprus NRA)	Views of a microstate NRA
Ministry of Communications Cyprus	Views of the Government of Cyprus
CYTA	Views of a microstate incumbent
ILR (Luxembourg NRA)	Views of a microstate NRA
EPT	Views of a microstate incumbent
MCA (Malta NRA)	Views of a microstate NRA
Maltacom	Views of a microstate incumbent

These interviews form the starting point for our analysis and findings. But the views expressed here are entirely our own.

1.3 The Structure of our Report

We have divided the presentation of evidence and our analysis of it as follows:

- Chapter 2 provides a brief summary of findings from the literature on the impact of scale on competition policy in small states
- Chapter 3 presents our work on differences in market conditions in the telecommunications industries of micro and macro states
- Chapter 4 looks at the economy of scale effects within telecommunications – at the access network, core network and retail levels
- Chapter 5 then looks at the prospects for market entry in microstates
- Chapter 6 considers differences in regulatory resources available to microstate NRAs and operators as a result of market scale.

In each of these chapters we consider first the evidence for differences between microstates and macrostates and then the implications of these differences for effective regulation.



We conclude with proposals for action by various regulatory authorities⁹. This includes a list of factors which we believe regulatory authorities at the national level should consider when developing remedies. We have deliberately kept these proposals general. There are clearly some major market differences among the microstates which are identified in Chapter 3. It is beyond the scope of this study to develop microstate-specific remedies. So in Chapter 7 we set out general factors which we believe microstate NRAs should consider when applying the EU regulatory framework. Clearly each NRA will need to consider these factors in the light of the specific circumstances of their country.

⁹ Including the European Commission and the ERG

2 Competition issues in microstates

2.1 Competition Policy in Microstates

We review in this chapter literature on the application of regulation to small states to see what lessons there are for telecommunications regulation. Such a review provides little specific analysis of the impact of small scale markets on competition or regulation in the telecommunications industry. But there is more general literature on the impact of market size on competition policy. In particular:

- Dr Michal Gal has spent the last few years studying how to make competition policy effective in small states
- the OECD held a conference in 2003 on competition policy in small economies.

We can summarise the relevant findings of this work as follows:

First there is general recognition that the scale of markets should be an important deterrent of competition policy. According to Gal¹⁰:

“the size of a market necessarily affects the optimal competition policy that should be adapted by it”

And the OECD notes¹¹ that:

“Specific regulatory policies are by definition economy-specific, even though some generalisations are possible. And competition policy in its broadest sense does not call for uniform or particular regulatory policies...”

Secondly there are substantial dangers in using the same rules of thumb in microstates as in macrostates when applying competition law. To quote Gal again (page 56):

“small size affects the accuracy of many of the rules of thumb and indicators of market dominance and anti competitive conduct used in large economies”

Thirdly, the OECD notes¹² that there are two main categories of problem when determining the optimal competition policy for small economies in the developed world:

- dealing with the problems of high levels of industry concentration, together with domestic firms operating at less than minimum economic scale. In some industries the need for productive efficiency may require a monopoly or duopoly in supply whilst the same industry in larger economies is effectively competitive¹³. These comments apply to many manufacturing industries and to the telecommunications industry.
- competition law enforcement problems. This includes the greater difficulties in preventing collusion in small states, the cost of the enforcement agency and the scarcity of qualified personnel.

¹⁰ Michal Gal. “Market conditions under the magnifying glass: general prescriptions for optimal competition policy for small market economies.” April 2001, University of Haifa.

¹¹ OECD. February 2003. “Small economies and competition policy: a background paper.” OECD Forum on Competition, http://www.oecd.org/document/1/0,2340,en_2649_201185_2395841_1_1_1_1,00.html

¹² Competition policy and small economies, Note by OECD secretariat, February 2003, OECD Global Forum on Competition

¹³ See for example “The economics of multi-plant operations; and international comparative study, FM Sherer, Harvard University Press, 1975

Fourthly there is a greater need to trade off competition for productive efficiency in small economies such as the microstates under study here. For example such considerations might lead to less stringent tests before allowing mergers^{14 15}

Finally welfare losses from sub scale production in small economies can normally be reduced through international trade. In this way microstate firms can grow to minimum economic scale through exports and prices for microstate consumer are reduced through competition. According to Gal:

“trade policy, aimed at enlarging the scope of the market and introducing competition into it, and competition policy....have a crucial role to play in a small economy”

2.2 Implications for ex ante regulation of telecommunications

We believe that the findings listed above are all relevant to ex-ante regulation of telecommunications markets of an EU microstate. In particular the EU regulatory framework is designed to complement and align with EU competition law, as discussed in the European Commission guidelines on market analysis¹⁶. So we would expect that any requirement to develop remedies to meet the circumstances prevailing in microstates would apply to ex ante telecommunications specific regulation just as much as to competition law regulation.

We also find that:

- the problems arising from minimum economic scale apply to regulation of the telecommunications industry. We discussed the evidence for this and its implications in Chapter 4
- regulatory enforcement problems arise in telecommunications regulation in a similar way to competition law regulation. We discussed these in Chapter 6.

Finally, we note that, while international trade can often reduce the negative impact of minimum economic scale in small economies, it has limited impact on the telecommunications industry. Multi-national corporations located in microstates buy their telecommunications services on an international basis, and there is a growing trend to locate certain telecommunications functions, such as switching and customer support, off-shore. But much of telecommunications, and especially local network access services, must be produced and purchased locally.

¹⁴ Michal Gal P47

¹⁵ In New Zealand, with a population of four million, the Commerce Commission does not generally challenge a proposed merger where the merged entity will have less than 40% market share, or less than 60% where it faces competition from at least one other market participant having not less than a 15% market share.

¹⁶ Commission Guidelines on Market Analysis, 2002/C165/03, July 2002

3 Current Market Conditions in Microstates

3.1 Introduction

Before we consider the regulatory issues which arise from differences in market scale we first consider current market and regulatory conditions in microstates in comparison with the four biggest member states of the EU¹⁷. This informs our subsequent analysis.

For each measure we compare:

- the average position in the three microstates with
- the average position in the four macrostates¹⁸.

In so doing it is important to note that, while market conditions are relatively uniform across the macrostates, they differ widely in a number of significant respects in the microstates. In particular:

- the GDP per head in Luxembourg is four time higher than that of Cyprus or Malta
- the markets in Luxembourg have been fully liberalised for over five years; in Cyprus and Malta only for two years
- Malta is the only true city state with a population density of over 1250 people per square kilometre. Population density in Luxembourg and Cyprus are at levels below those in the macrostates¹⁹
- as at mid 2004, prices in Malta (and especially mobile service prices) were substantially higher than those in the other two microstates - although these prices are still falling quite rapidly
- CYTA, the incumbent operator in Cyprus, has lost significantly less market share than the other two operators. In particular it still retains close to 100% of the broadband access and international voice markets. In comparison Maltacom's retail market share in these two markets is now 25%.

3.2 Key differences – micro versus macro states

Figure 3.1 summarises the main differences between market conditions in microstates and macrostates. There are a number of key points to make.

NRAs in microstates spend a much higher proportion of total telecommunications revenues than macrostate NRAs. But they are still much smaller – typically 5% to 10% of the size of a macrostate NRA. We consider this point further in Chapter 6.

¹⁷ France, Germany, Italy and the UK

¹⁸ We chose the four biggest member states, rather than other member states, for comparison because they provide the opposite extreme in scale within the EU.

¹⁹ I.e. around 100 to 200 people per sq km

Figure 3.1 The main differences between microstate and macrostate incumbents

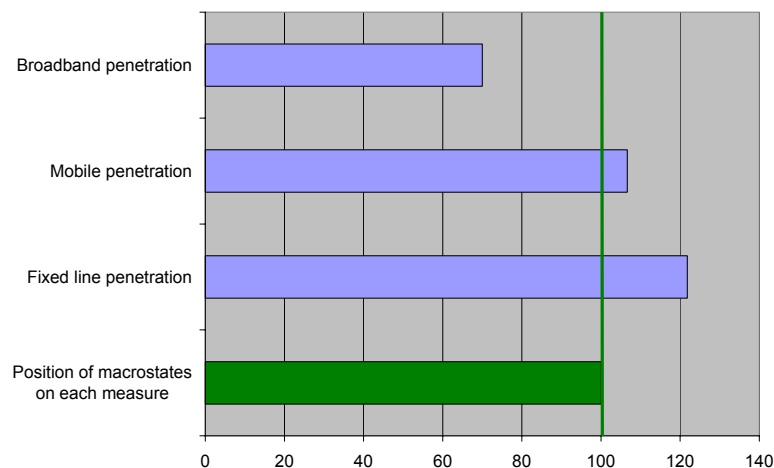
Item	micro state	macro state	micro vs macro (1)
Fixed line penetration	67%	55%	122
Mobile penetration	96%	90%	107
Broadband penetration	7%	10%	70
PPP cost of residential basket of services (€ per month)	37	39	95
PPP cost of business basket of services (€ per month)	74	94	79
PPP cost of 2km 64 kbit/s leased line (€ per month)	182	187	97
PPP cost of 2km 2 Mbit/s leased line (€ per month)	596	508	117
PPP cost of mobile - low volume basket (€ per month)	18	25	72
PPP cost of mobile - high volume basket (€ per month)	67	77	87
Ratio of international to local peak call price (2)	3.4	5.7	60
Ratio of business line rental per month to local peak call price	447	449	100
Fixed lines per employee	324	327	99
NRA spend as % of total telecoms spend by end users	2.12%	0.27%	786
Profits as a % of revenues	24%	20%	118
Capex as a % of revenues	16%	12%	136

(1) With macrostate at 100

(2) Near country international call price

On the whole take up of basic telecommunications services is better in the microstates than the macrostates. Only in terms of broadband access do the microstates lag behind the macrostates. Figure 3.2 illustrates here.

Figure 3.2 Differences in penetration rates

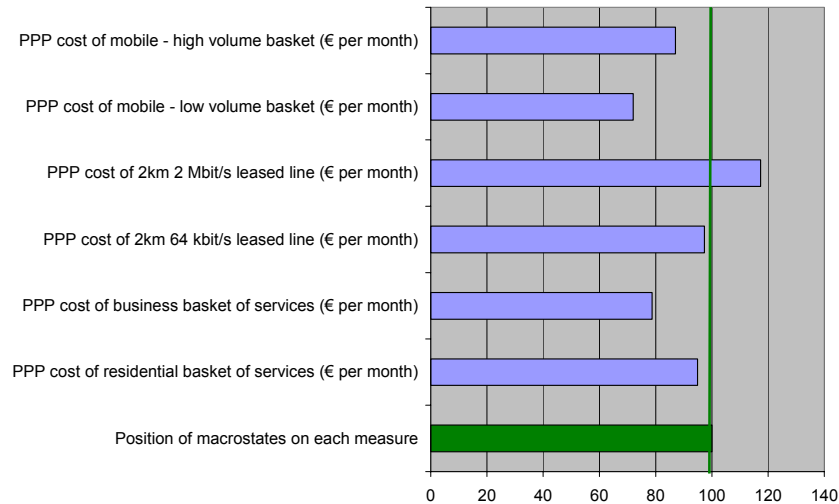


On almost all measures the prices charged by microstate incumbents are lower than those charged by macrostate incumbents. Only for high speed leased lines are the prices charged by microstate incumbents higher. Figure 3.3 illustrates here. At the same time the basic voice telephony prices of microstate incumbents are as rebalanced as those of macrostate incumbents²⁰. The ratios of monthly

²⁰ This does not apply to residential line rentals in Malta which are still a long way below a cost recovery level

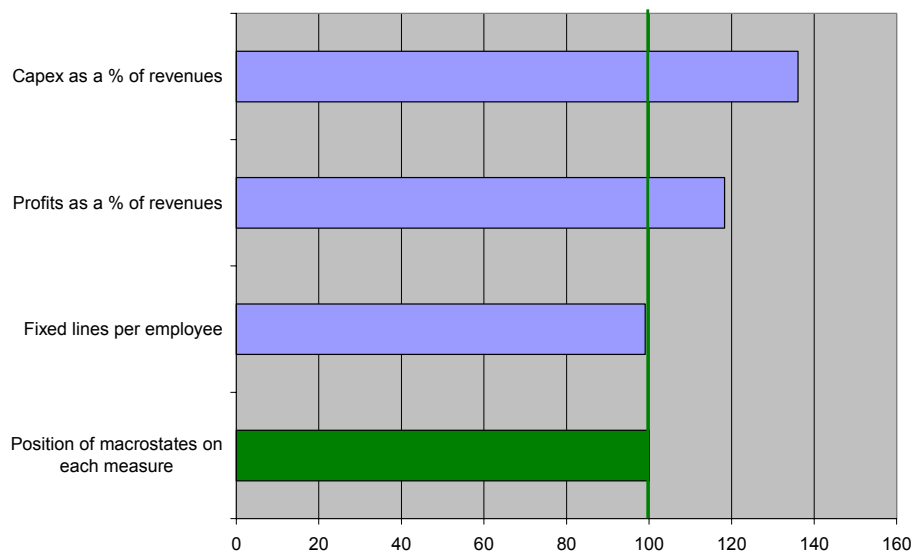
business line rental to local call prices are almost identical, while the ratios of international to local peak period call prices per minute are significantly lower. See Figure 3.1 for details.

Figure 3.3 Differences in price levels



Operator efficiency, as measured by fixed lines per employee is as good for the average microstate as for macrostate incumbents. At the same time, profits are slightly higher among the microstate incumbents whilst retail prices are lower. Again this suggests that microstate incumbents are, overall, more efficient than their macrostate equivalents. Figure 3.4 illustrates and also shows that microstate incumbents are currently investing a higher proportion of their revenues in their networks than macrostate incumbents.

Figure 3.4 Comparison on other measures



Finally Figure 3.5 looks at how much market share the incumbents hold in microstates and macrostates. It is more difficult to draw conclusions here given:

- the differences in dates of full liberalisation. On average the macrostates liberalised in 1996 and the microstates in 2001
- the differences in the number of mobile licenses. On average there are 2.3 mobile licences issued in the microstates but 3.7 in the macrostates
- the big variation between CYTA and Maltacom even though both liberalised fully at the start of 2003. In the international calls and retail broadband access markets Maltacom has lost 75% of the market to rivals; CYTA has lost very little market share.

Allowing for these differences there is as yet no reason to believe, from the statistics of Figure 3.5, that microstate incumbents retain a bigger market share than their macrostate equivalents did at a similar stage in the market liberalisation process.

Figure 3.5 Incumbent market shares – microstate vs. macrostate

Measure of market share	micro state	macro state
Average date of liberalisation	2001	1996
Average market share of incumbents		
overall share	75%	44%
fixed services only	86%	59%
mobile services	65%	32%
number of mobile licences	2.3	3.7

3.3 Conclusions

The results of the comparisons have surprised us. On average the telecommunications industry in the microstates:

- charges lower prices than those in competitive macrostates
- has achieved higher take up of major services
- is more efficient
- has rebalanced prices for basic telephone services more closely to costs²¹.

So in terms of the citizens which they serve, it is reasonable to conclude that the telecommunications industries of the microstates deliver better outcomes than those of the macrostates in the provision of basic services²².

²¹ Residential line rentals in Malta are an exception here

²² See also our discussion in Section 4.2. This indicates that microstate incumbents offer a narrower range of value added services than macrostate incumbents

4. Economy of Scale Effects

4.1 Introduction

Where they exist it is clear that economy of scale effects impact effective remedies to market problems. For example considerations of productive efficiency may mean that remedies which are appropriate in macrostates are economically inefficient in microstates. This point is made in Chapter 2 and discussed further in Section 4.6.

In this chapter we consider the evidence for economies of scale²³ in the supply of telecommunications services, develop a model of where economies of scale apply, and consider its regulatory implications.

4.2 Current Economy of Scale Effects – fixed networks

To make an assessment of current economy scale effects we have:

- carried out analysis on the FCC ARMIS database of the costs of incumbent operators in the USA
- looked at the economies of scale predicted by bottom up cost models built by the NRAs in Denmark and Sweden
- modelled economy of scale effects based on the split of fixed and variable core network costs of one of the microstate incumbents
- looked at network utilisation effects – both theoretical and empirical.

Our main findings are summarised below for fixed networks. Annex A provides details.

Access networks do not generate substantial economies of scale. They are undoubtedly non-replicable in many cases i.e. an operator would not be able to justify on a commercial basis building a second access network in an area with a fully built out first access network. At the same time analysis by Indepen of the ARMIS database shows that there are substantial economies of density for efficiently engineered access networks i.e. it is significantly cheaper per line to serve an urban area than a rural area. But access networks show very few economies of scale when compared with core networks²⁴. So a 10% increase in the size of the access network leads to an increase in total access network costs which is close to 10%. *Were* access networks to demonstrate significant economies of scale then we would find that a 10% increase in the size of the access network would lead to (say) a 5%, rather than something approaching a 10% increase in the total costs.

There is anecdotal and quantitative evidence to suggest that there are diseconomies of large scale²⁵ in retail activities. The microstate incumbents are, according to the analysis of Chapter 3, more efficient than their macrostate equivalents. Yet they suffer from subscale production of core network services as discussed below. The obvious way to reconcile these two findings is to conclude that the retail activities are provided more effectively by small-scale operators. This tentative conclusion is supported by our interviews with microstate operators and our experience of working for larger operators. This suggests that:

²³ A product exhibits economies of scale when a 10% increase in demand produces an increase in costs which is less than 10%

²⁴ This reflects the fact that access network costs are driven primarily by the length of cables and the number of customers. Rural customers use longer loops than urban customers and this is a major factor in raising the cost of serving a rural community

²⁵ So that a 10% increase in demand produces an increase in costs which is greater than 10%

- functions which are combined in one person in a microstate incumbent are carried out by separate people or even departments of people in a macrostate incumbent. So internal communication and coordination costs are significantly lower
- a microstate incumbent typically offers a narrower range of products for which there is proven market demand and where margins are highest. By observing what is successful for macrostate incumbents it avoids the many break even and loss making services offered by macrostate incumbents and improves efficiency²⁶. It also means that the risk of failure of new products is significantly reduced
- the number of outlets in an incumbent's retail branch network is more limited in a microstate and this helps reduce costs.

At the same time the economy of scale effects generated by the fixed costs of retail product development are currently very modest. From the information collected during the study we estimate that microstate incumbents currently spend only around 1% of their budget on product development.

There are major economy of scale effects in the supply of core network services. For many incumbent operators these represent around 35% of total costs, with access networks and retail costs generating the other 65%. Figure 4.1 presents the evidence collected.

Figure 4.1 Economy of scale effects- core network costs²⁷

Source	% decrease in unit costs for a 1% increase traffic
Swedish cost model	0.5%
Danish cost model	0.3%
US database	0.15%

In delivering core network services, microstate incumbents are at or below the economic scale. The evidence for this conclusion is presented in Figure 4.2 which is based on analysis of fixed and variable costs of one of the microstate incumbents.

There are a number of reasons as to why core network costs exhibit strong economy of scale effects:

- there are fixed costs in operating a switched network. These include the provision of a network management centre and operational support systems. These fixed costs are then spread over the traffic carried
- efficiently run small networks operate at lower levels of utilisation than efficiently run large networks. Network components, such as the civil engineering components²⁸ of inter switch transmission links, are supplied at some minimum size. The need for redundancy also lowers utilisation more in micro networks. For example see Box 4.1 Finally queuing theory suggests that micro networks must operate at lower utilisation for the same grade of service
- small operators have relatively little procurement power when compared with large operators. This has two main effects:

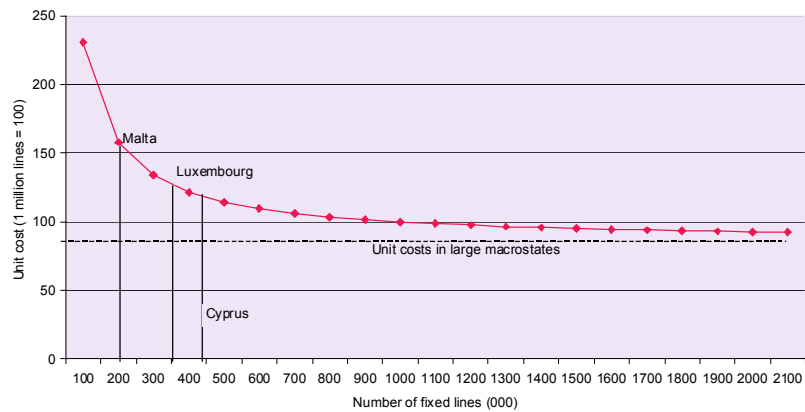
²⁶ e.g. a recent Ovum study shows that macrostate incumbents all offer services to multi national corporations on which they make a consistent loss year after year

²⁷ Operating expenses plus annualised operating costs

²⁸ Digging and cabling

- small operators get limited discounts from suppliers when compared with large operators and this raises unit capital costs. According to one recent interview with ECTA²⁹, DSLAM prices for macrostate incumbents are often 50% below those charged to small operators
- small operators are a low priority for the large equipment vendors. So, unless they become test beds for new technology equipment, they receive equipment and service after the large operators.

Figure 4.2 Economy of scale effects in supply of core network services



The curve assumes that the total core network costs are given by:

$$C = a + bL \text{ where}$$

a and b are constants and L is the number of fixed lines served

Box 4.1 Maltacom's Network Upgrade

In 2004 Maltacom's circuit switched network was reaching the end of its economic life and needed replacing. The only viable option was a next generation IP network. On grounds of capacity Maltacom only required one switch to handle the expected future traffic. But, as carrier of last resort, and in order to provide redundancy in case of terrorist attack, it decided it had to install three switches.

4.3 Future Economy of Scale Effects

In our discussion with operators and regulators during the study we identified two main effects which will change the nature of economy of scale effects within the telecommunications industry.

First the move to next generation networks will lead to increased economy of scale effects at the retail level. Operators argue that one of the keys to the success of next generation networks is the development of content based and value added services. The acquisition of content and the systems development work required to develop such services represent a substantial fixed cost. So small operators will find it increasingly difficult to compete with large operators in the provision of services over next generation networks.

²⁹ Barriers to competition in the ECNS markets of the EU, Ovum, December 2003

Secondly, there are growing opportunities for operators to reduce economy of scale problems by relocating key functions, such as switching and customer support, to remote locations and combining them with the same functions for other operators. See Box 4.2 for examples. This might mean outsourcing functions where there are economies of scale to other, bigger, players located in other countries eg switching, billing, customer support.

Such moves might reduce unit costs in future. But they are unlikely to remove economy of scale effects completely. Remote operation only works for some functions and there is still the fixed cost of the remote link to take into account. In some cases the fixed cost of outsourcing even outweighs the savings. This is especially true for very small operators which face the same fixed costs of outsourcing as larger operators and have lower bargaining power when negotiating a deal with the outsourcing supplier.

Box 4.2 Internationalisation of telecoms supply

BT uses call centres in India for customer support

T-Mobile is considering running a single network to serve its customers in Germany, UK, Netherlands, and Austria

Vodafone has the option to extend its Italian 3G service into Malta rather than setting up a separate switching centre there.

4.4 Economy of scale effects – mobile networks

Economy of scale effects are more complex in mobile than fixed markets:

- there are similar economy of scale effects in the supply of **core networks** as for fixed networks
- there are few economies of scale at the **retail level** but this will change with the development of third generation value added and content based services in the same way as for fixed networks
- unlike fixed networks there are economy of scale effects in the **access network** for mobile operators. These arise because there is a fixed cost to provide a competitive level of coverage to mobile users. We discuss this point further below.

Figure 4.3 shows the economy of scale effects in a mobile access network. The point at which minimum economic scale is reached depends upon:

- the population density
- the geographical coverage of the competing networks and the topography of the area covered
- the level of penetration of mobile services
- the volume of traffic generated by each subscriber and
- the number of mobile operators.

In general the higher the density of subscribers per kilometre of network coverage the higher is the number of operators which the market can support. So while big countries like France and Germany currently license three or four operators, much smaller countries like Hong Kong, with a significantly higher subscriber density per square kilometre of coverage, can support eight.

Figure 4.3 The cost of providing a mobile network³⁰

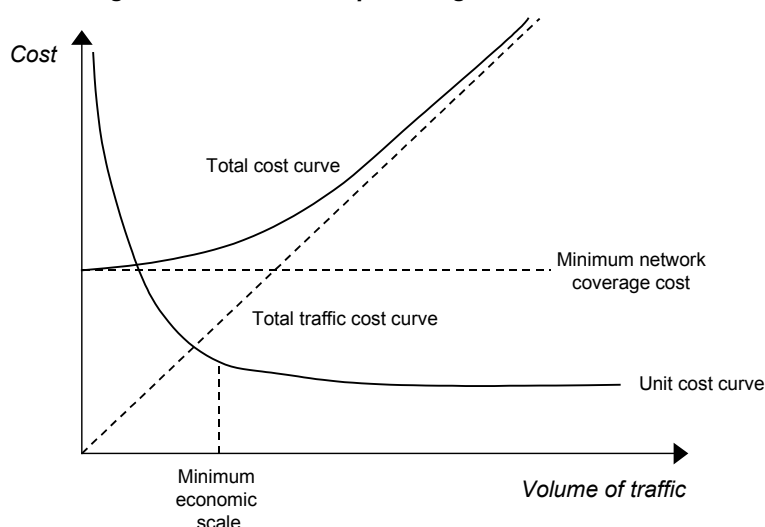


Figure 4.4 compares the subscriber density per square kilometre per coverage per operator in the three microstates with that of the four biggest microstates. Geographic coverage is estimated from GSM Association coverage maps. We can see that:

- the subscriber density in Cyprus and Luxembourg is in line with that in the four macrostates. This indicates that the number of network operators in microstates is consistent with the view taken in the macrostates as to what constitutes an efficient number of operators
- on the face of it the very high population density in Malta indicates that there is room for additional mobile operators. But we are told that the geology of Malta causes problems in delivering adequate in-building coverage. This raises radio access network costs. At the moment for example the great majority of cell sites of the two mobile networks in Malta are operate at a level below capacity in order to ensure adequate coverage and quality of service. In these circumstances adding a third operator would substantially reduce productive efficiency.

Figure 4.4 Subscriber density and the efficient number of mobile operators

Country	Number of operational mobile operators	Subscriber density per sq km of coverage per network
Cyprus	2	38
Luxembourg	3	73
Malta	2	470
France	3	28
Germany	4	53
Italy	3	74
UK	5	54

³⁰ For simplicity this graph does not show the economy of scale effects in the supply of core network services

Based on this analysis we conclude that:

- in considering competition in mobile services microstate authorities need to take into account the additional consideration of economies of scale in the access network when deciding how many mobile operators to license
- at the moment the number of licences in the microstates seems to strike a good balance between maximising competition and maximising productive efficiency.

Given these conclusions we focus the analysis of the remainder of this chapter on the implications of economy of scale effects in fixed networks.

4.5 An Economy of Scale Model

Combining the findings of the previous sections lead us to propose the economy of scale model of Figure 4.5 for fixed network services. In applying this model we need to take account of the nature of the operators:

- a microstate incumbent provides all three functions and so all six cells apply
- a pure reseller which buys core and access network services from the incumbent is only active at the retail level. So only Cells 5 and 6 apply
- a service provider which buys carrier selection and call origination services from the incumbent is active at the core network and retail levels. So Cells 3 to 6 apply.

Figure 4.5 An economy of scale model for telecommunications services

<i>Functions</i>	<i>Now</i>	<i>Future</i>
Access network provision	Cell 1 Limited economies of scale	Cell 2 Limited economies of scale
Core network service supply	Cell 3 Strong economies of scale Microstates below minimum economic scale	Cell 4 Possible reduction in economy of scale effects from international outsourcing. But this approach has limited value to the smallest operators
Retail activities	Cell 5 Limited economy of scale effects combined with narrower product range from microstate incumbents means small operators often more efficient	Cell 6 Growing economies of scale in providing value added and content based services over NGNs

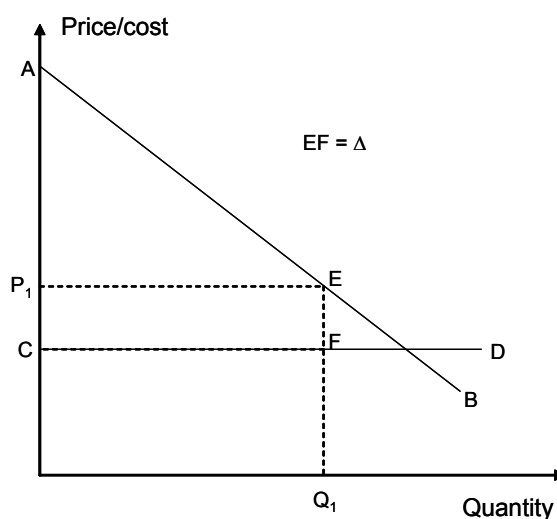
4.6 Implications from Microstate Regulation

We now consider the implications of this model for regulation in microstates. In so doing we assume that the overall policy of the microstate regulator and its Government is to **maximise economic and social welfare rather than to maximise competition**. As we discuss below, regulatory trade offs between competition and other factors are more important in a microstate than in a macrostate if the industry is to develop in an economically efficient manner.

Economic welfare is measured by the area between the demand curve and cost function and is represented by the area AEFC in Figure 4.6³¹. Economic welfare is increased by:

- driving the price P_1 towards cost so that Δ is minimized. This is normally done through a mix of competition and retail price controls
- moving the demand curve AB as far right as possible. This requires the industry to improve the quality, functionality and price packaging of its offers
- reducing the cost curve CD as much as possible through a mix of operational efficiency measures, investment in new and lower cost technologies, and economy of scale effects.

Figure 4.6 Maximising economic welfare



Competition is an important tool for achieving these goals. But it is not a goal in itself. For example:

“Competition is not an end by itself but rather a means towards certain ends”³²

Indeed an NRA must make a number of trade offs if it is to maximise economic and social welfare. For example:

- measures to protect consumers may require NRAs to impose additional costs on the industry
- an NRA may need to trade off the interests of competition against increased productive efficiency through economy of scale effects. We discuss this issue in more detail below
- an NRA may need to trade off regulatory measures which promote infrastructure based competition against others which promote service based competition. Again we discuss this issue further below
- an NRA must trade off incentives for investment in infrastructure by both incumbents and entrants against the intensity of competition when setting access prices³³.

With these trade offs in mind we have identified five implications of our economy of scale model for NRAs in microstates.

³¹ This diagram represents a highly simplified telecommunication industry with a single tariff for a single product

³² Gal (2001)

³³ Wholesale prices charged to the entrant for use of the incumbent’s services and facilities

Implication 1: *build economy of scale effects into access prices.*

The price of interconnect services like call origination, call termination and transit services should be based on the cost of a reasonably efficient incumbent operator so as to send the right signal to potential entrants. Prices which are lower than this promote inefficient entry and create an industry in which entrants are dependent on the regulator maintaining prices at levels below cost for their survival. It is clear that the costs of interconnect services reflect the cost of core network functions, where there are strong economy of scale effects. So it is important to reflect these economy of scale effects in access prices in microstates. This can be done by:

- measuring the actual costs of the microstate incumbent and making relevant adjustments³⁴
- constructing international benchmarks or building bottom up cost models which explicitly incorporate the higher proportion of fixed costs, lower procurement power and lower utilisation levels enjoyed by microstate incumbents.

Whichever approach is chosen it is important for microstate NRAs to refrain from setting access prices using simple international benchmarks based on other (larger) EU Member states.

Implication 2: *balance regulatory measures to promote competition against the need to preserve productive efficiency.*

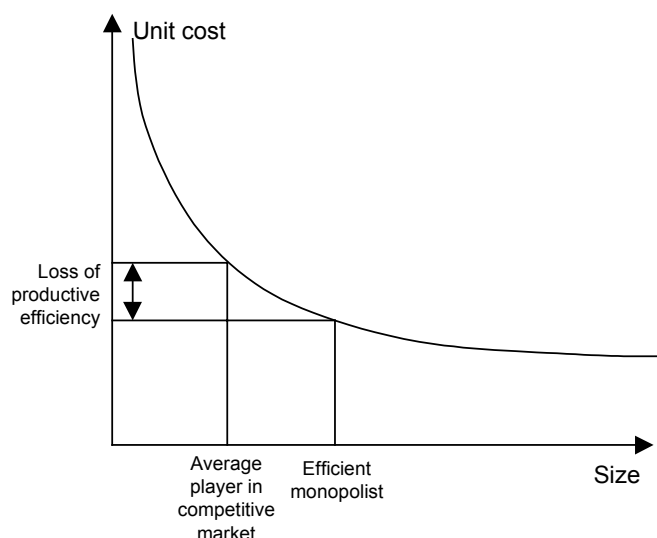
The basic argument here is a simple one. Competition tends to drive down unit costs by introducing powerful incentives for incumbents to increase operational efficiency and invest in new, lower costs, technologies. But in microstates problems of subscale production lead to increased unit costs when moving from monopoly to competitive supply as shown in Figure 4.7. This effect does not occur to anything like the same degree in macrostates where the incumbents starting point is much further to the right on the economy of scale curve. Nor does it occur in markets where there is strong growth in traffic volumes so that the position of the industry is shifting constantly to the right. But with fixed mobile substitution and the migration to voice over IP this condition no longer applies to circuit switched networks.

In practice the argument is more complex than that shown in Figure 4.7 for three reasons:

- strong economy of scale effects apply only to core network activities
- virtually all entrants focus on certain parts of the market and continue to buy some wholesale products from the incumbent. This limits the economy of scale effects of Figure 4.7
- infrastructure based rivals to the incumbent often leverage pre-existing resources when they enter the market. For example CATV operators leverage economies of scope with pre-existing TV services and distribution networks. So their economy of scale curves may be different from those of the incumbent. We consider this point further under Implication 3.

³⁴ Eg for embedded inefficiency

Figure 4.7 Competition vs. productive efficiency



Implication 3: take account of economy of scale effects in deciding between measures designed to promote infrastructure and service based competition.

Infrastructure based competition is clearly superior to service based competition where it is viable. Service based entry promotes competition in retail pricing and customer service. But its ability to promote competition in network efficiency or in product or pricing innovation is limited because the service provider is reliant on the incumbent for its wholesale inputs. So it is important not to promote service based competition which reduces incentives for infrastructure based entry.

The European Commission recognises this problem. In Recital 19 of the Access and Interconnection Directive (2001/19/EC) it states that:

“the imposition by national regulatory authorities of mandated access that increases competition in the short-term should not reduce incentives for competitors to invest in alternative facilities that will secure more competition in the long-term.”

The ERG also recognises this tension in its remedies paper³⁵. For example on P59 of this paper it states that:

“where... replication of the incumbent’s infrastructure is viewed as feasible the available remedies should assist in the transition to a sustainable competitive market”

and in markets where replication is uncertain

“no action should be taken that might delay or otherwise stop investment in competing infrastructure where this is efficient”.

Finally from a senior manager from Ofcom in January 2005:

“The first thing we sought to do was approach this array of issues from a strategic standpoint: namely that the regulator’s job is not to create short-term arbitrage opportunities for alternative businesses, but to encourage sustainable competition at the deepest points of

³⁵ ERG (2004)

interconnection with the BT network- that is, true facilities-based competition which allows a wide range of innovation and differentiation in the retail and service markets."

In microstates this trade off is impacted by economy of scale considerations. In particular:

- economy of scale effects are strong in the supply of core network functions. These effects apply to both service providers which rely on carrier selection mechanism for access and on service providers using their own infrastructure
- these effects make entry more difficult in microstates than macrostates so long as the economy of scale curves of the entrant and the incumbent are similar. Figure 4.8 illustrates. The unit costs disadvantage in a microstate is substantially greater than that in a macrostate because a microstate entrant suffers far more from the diseconomies of small scale than a macrostate entrant
- the difference between the economy of scale curve of an infrastructure based entrant and that of an incumbent is likely to be greater than that between a carrier selection based service provider and an incumbent. The carrier selection based service provider typically relies on renting transmission components from the incumbent, whilst the infrastructure based entrant typically leverages pre-existing infrastructure as shown in Box 4.3
- the proportion of a carrier selection service provider's cost base which involves core network services, where economy of scale effects are strong, is higher than for an infrastructure based entrant. Figure 4.9 illustrates. It shows that core network costs, where economy of scale effects are strong, forms a higher proportion of total costs for service based than for infrastructure based entrants.

Figure 4.8 The cost disadvantage for microstate entrants

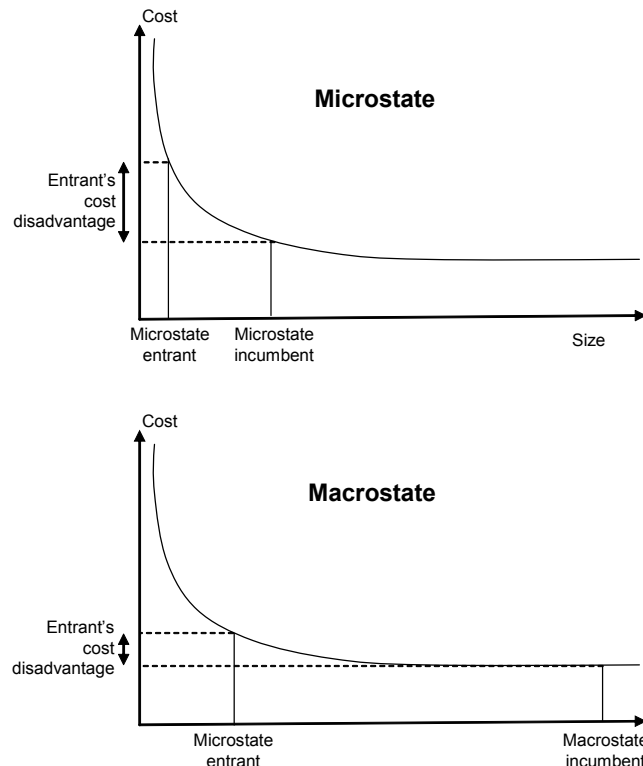


Figure 4.9 Economy of scale effects are stronger for service based entrants

Functions	Costs for:		Economy of scale effects?
	Infrastructure based entrants	Carrier selection service based entrant	
Access network	Yes	No	Weak
Core network	Yes	Yes	Strong
Retail	Yes	Yes	Weak

In combination this analysis suggest that:

- the prospects for infrastructure based competition in microstates are uncertain. But they are likely to be better relative to service based competition in microstates than macrostates if, as our analysis suggests, minimum economic scale effects impact service based entrants more than infrastructure based entrants
- service based entrants using carrier selection mechanisms will find it difficult to enter the microstate markets with a viable business plan based on cost orientated access prices
- this will lead to increased pressure on NRAs to reduce access prices below cost orientated levels (or increase retail prices to levels well above costs) so that the service based entrant can create a viable business plan. It is important that the NRA resists such pressure. If it does not it creates inefficient based entry and/or increases end user prices. At the same time it reduces prospects for infrastructure based competition.

Box 4.3 Infrastructure Based Competition Prospects in the three microstates

In **Cyprus** the electricity company is building fibre access and long haul networks as it upgrades its power distribution network. As a result two entrants now have access to all buildings in Nicosia (around 30% of Cyprus's population) and the proportion is growing steadily.

In **Luxembourg** a pre-existing analogue CATV network reaches over 90% of the population. Another entrant is the subsidiary of the national electricity company and has access to fibre installed when the parent company upgrades its power network

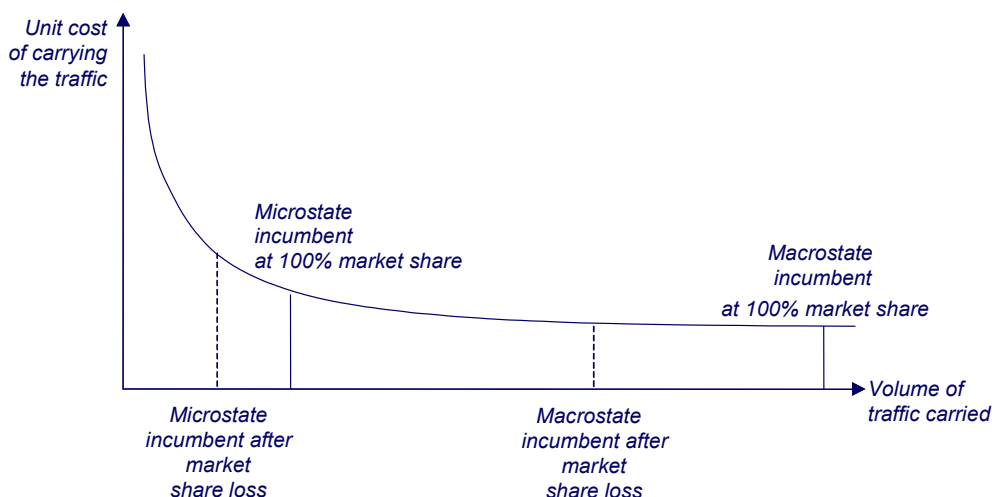
In **Malta** the CATV network reaches over 90% of the population and a substantial % is digitised. Three broadband wireless access licences will be assigned shortly. There are also two international gateways – one operated by Maltacom and another by Vodafone

Implication 4: consider the impact on all citizens when imposing measure to promote competition

Measure which promote competition should help drive down the incumbent's costs and lead to more cost orientated prices. But they also lead to market share losses which raise the microstate incumbent's unit costs of carrying traffic. Figure 4.10 illustrates this effect and shows that it does not

occur in macrostates to any significant degree. Higher unit costs then lead to higher prices for services and customers not targeted by entrants. If retail price controls are imposed to constrain such price rises then the microstate incumbent's free cash flow is reduced. This then threatens the microstate incumbent's ability to meet its universal service obligation and to invest in new technologies such as next generation networks.

Figure 4.10 *The impact of major market share losses on a microstate incumbent*



Again this analysis points to the fact that, while it is important that the incumbent faces competition, or at least the threat of competition, encouraging inefficient entry generates significantly greater social costs in microstates than a macrostates.

Implication 5: *consider how the microstate will migrate to next generation networks*

Most microstates have limited natural resources and low levels of industrialisation. So they are especially reliant on ICT intensive industries for economic prosperity. For these industries to remain globally competitive and to attract new investment requires first class telecommunications infrastructure.

The EU telecommunications industry is now starting a major programme of investment to replace its circuit switched fixed and mobile networks with next generation IP networks. These should provide a much wider range of services at significantly lower unit costs. So the question naturally arises as to who will invest in these networks in microstates and how quickly they will make that investment.

Our research indicates that:

- microstate incumbents have incentives to invest in next generation networks (NGNs) to reduce the costs of supplying established services which currently run over their circuit switched networks
- microstate incumbents are concerned about the uncertainties which exist over the regulatory conditions under which they will make this investment
- service providers from other, larger, countries will be able to supply advanced services over the NGNs of microstate incumbents. This reflects the nature of NGNs. There is a clear separation of the services, applications, content and intelligence from IP transport and access which is inherent in next generation network architectures
- microstate incumbents are deterred from investing in NGNs by the knowledge that they will find it difficult to compete with these service providers in the supply of advanced services. They are

aware of the major economies of scale which are created by the high fixed costs of service development and content acquisition

- only microstate incumbents are likely to invest in a nationwide NGN which will serve all citizens. Other entrants may build NGNs, but these will probably be focussed on high profit market segments such as corporate customers.

If microstate Governments and NRAs want to see speedy roll out of nationwide NGNs then it is important for them to consider how they can maximise the incentives for microstate incumbents to make the necessary investment. This might involve making a commitment in advance on how microstate incumbents NGNs will be regulated so as to:

- give microstate incumbents retail pricing freedom for NGN services
- focus regulation of NGNs on non replicable assets only
- set regulated prices for these assets in a way which takes full account of investment risks and the asymmetric consequences of regulatory error.

Such measures are discussed in a recent economic policy note issued by OPTA³⁶ – the NRA in the Netherlands. The note argues that such an approach is consistent with the EU regulatory framework

³⁶ Regulating emerging markets, Economic Policy Note 5, OPTA, April 2005

5. Market Entry in Microstates

5.1 Introduction

In this chapter we consider the factors which are likely to affect market entry in microstates. Our discussion focuses on the fixed services markets. Market entry in mobile markets, which is limited by spectrum licensing, is discussed in Section 4.4.

In carrying out this analysis we need to distinguish between:

- the mass market of SMEs and consumers versus the corporate market
- entry by large foreign operators versus entry by local organisations.

5.2 Entry Prospects by Market

The corporate market of large business customers is a natural target for entrants across the EU. The concentration of traffic on relatively few sites means that such customers generate high revenues while the cost of serving them is low relative to that for consumers. Microstates are no exception to this general rule. So we expect strong competition in this segment of microstate markets.

The prospects for effective competition in the mass markets of SMEs and consumers are substantially lower - especially for those customers who are located outside the big towns³⁷. The ratio of revenues generated to the cost of serving mass market customers limits the opportunity for pure infrastructure based competition. At the same time, where the microstate incumbents have largely rebalanced basic service prices to cost, this limits the opportunity for profitable carrier selection based entry into traditional fixed network markets. In analysing these prospects further we need to consider separately the entry positions of large foreign operators and the more modestly resourced local entrants.

5.3 Prospects for Entry by Large Foreign Operators

Three factors affect entry by large foreign operators to microstates:

- the cost disadvantages discussed under Implications 3 and 4 of Section 4.5 are greater in a microstate than in a macrostate
- in other respects market power is balanced more evenly between the incumbent and large foreign operators in microstates than in macrostates
- relative to other larger countries, microstates are not attractive because of their small size.

We discuss these the second and third of these factors in more detail below. They clearly pull in opposite directions. Overall we expect limited entry by foreign operators into microstates in the short to medium-term, except in the corporate market.

³⁷ In Cyprus for example 70% of the population is located outside the main town of Nicosia

The Attractiveness of Microstate Markets

Microstate markets are not attractive to potential foreign entrants when compared with entry into macrostates. There is a fixed cost of entry and the potential reward is substantially less than in other much larger markets. At the same time prices are lower in the microstates than in the large macrostates, as Figure 3.3 illustrates.

Only in the case of the corporate sector do we expect, and observe, strong interest from large foreign operators. In the case of Luxembourg for example there is considerable activity from companies like Equant, COLT, KPN, MCI, Belgacom and BT in supplying the many international and multi-national companies with offices in Luxembourg. In many cases the buying point for the services supplied by these entrants is outside Luxembourg, the prices are negotiated on an EU wide basis, and they do not reflect the high unit costs faced by the local incumbent. So prices are imported from other, lower cost, parts of the EU.

The Balance of Power with the Incumbent

The competitive advantages of incumbents over entrants are reduced in microstates. In macrostates the incumbent has a number of advantages over entrants in terms of:

- lower unit costs as a result of economies of scale and scope
- ownership of the established customer base. Entrants must persuade customers to switch supplier. This further raises their costs relative to the incumbent
- the ability to offer a wide range of services ubiquitously across the country.

The first of these disadvantages remains in terms of supply of core network services. But in other ways these advantages are significantly reduced or, in some cases, even reversed – especially when we compare a microstate incumbent with an entrant or a potential entrant which operates in many countries³⁸ or an entrant which is an incumbent in a large neighbouring country³⁹. So for example:

- the cost of developing new services and acquiring content to make those services attractive is spread over a few hundred thousand customers in the case of a microstate incumbent. In the case of an entrant it might be spread over tens or even hundreds of millions of customers
- entrants which are established operators in larger markets have greater procurement power than microstate incumbents. These entrants can now run a substantial proportion of the functions which are required for entry from their home location⁴⁰. This leads to substantial cost savings over entry using 100% locally delivered service
- microstate incumbents are often more vulnerable to cherry picking than incumbents in macrostates. Some observers argue that the Pareto principle⁴¹ applies equally in microstates and macrostates. We disagree. The minimum economic scale effects identified by Gal in Chapter 2 mean that there is greater concentration of many industries in the hands of relatively few large firms. This makes the Pareto effect stronger in microstates. Entrants can target this small number of high volume customers at relatively low cost⁴² and this makes the microstate incumbent more vulnerable to revenue loss than its macrostate equivalent.

³⁸ eg Vodafone in Malta

³⁹ eg France Telecom if it were to enter the Luxembourg mass market

⁴⁰ up to 60% of total costs according to one respondent who specialises in advising market entrants

⁴¹ e.g. 80% of revenues comes from 20% of customers

⁴² In addition a major customer will typically operate from many fewer sites in a microstate than a macrostate. This makes them easier for the entrant to capture

- given their small size, microstate incumbents typically find it cost effective to offer a narrower range of products than a macrostate incumbent. This reduces economies of scope and the competitive advantage of a wide product range.

These differences mean that the barriers to entry in microstates are often lower than in macrostates.

5.4 Prospects for Entry by Local Organisations

The limited resources and expertise available to local microstate companies who wish to take advantage of liberalisation of their telecommunications markets means that they usually do not have a choice between entering the home market and entering other larger foreign markets. If they enter then they enter only in their home market. This consideration, when combined with the analysis of the previous section, suggests that the bulk of entry into mass markets will come from local organisations. This is consistent with the empirical evidence we have gathered for Cyprus and Malta⁴³.

We would expect such entrants to struggle given:

- the economy of scale issues discussed under Implications 3 and 4 of Section 4.5
- the relatively low prices charged by the microstate incumbents – as shown in Figure 3.3
- the fact that the microstate incumbents' basic voice telephony prices are largely rebalanced to cost⁴⁴.

5.5 Implications for Microstate regulation

It is clear from the analysis set out above that microstate NRAs will come under pressure from entrants to set entry conditions which will enable them to create viable business plans e.g. to set lower access prices or higher retail prices.

Microstate NRAs may also be put under pressure by their governments and/or by EU institutions to demonstrate that telecommunications liberalisation is leading to competition. The obvious way to do this is to measure the number of entrants and the loss of market share by the incumbent and to compare it with equivalent statistics in other EU member states.

However the analysis of this chapter suggests that, with access prices set at economical efficient levels, microstates can expect limited competitive entry. Because of their small size microstate markets are a low priority for foreign operators, even though the barriers to entry there are lower than in macrostates. At the same time smaller local players will struggle to develop a viable business.

In the circumstances it is important that:

- microstate NRAs resist pressures from entrants to create conditions for inefficient entry
- microstate NRAs are not judged by their Governments or by EU institutions in terms of the numbers of entrants or loss of market share by the incumbent relative to other larger countries.

There are other options which a microstate NRA might wish to consider. For example it might:

- enact regulatory measures which ensure that the telecommunications markets are contestable – for example by requiring the incumbent to supply entrants with local loops, carrier selection services and call origination at cost orientated prices

⁴³ Excluding the corporate market, this hypothesis is also consistent with the position in Luxembourg with the exception of Tele2. There are two reasons for Tele2 entering the fixed services mass market in Luxembourg: Tele2 is headquartered in Luxembourg and Tele2 has operated as a mobile carrier there since 1997.

⁴⁴ If the microstate incumbent is not allowed to rebalance its prices to cost, inefficient entry is encouraged



- monitor the development of competition. This may take some time, especially if infrastructure based competition is to succeed
- monitor major outcomes⁴⁵ against those observed in competitive macrostates to identify where there are market problems and
- take regulatory action if the industry cannot resolve the problems itself within a reasonable period of time.

⁴⁵ Eg take up levels, service innovation, and prices

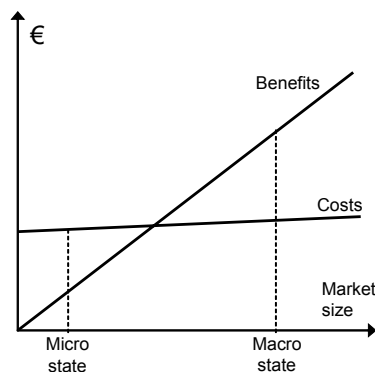
6. The costs and benefits of regulation

6.1 Introduction

The OECD has identified that enforcement of regulation is a major problem in microstates. See Section 2.1. In this chapter we consider this issue in the specific context of ex-ante telecommunications specific regulation.

There is a general problem here. The costs of developing, implementing and enforcing regulation varies relatively little with the size of the market being regulated while the benefits are typically proportionate to the size of the market. Given these differences in the way costs and benefits vary with market size it is possible that regulatory approaches and remedies which are appropriate in macrostates lead to economic losses in microstates. Figure 6.1 illustrates.

Figure 6.1 The impact of regulatory measures in micro and macrostates



To deal with this general problem we suggest that:

- there is a need for **regulatory impact assessments** to ensure that standard regulatory measures imposed in macrostates continue to make economic sense in microstates
- there is a need to develop a **simpler approach** to regulation in microstates than macrostates so as to keep the cost burden of regulation to reasonable levels.

6.2 The Need for Regulatory Impact Assessments

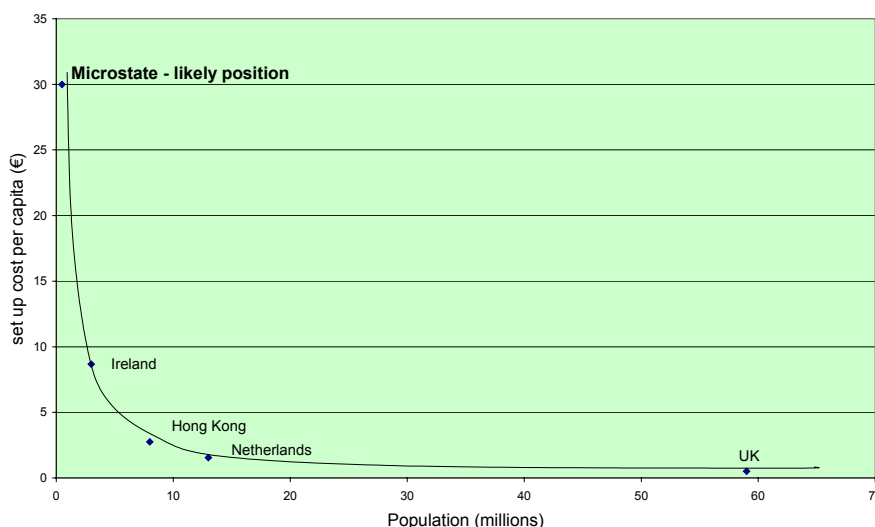
Regulatory measures which are effective in macrostates may lead to economic welfare losses in microstates as Figure 6.1 illustrates. Examples of such measures include:

- requirements for fixed and mobile number portability
- obligations on fixed incumbents to provide wholesale line rental
- requirements for incumbents to carry out accounting separation and LRIC modelling
- implementation of equality of access⁴⁶.

⁴⁶ In its strategic review of telecommunications in the UK, Ofcom proposed that BT should offer equality of access to wholesale customers. Under this concept BT's wholesale customers would use the same ordering systems and network management interfaces as BT's retail arm when purchasing a wholesale product in addition to receiving the same quality of service for the same price.

Figure 6.2 illustrates the point from a recent Ovum study which looked at the costs and benefits of mobile number portability. It plots the set up cost per head of population against the size of the country. We can see that, as the population declines, the cost of MNP per person rises sharply while the benefits remain roughly constant⁴⁷. In Ireland the costs and the benefits were found to be roughly equal. In a microstate it is hard to believe that the costs would not outweigh the benefits several times over⁴⁸.

Figure 6.2 The case of mobile number portability



This analysis suggests that it is especially important for NRAs in microstates to carry out regulatory impact assessments to check on whether the benefits of a measure clearly outweigh the costs – even for measures which are commonplace in macrostates.

6.3 The Need for Simpler Regulation

The microstate versus macrostate comparisons set out in Figure 3.1 show that:

- NRA costs are **eight times** higher (as a % of telecoms revenues) in microstates⁴⁹
- despite this additional cost burden microstate NRAs are **5% to 10%** of the size of macrostate NRAs. So they currently lack the resources needed to carry out the range and depth of analysis done by macrostate NRAs.

At the same time microstate NRAs cannot cut costs simply by copying the actions of macrostate NRAs:

- the differences in market conditions between microstate and macrostate, which are set out in Chapter 4 and 5, mean that microstate NRAs cannot copy remedies imposed in macrostates but must develop country specific remedies

⁴⁷ Assuming that the penetration of mobile services is roughly the same across the countries concerned

⁴⁸ However all member states are required by the Universal Services Directive to provide MNP as a user right. So NRAs do not have discretion over this decision

⁴⁹ This statement refers to NRA budgets and does not include the regulatory costs of the operators

- Section 6.2 above highlights the importance of regulatory impact analyses in microstates
- there are certain functions, such as representing national interests on international bodies and market analysis under the EU regulatory framework⁵⁰ which microstate NRAs must carry out and where there is an irreducible minimum cost.

Microstate NRAs could do their job in the same way as macrostate NRAs do now. But if they did so they would impose a major additional cost burden on the telecoms industry – perhaps raising end user prices by 60% to 80%⁵¹. This is clearly disproportionate regulation. So there is a need for NRAs to simplify regulation in microstates while making sure that they take note of the microstate regulatory problems highlighted by this study.

The Netherlands Bureau for Economic Policy Analysis recognizes this issue in its working paper on yardstick competition where it notes⁵² that:

Regulatory success also depends on the level of costs that are associated with the implementation of the regulatory prescriptions. It would be detrimental to the regulatory endeavour if the costs outrun the benefits. In other words, if the costs are higher than the benefits, one should reconsider whether there should be any regulation at all.”

6.4 Possible Approaches to Simplifying Microstate Regulation

We list below six possible ways in which a microstate NRA might lighten its workload without compromising its overall effectiveness. This approach is consistent with the requirements of the EU regulatory framework that member states should intervene to the minimum degree necessary to solve the problem and in a proportionate manner⁵³.

Approach 1: Focus the market review process on developing proportionate remedies

Microstate NRAs might wish to focus market reviews on developing **remedies** which take account of the factors identified in this report, rather than on adjusting the **market definition** and **SMP assessment** phases to take account of the special circumstances of microstates.

The list of 18 markets identified as susceptible to ex ante regulation in the European Commission's Recommendation⁵⁴ may not be appropriate in microstates. In drawing up this list the Commission first analysed whether the barriers to entry were substantial, whether market power was likely to endure, and whether competition law alone was inadequate to deal with the problem identified. Only markets which passed all three tests were included in the Recommendation. But in carrying out its analysis the Commission did not consider the lower barriers to entry in microstates. Had it done so it might have produced a shorter list for the microstates.

In practice our research suggests that this is not a productive line of argument for microstate NRAs:

- the European Commission's Article 7 Task Force would allow an NRA to drop one of the 18 recommendations from its analysis only if it could provide compelling evidence as to why it should do so. The burden of proof required here is exceptionally high

⁵⁰ For example at a CEPT conference in April 2005 Professor Cave estimated the average cost for the initial market review process at €5 million per member state

⁵¹ This estimate assumes that the microstate NRA and the regulatory department of the microstate operators grows to the same size as the equivalent bodies in macrostates to do their work

⁵² Yardstick competition: Theory, design, and practice, page 44, CPB Netherlands Bureau for Economic Policy Analysis, Working Paper No. 133, The Hague, December 2000

⁵³ See for example Article 8.1 of the Framework Directive and Article 8.4 of the Access and Interconnect Directive

⁵⁴ Commission Recommendation on Relevant Markets...susceptible to ex ante Regulation, C(2003)497, February 2003

- the EU regulatory framework is more open to the need for remedies which differ from state to state so as to take account of local circumstances.

With this guidance in mind we suggest that microstate NRAs should focus on developing remedies which reflect local conditions rather than trying to remove markets from the review.

Approach 2: Impose simple low cost remedies

Microstate NRAs might consider imposing simple and low cost obligations on the incumbent operator when it is found to have SMP following the market review process. This is the approach which Ofcom has taken when regulating Kingston Communications. Ofcom regulates BT, the fixed incumbent in almost all of United Kingdom and Kingston Communications, the incumbent in the town of Kingston-upon-Hull, in very different ways. This reflects the fact that Kingston Communications is one hundred times smaller than BT. For example Ofcom has:

- required Kingston Communications to supply wholesale products on fair, reasonable and non-discriminatory terms rather than on a cost orientated basis for certain obligations
- allowed Kingston Communications to supply a wholesale product only when there is reasonable demand, and not to oblige it to develop the product by a specific date⁵⁵.
- allowed Kingston Communications to make voluntary price undertakings and only requires cost orientation and cost accounting if this undertaking is breached.

Approach 3: Simplify the Wholesale Product Set

In a macrostate an NRA might require a fixed incumbent to provide:

- full local loop unbundling
- shared access local loop unbundling
- bitstream access products
- wholesale DSL services
- wholesale line rental
- narrowband call origination
- carrier selection services and
- partial private circuits

as ways of dealing with the access bottleneck so as to encourage entry. This is a complex and costly set of products to supply. In addition there is only a limited chance that the NRA can set the relative prices of each product in a way which does not undermine effective competition. One way to reduce the cost of regulation, whilst also reducing the likelihood of regulatory error, is to simplify the list of wholesale products which the incumbent is required supply. In making this simplification it is important to choose wholesale products which:

- do most to encourage infrastructure rather than service based competition
- are simple to specify and price
- pass a regulatory impact assessment test⁵⁶
- encourage competition in growing rather than declining markets.

⁵⁵ In Malta and Cyprus combined the incumbents have already spent around €1 million on the development of local loop unbundling products. So far there is no clear demand

⁵⁶ For example an obligation to supply wholesale line rental might not pass this test in a microstate

Approach 4: Use simple approaches to setting access prices

Many NRAs have required their incumbent to develop LRIC rather than FAC models whilst themselves developing bottom up cost models. Such requirements impose substantial cost burdens on microstates – typically around €1 to €2 million on an industry with a turnover of €100 million to €400 million per annum. Moreover NRAs in microstates need to ensure that costs properly reflect economy of scale effects so as to enable them to avoid setting below cost prices which encourage inefficient entry. In these circumstances a microstate NRA could both reduce the regulatory cost burden and minimize the chance of regulatory error by using the incumbent's actual cost to set access prices, whilst, as the same time, checking for operational efficiency by other means.

Approach 5: Screen complaints before investigating disputes

Microstate NRAs might wish to reduce their regulatory burden by raising the threshold for hearing complaints. Ofcom, the UK telecoms regulator, raised the threshold for complaints in order to reduce its routine workload and to focus on the most substantive issues. Ofcom published revised guidelines for resolving complaints and disputes in July 2004, noting that:⁵⁷

“Investigations into allegations of anti-competitive behaviour impose significant costs on Ofcom, on the target of the complaint and often on other industry players who are required by Ofcom to provide evidence and information. A requirement to provide evidence to back up allegations will enable Ofcom to identify those complaints that raise real concerns about anti-competitive behaviour and allow Ofcom to target its resources on the most important issues.”
Paragraph 12

Ofcom introduced a number of measures to raise the threshold for complaints and to improve the quality of information in relation to complains, in particular:

“Ofcom will not accept a dispute without evidence of the failure of meaningful commercial negotiations. Ofcom will not accept a complaint without evidence to back up the allegation. Ofcom will require an officer, preferably the Chief Executive Officer, of the company making the submission to verify that the company has taken due care in checking that the evidence submitted is correct and complete and (in the case of a dispute) that best endeavours have been used to resolve the dispute through commercial negotiation.” Paragraph 13.

These measures have enabled Ofcom to focus resources. During 2004 Ofcom considered **one in five** requests for a full investigation. For comparison purposes, in the last six months of 2003, Ofcom's predecessor Oftel considered full investigation in response to almost **nine out of ten** requests.⁵⁸

Approach 6: Put the emphasis on negotiation

There are a number of options for reducing the burden on regulation via incentives and mechanisms for private resolution of potential problems. One approach would be to remove *ex ante* regulation, but to maintain a threat of regulation, effectively reversing the burden of proof. The task of the regulator is then to monitor the market rather than fix in advance detailed terms and prices. Another approach is to rely more heavily on voluntary negotiation backed by some sort of arbitration mechanism (the “negotiate-arbitrate” model). Microstate NRAs might consider how such approaches could be

⁵⁷ Ofcom. July 2004. “Ofcom's approach to complaints and disputes”. <http://www.ofcom.org.uk/bulletins/crt/crt0305/crtb.pdf>

⁵⁸ Ofcom. March 2005. <http://www.ofcom.org.uk/media/news/2005/03/nr20050323> “Ofcom guidelines maintain reduced regulatory intervention.”

adopted within the context of the EU regulatory framework. Box 6.1 provides more detail on the application of such mechanisms in specific countries and industries.

Box 6.1 Examples of reliance on negotiation and arbitration

Regulatory variants such as price surveillance rather than *ex ante* regulation and various forms of negotiate-arbitrate models have been considered and implemented in a number of countries.

- Following a review of airport regulation during 2001, the Australian Federal Government accepted the Productivity Commission's recommendation that Sydney, Melbourne, Brisbane, Perth, Adelaide, Canberra and Darwin airports no longer be subject to *ex ante* price controls, but instead be subject to price monitoring under the Prices Surveillance Act 1983. These arrangements took effect from 1 July 2002, and an independent review will be carried out after five years to ascertain the need for future price regulation. The Government has stated that it would consider re-introducing price controls if it formed the view that an airport operator had unjustifiably increased prices.
- Following an inquiry into telecommunications regulation, the Australian *Telecommunications Competition Act 2002*, which came into effect on 19 December 2002 includes provision for access undertakings, which set out access provisions and other terms and conditions, prior to investment⁵⁹. This effectively means that an investor can obtain certainty about the treatment of an investment prior to it being undertaken. However, the undertaking can be rejected by the Australian Competition and Consumer Commission on a number of grounds.
- Under the New Zealand Telecommunications Act 2001 (Section 22) no person may apply for an access determination by the regulator if "*that person has not made reasonable attempts to negotiate the terms of supply of the service with the person who would otherwise be a party to the determination*". This introduces a general presumption that opportunities for negotiation should be pursued first.
- A narrower use of negotiation, backed by arbitration, was implemented by Ofcom in 2004 with the established of a Telecommunications Adjudicator scheme to resolve disputes in relation to the implementation of LLU.⁶⁰ The scheme codifies and distance Ofcom from the process for resolving detailed technical disputes regarding the implementation of LLU.
- Another example of adjudication is the inclusion of disputes resolution through "final offer" arbitration to support negotiated access under a specific timetable under the 1996 telecommunications law in Guatemala.⁶¹ Final offer arbitration, also known as pendulum arbitration, limits parties' posturing incentives since the arbitrator must choose only between the two final offers, and the chosen offer then becomes binding on both parties. We note that if decisions of this kind were subject to appeal to a higher authority that authority would also need to be constrained to choose between the two offers to maintain incentives for truthful revelation of offers during negotiation.

⁵⁹ *Trade Practices Act 1974 (Cth)*, section 152CBA.

⁶⁰ Ofcom. June 2004. "Telecommunications Adjudication Scheme for Local Loop Unbundling" http://www.ofcom.org.uk/telecoms/groups/telecoms_adj_sch/telecoms_adj_sch.pdf

⁶¹ P.T.Spiller and C.G. Cardilli. 1997. "The Frontier of Telecommunications Deregulation: Small Countries Leading the Pack." *Journal of Economic Perspectives*, Vol.11 no.4, 127-38.

7 Conclusions and proposals

7.1 The Key Differences Between Micro and Macrostates

Our study indicates that there are three main differences between micro and macrostates which impact effective application of the EU regulatory framework:

- there are economy of scale effects which impact the cost structures of incumbents and entrants alike. These raise unit costs and reduce competitive entry prospects. They also make it more important for NRAs to get the trade off between intensity of competition and incentives for investment right
- the relative market power of incumbents and large foreign entrants is more balanced in microstate than in macrostates. Set against these lower barriers to entry, the limited size of the market means that microstates are unattractive for such entrants
- the balance between the costs and benefits of regulation is more critical in microstates. The costs to the industry of implementing the regulatory process⁶² is already an order of magnitude higher in a microstate as a proportion of total costs. This could rise by another order of magnitude if microstate NRAs were to take on the same workload as macrostate NRAs. So it is especially important to use regulatory approaches and to implement remedies where the benefits clearly outweigh the costs.

7.2 Proposals for Action

In combination these differences present challenges to all the main stakeholders. We suggest that:

- microstate **incumbents** will need to develop new business models to deal with the major new economy of scale effects inherent in the development of value added and content based services running over next generation networks
- it would be helpful to microstate NRAs if the **ERG** were to develop guidance on remedies which takes specific account of market scale. It might for example form a task force within its working group on remedies to look at the issue. Members of the task force might include representatives from microstate NRAs and from large NRAs, such as Ofcom, with expertise in regulating both large incumbents (BT) and small incumbents (Kingston Communications)
- microstate **NRAs** will need to take account of the differences of Section 7.1. They cannot simply copy remedies developed in macrostates. We set out in Section 7.3 some factors which the microstate NRAs might wish to take into account until such time as the ERG has developed guidance
- it would also be helpful to microstate NRAs if the **European Commission** were to take account of the differences of Section 7.1 in monitoring implementation of the EU regulatory framework and in developing future regulatory policy. We set out more detailed proposals in Section 7.4.

7.3 Factors for Microstate NRAs to consider

We suggest that microstate NRAs consider the following factors as they implement the EU regulatory framework and develop remedies using the EU regulatory framework.

⁶² The costs of the NRA plus the costs incurred by the operators

Factor 1: *microstate economies are different from those of macrostates.* In particular economy of scale effects make a difference to what constitutes effective regulation. These differences mean that the telecommunications industry of microstates may require different regulatory remedies if it is to function efficiently. In particular it is important that:

- microstate NRAs do not simply copy regulatory remedies which are widely used in macrostates
- national and EU authorities do not assume that the telecommunications industry infrastructure in a microstate must evolve in the same way as in a macrostate.

Factor 2: *it is important to maximise economic welfare rather than competition.* Competition is clearly important to the effective development of a microstate's telecommunications industry. But it is not an end in itself. The microstate NRA needs to make trade offs:

- between the intensity of competition and the level of investment by the telecommunications industry
- between competition and productive efficiency
- between measures which promote infrastructure based competition and those which promote service based competition.

Our analysis suggests that, for an economically efficient industry, it is more important to get these trade offs right in a microstate than in a macrostate.

Factor 3: *taking account of economy of scale effects is important in developing remedies.* Our analysis shows that there are major economy of scale effects in the delivery of core network services - but not in the supply of access networks or retail functions. While a macrostate incumbent is well above the point of minimum economic scale, our analysis indicates that microstate incumbents are at or below this point given that:

- fixed costs are a substantially higher proportion of total core network costs for microstate incumbents
- microstate incumbents necessarily operate their core network at lower levels of utilisation
- microstate incumbents have significantly less procurement power than macrostate incumbents.

Factor 4: *competitive entry is more likely to be limited in a microstate.* Economy of scale effects mean that entrants suffer a greater cost disadvantage relative to the incumbent in a microstate than in a macrostate. They are therefore less likely to enter the mass markets of microstates. The small scale of the market makes entry into microstates a low priority for large foreign operators. At the same time local entrants are likely to struggle - partly because of the economy of scale cost disadvantages and partly because prices in microstates are already relatively low and cost orientated.

Factor 5: *assessing outcomes and contestability, rather than industry structure, is the best way to judge the performance of the telecommunications industry in a microstate.* Given that efficient entry is likely to be limited in microstates, it is important that microstate NRAs are judged by their Government and by EU institutions on key outcomes⁶³ rather than on the number of entrants and the speed with which the incumbent loses market share.

Factor 6: *it is important that all microstate markets are at least contestable.* Efficient entry in microstates is likely to be more limited than in macrostates. So it is important to ensure that all markets are contestable and that the microstate incumbent always faces the threat of competition, even if competition itself is limited. Contestability is an important pre-condition for ensuring that the incumbent invests, innovates and improves its operational efficiency in an effective way.

⁶³ e.g. end-user price levels, service quality, innovation

Factor 7: *building economy of scale effects into access prices is essential for an efficient industry.* Given that there are strong economy of scale effects in the supply of core network services such as call origination, call termination and transit services, it is important to build these effects into the microstate incumbent's regulated access prices. Failure to do so leads to inefficient entry and reduced incentives for infrastructure investment. It is especially important that microstate NRAs do not set access prices based on simple international benchmarks, made up of an average of access prices from other, larger, EU states.

Factor 8: *microstate NRAs will come under pressure to set access prices below costs.* Entrants which are struggling to create viable business (see Factor 4) will bring strong pressure on microstate NRAs to set access prices at levels below costs. It is important that the NRA resists this pressure, even if it means that the entrant fails and competition is more limited. If it does not then the microstate NRA:

- encourages inefficient entry and a set of entrants which are reliant on the regulator continuing to set economically inefficient prices for their survival
- discourages entry by infrastructure based rivals who cannot compete with service based rivals which are subsidised by below cost purchase of network components
- discourages future investment by the microstate incumbent (who fears that the NRA will demand below cost access to this new infrastructure)
- leads to higher prices for end-users in market segments where the incumbent retains a monopoly, or, if this is prevented, threatens the incumbent's ability to meet its universal service obligations.

Factor 9: *there are additional challenges in microstates in promoting investment in a nationwide next generation network so as to enable economic development.* Microstate incumbents are the only operators likely to build next generation networks on a nation-wide basis. But microstate incumbents have reduced incentives to invest in NGNs when compared with macrostate incumbents. They may have incentives to build NGNs to reduce unit costs. But they are unlikely to be able compete in the provision of new content based services where economy of scale effects are substantial. In these circumstances microstate NRAs could improve the prospects for next generation network build by making a commitment in advance on how they will regulate NGNs. This might involve:

- giving microstate incumbents retail pricing freedom for NGN services
- focussing regulation of NGNs on non replicable assets only
- setting regulated prices for these assets in a way which takes full account of investment risks and the asymmetric consequences of regulatory error.

For more detail on these proposals microstate NRAs might want to look at a recent economic policy note⁶⁴ issued by the Netherlands' regulator OPTA.

Factor 10: *regulatory impact assessments are particularly important in microstates to check that standard remedies are applicable.* Regulatory measures which are effective in macrostates may lead to economic welfare losses in microstates. The cost of implementing many regulatory measures varies little with the size of the market while the benefits of these measures are often proportionate to the size of the market. Given the differences in the costs and benefits of such measures as a function of market size, it is quite possible the measures which make good economic sense in a macrostate lead to economic losses in a microstate. This analysis suggests that it is especially

⁶⁴ Regulating emerging markets, Economic Policy Note 5, OPTA, April 2005

important for NRAs in microstates to carry out regulatory impact assessments to check on whether the benefits of a measure clearly outweigh the costs – even for measures which are commonplace in macrostates.

Factor 11: *a simpler, lower cost, approach to regulation is needed in microstates to keep end user prices to reasonable levels.* Regulating in the same way as a macrostate NRA is not an option. It would require similar levels of regulatory resources. And this would raise end-user telecommunications prices by over 50%. So we suggest that microstate NRAs should:

- use a simpler approach to setting access prices than that used in a macrostate. For example, given the economy of scale effects in a microstate, its NRA might base access prices on the incumbent's actual costs whilst checking its cost efficiency in other ways
- screen complaints from entrants by requiring a minimum standard of supporting evidence before any investigation starts
- put more emphasis on negotiation and arbitration to resolve disputes between operators.

In particular during the market review process which they are now conducting, a microstate NRAs might:

- focus market reviews on developing **remedies** which take account of the factors identified in this report, rather than on adjusting the **market definition** and **SMP assessment** phrases to take account of the special circumstances of microstates. A microstate NRA might argue that the list of 18 markets identified as susceptible to ex ante regulation in the European Commission's Recommendation⁶⁵ should be shortened. But the burden of proof required here by the Article 7 Task Force is especially high. So we suggest that microstate NRAs should focus on developing remedies which reflect local conditions rather than trying to remove markets from the review
- implement simple, low cost obligations on the incumbent operator when it is found to have SMP following the market review process. This is the approach which Ofcom has taken when regulating Kingston Communications. It might involve imposing obligations to supply on a fair, reasonable, and non-discriminatory basis rather than on cost orientated terms; to supply a wholesale product only when their reasonable demand; and to make voluntary price undertakings
- simplify the wholesale product set which microstate incumbents are obliged to supply to that which ensures that the market is contestable. This means selecting from the wide range of remedies used in a macrostate those which encourage infrastructure based competition in growing markets and which are lowest cost to specify, price and implement.

7.4 Considerations for the European Commission

The differences of Section 7.1 mean that:

- the industry structure in microstates could develop differently from that of macrostates because of the more limited prospects for efficient entry
- remedies which are effective in macrostates may not be appropriate in microstates because of the difference balance between the costs and benefits of regulation.

We therefore propose that the European Commission should:

- judge the success of regulation in microstates by comparing key outcomes with those in competitive macrostate and by assessing the contestability of markets rather than by comparing the industry structure in macrostates with that in competitive microstates

⁶⁵ Commission Recommendation on Relevant Markets...susceptible to ex ante Regulation, C(2003)497, February 2003



- focus the Article 7 Task Force's review of remedies proposed by microstate NRAs on evidence that the benefits of each remedy outweigh its costs
- take account of issues of market scale when it reviews the current regulatory framework and when it issues general guidance to member states
- initiate work to consider further the economy of scale effects. We are reasonably confident that there are major economy of scale effects in the supply of core network services and that the microstate incumbents are at, close to, or below minimum economic scale. But we believe it would be useful to study further the level of minimum economic scale to see to what extent the issues identified in this study apply to the member states in the EU in the one million to three million population range.

Annex A Investigation of economies of scale

A1 Introduction

Businesses in many industries are subject to economies of scale and scope. In order to test this hypothesis in the telecommunications industry, and to identify where on a cost-volume curve the microstates lie, we have looked at various cost models of core networks and carried out other investigations.

Top-down cost models and accounts provide some views of a business's core network costs. These tend to be difficult to compare, unless based on similar fiscal principles. Ovum and Indepen have access to a variety of cost data from operators, but in many cases these are confidential and frequently use different accounting bases. We believe for the purposes of testing the economic hypothesis and to enable tests that can be verified by other parties, public domain data provides a better data source.

We have therefore looked at:

- two public domain Bottom Up (BU) models (from Sweden and Denmark)
- US carrier's accounts.

The BU models have been reconciled with the top-down models of the incumbents and are deemed to be a reasonable approximation of an efficient operator's costs (naturally points of any model will be disputed by some parties, so complete agreement is never possible). We acknowledge that the models are not exactly accurate and they may even have some errors. However gross errors are unlikely and we are not concerned with the *absolute level* of cost, but with: *how the cost varies with volume*. Hence the influence of "regulatory bias" or other factors to reduce (or increase) costs does not distort the general results.

The database of US carriers accounts (from ARMIS data) is in the public domain and is one of the few sources of diverse operators' data that is based on very similar accounting standards. It therefore forms a good basis for analysis.

A1.1 Investigations using Bottom Up models

Using the Swedish BU Model (version 2.1), we have varied the volumes to see how the costs vary. This BU model (like the Danish BU model) has costs of the network (wholesale) business only, and has little costs relating to the retail business, other than some common business costs. The network business is the dominant part of the smaller operators' costs and so the model is valid to test the general hypothesis.

Varying volumes of services has to be done with some care, since the model is designed to work around the scope and volumes existing today (or those of recent years). Modelling algorithms (cost-volume relationships) cannot be made to extend over *very wide ranges*, without major errors. Hence the volume changes need to be relatively small (the model cannot be assumed accurate say if volumes fall to 1% of the current design). However smaller variations can identify the *slope* of the cost-volume relationship.

We varied the volumes of traffic and access lines by amounts from $\pm 10\%$ up to -50% . The latter may be moving beyond the reasonable modelling bounds, however the results even of this change were not far from the straight-line extrapolation of the smaller changes. We also varied the operational

costs in direct proportion to the volumes. We did not vary the common business costs. We varied the numbers of nodes in the network in the same proportion as traffic so as to ensure the model remains representative over a wide volume-change.

The results of this modelling show that:

- for small changes in size, 1% volumes change results in about 0.5% change in cost per call
- this cost variation rises when volumes fall below 50% of the current levels. Therefore with larger reductions (say 50% or more) in traffic, a 1% volume change results in even greater cost increases.

We are not totally confident that the model is truly accurate under such a large volume variation, but it is unlikely to be far out. The authors of this report have some experience of this model.

We have some confidence that the results are not a major over-estimate of the cost-volume-variable relationship⁶⁶ (CVR), since some other factors could be considered:

- non-PSTN volumes were not varied. Reducing these would increase the CVR
- the information assumes equipment costs are constant (no reduction in cost with larger purchase levels)
- operational costs *could* be considered relatively constant, however this does not impact the results significantly (CVR rises to about 0.7% cost change per percentage volume change if operational costs are constant).

We conclude that using the Swedish BU model, gives strong support for the hypothesis that falling demand and smaller networks results in increase cost per unit. The model-analysis supports that assumption that costs rise even faster for a similar relative reduction in demand, at lower demand levels, but we acknowledge that this may be pushing the bounds of the BU model design algorithms.

The same analysis technique has been applied to the Danish BU model (version 1.3) with similar results – costs per call rise by about 0.3% for every percentage reduction in demand.

For comparison to the microstates, the Danish model assumes about 3.5 million lines and the Swedish model assumes over 5 million PSTN lines. The microstates have around 10% of the demand of these countries.

A1.3 US carriers data

We have examined the costs of US carriers using the ARMIS accounting data. This shows the costs (and revenues) of a wide range of carriers. The data is filed in a similar manner, enabling comparisons between operators. The data also includes information on customer lines and calls, to allow a cost per unit to be calculated.

There are naturally a wide range of *other factors* that impact costs across the states (such as demography, network design, relative salaries in different states etc). We have not attempted to remove these factors in our analysis and have simply looked at the total costs (operational, including or excluding depreciation) versus size. The data supports the previous analysis. A 1% reduction in network size (line numbers) increases the operational costs per call by about 0.15%.

The data was taken from 23 US carriers ranging in size from 0.5 million lines to over 28 million lines. We note that the other factors tend to “scatter the results,” but cost volume relationships are still significant.

⁶⁶ Increasing the CVR causes greater increase in unit costs for a given reduction in network size or demand

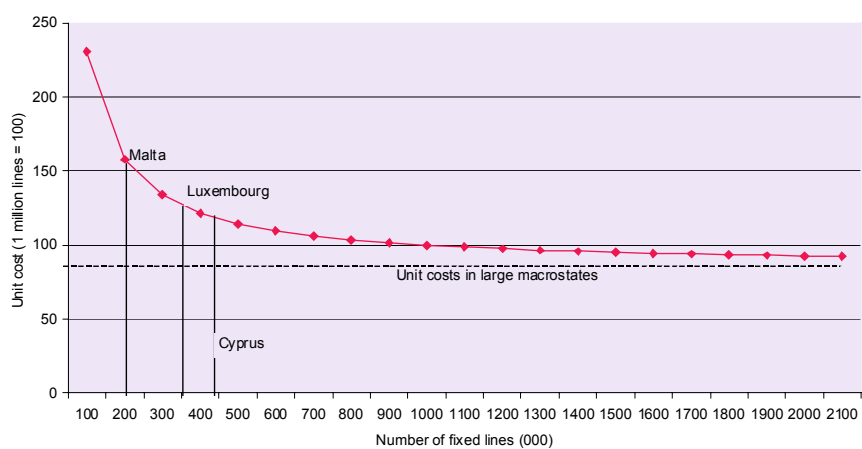
A1.4 Fixed versus variable costs

We also considered where the microstate incumbents may sit on the economy of scale curve for core network costs. The results are presented in Figure A1 which is based on analysis of the fixed and variable core network costs of one of the microstate incumbents. The curve assumes that the total core network costs are given by:

$$C = a + bL \text{ where}$$

a and b are constants and L is a number of fixed lines served

Figure A1 Economy of scale effects in supply of core network services



A1.5 Conclusions

Figure A2 summarises the evidence.

Figure A2 Economy of scale effects – core networks

Source	% decrease in unit costs for a 1% increase traffic
Swedish cost model	0.5%
Danish cost model	0.3%
US database	0.15%

Our analysis of robust data (US operator's accounts and BU models) supports the general assumption that smaller carriers naturally have a greater cost per unit. We can reasonably claim that the relative impact of size is greater for the smallest operators. Thus the relative cost differences (per call or per line) between (say) a business with one or two million lines is not as significant as the differences between operators with a (say) 0.25 million and 1 million lines.

Our first conclusions on economies of scale are therefore clear:

- smaller operator cannot achieve the economies of scale of the major operators
- economy of scale effects are much less relevant for larger operators. An operator with 10 million lines does not have a huge economy of scale advantage over one with 2 million lines

- the microstate incumbents are probably at or below the minimum economic scale in the supply of core network services.

A2 Utilisation

Smaller networks produce smaller amounts of traffic. They also require less equipment, so the cost per unit of using a network component *might* not be very different from larger networks. In practice, this is not the case as the network efficiencies are lower in smaller networks.

To illustrate this point, we consider the issue of optical cables. These have significant fixed costs – the cable and digging investment are fixed no matter the volume of traffic. The more services that use the cable, the lower the unit cost.

Smaller operators do not generate enough traffic to make cables as economic as the larger operators. This is most obvious in the backbone network where major cities are interconnected. The traffic per cable of a small operator cannot hope to reach the levels of a large operator, hence the unit costs are significantly greater.

From previous experience of the authors when modelling optimum network designs, it can be seen that lower costs are obtained by centralising switch infrastructure into fewer larger centres (larger switches are cheaper to operate than many smaller ones). Microstates do not have this option and by definition have smaller switches and hence a higher cost base. The need for network redundancy exacerbates this problem.

We conclude that microstate operators' networks do not have the utilisation rates of the larger operators and this contributes to higher unit costs.

A3 Purchasing power

There is considerable anecdotal evidence that small operators have lower procurement power. But, from the limited data we have, it is not possible to show that microstates pay significantly more (or less) for commodity telecoms products. More bespoke telecoms products and services are more likely to cost more for smaller buyers (such as IT developments), but prices for these products are much harder to compare, since they are bespoke, and so direct one-for-one comparisons become very difficult.

An interview with a senior advisor who works with smaller operators revealed that, based on many years experience, smaller operators face on average a 10% to 20% cost disadvantage. This is significant. In contrast the purchasing power differences between major operators is not very large: a recent consulting study for a large mobile operator showed that its buying power was little different from that of the much larger Vodafone.

A4 Summary

Our analysis suggests that:

- cost-volume relationship exists and smaller networks have higher units costs.
- the rate of increase in cost, for the same percentage reduction in volume, is larger for the smaller operators
- microstate incumbents are at or close to minimum economic scale as shown in Figure A3. There is good reason to believe that the microstate incumbents are closer to the steeper part of the

curve (A) and are *not* “in the middle” (B) where relative size differences to the larger operators (C) are less of an issue

- lower levels of network utilisation and limited procurement power for small operators contribute to economy of scale effects in addition to the presence of fixed costs.

Figure A3 Cost volume relationship

