

Centre for Commercial Law Conference
Faculty of Law - ANU

" Commercial Law - Private Business/Public Concern"

Canberra - 30 September 2002

**Regulating Commercial Relationships
and Uncertainty:**

**A Regulatory Framework for Industries
facing Dynamic Change**

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Executive Summary

The purpose of this report is to develop a general framework for addressing issues surrounding the regulation of commercial relationships in a consistent and coherent manner. The framework elaborated in this report:

- Focuses on the uncertainty surrounding the consequences of regulatory intervention;
- Provides a methodology to estimate the net benefit of regulatory forbearance given uncertainty; and
- Assesses the nature and importance of regulatory safeguards in this context.

Our focus is on industries facing dynamic change. For the purposes of illustration our focus shall be on mobile communications (eg 3G). A key source of uncertainty for regulators of mobile telephony is that technological and market conditions in mobile telephony have been changing dramatically, and are likely to keep doing so. Thus the regulator faces considerable uncertainty about which of many possible future “states of the world” will in fact hold. Given current trends however, any forward looking assessment of competitive conditions is likely to suggest a broad market definition, in which more forms, or modes of communication, and suppliers compete for customers. On the other hand the consequences of intervention at an aggregate level are very hard to predict, given that any regulatory intervention will lead to interactive changes in human behaviour by many players. At the same time any regulatory intervention will foreclose better information about the state of the world in the absence of regulation.

The fact that the costs and benefits of regulatory intervention are inevitably difficult to predict, in itself explains the apparently wide scope for divergent views, and strong debate. It is clear however that the unintended consequences of an inappropriate regulatory intervention are both significant, and increasing exponentially over time. There is therefore significant risk of regulatory error that requires regulatory safeguards. Indeed a key message from the analysis of the report is that there are considerable net benefits from regulatory forbearance, or a “wait and see” approach to enable more information to become available to reduce uncertainty - *before* regulating mobile telephony further.

The general framework presented in this report can be applied to address whether a regulator¹ should declare a new service or remove an existing one, and to address either current regulatory issues or future regulatory issues. In addition, it shows how to better ensure the quality of regulation.

In summary the highlights emerging from this report are that:

- Lack of information results in uncertainty about future states of the world and in particular about the competitive conditions that will hold in the future with regard to mobile communications services;
- The probability of highly competitive conditions in mobile communications services without regulation is however increasing, given convergence of technologies, proliferation of players, and increasing investment in competing networks;
- The potential costs of inappropriate regulatory intervention are therefore rising, and may be very high, to the extent it can discourage competition, innovation and the development of new competitive technologies;
- There is a high probability that a much better decision on whether to regulate can be made at some later stage with the benefit of information that will become available over time;

¹ A regulator includes any competition regulation agency such as REGULATOR in Australia or FCC in US, and OFFTEL in the UK.

- Information on competitive conditions without regulation will however never emerge if a service is regulated;
- Overall then the cost of regulating appears to be rising, the cost of forbearance appears to be falling, and better information for making decisions is becoming available over time, thereby strengthening the case for regulatory forbearance over time.

Such a view is supported by specific observable trends:

- Overall, prices are decreasing;
- Mobile penetration is increasing;
- Subscribers’ awareness of prices is increasing;
- Price information is becoming more transparent;
- With the introduction of the mobile number portability, the barriers to consumer switching has become relatively low;
- As 3G and other platforms become available consumers have more choices;
- As a result so-called high termination charges, if any, can be avoided.

Indeed this evidence supports the view that the mobile market is already intensively competitive and not just becoming increasingly so. In accordance with these changes Governments should therefore adopt a forbearance approach and

- Act to remove regulations that are inconsistent with general competition laws that apply to all industries; and
- Move to enforce regulatory safeguards that protect against regulatory error, safeguard the legitimate property rights of the shareholding public, and therefore foster incentives to invest.

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1 Introduction

This report develops a broad analytical framework for thinking about regulatory issues in relation to mobile communications services. It is intended to provide a structure and methodology for analysing specific regulatory issues. It does not conduct specific analyses of a particular case. This framework has a number of key features.

First it uses comparative institutional analysis to frame the regulatory decision. Quite often, specific regulatory interventions are simply justified by general references to “market failure”, and in particular to alleged failures in the competitive conditions in particular markets. While market failure given a clear objective or set of criteria is generally accepted as a necessary condition for regulatory intervention, it is not a sufficient condition. In short all institutions are flawed including regulated markets. The challenge is to find the most efficient institutional arrangement, efficient in the sense that no feasible better alternative can be identified and implemented. The challenge for the regulator in any particular case therefore is to identify the most efficient regulatory strategy from a set of feasible alternatives, when a key alternative is regulatory forbearance. This implies all interventions have to be justified using “the with and without test” – or by establishing how regulation would be better than regulatory forbearance. The comparison of real world institutional options, and their effects is the essence of the comparative institutional method.

Second the framework emphasises the inherent uncertainty in regulatory decision-making. There is inevitably considerable uncertainty in regulatory decision-making using the comparative institutional approach. A regulator may have limited information because they lack access to some private information, or because relevant information has not emerged. The regulator may also have limited capacity to process information due to bounded rationality, and both limited resources and limited time. The upshot is uncertainty over the efficiency effect of regulation. This includes uncertainty not only about the magnitude, but also about whether the impact is positive or negative. The report develops a framework for evaluating regulatory decision-making under uncertainty.

Third the framework emphasises that the evaluation of a regulatory intervention must take into account a key asymmetry in regulatory decision-making: reversing a decision not to regulate is easy, but reversing a regulatory intervention once it has been made is costly. The fundamental idea is the same as the real-options idea underlying modern thinking about investments. At the same time regulation forecloses the acquisition of information about how competitive conditions might have evolved in the absence of regulation.

The framework thus has some distinct features:

- It emphasizes the implications of uncertainty in regulatory decision making;
- It applies decision theory and develops a methodology for evaluating regulatory decision making under uncertainty, which
 - Adopts a comparative institutional approach to compare the world “with” and “without” regulation;
 - Explicitly accounts for uncertainty about competitive conditions;
 - Enables quantification of the expected benefits and costs of alternative regulatory outcomes given uncertainty about competitive conditions; and
 - Puts a value on the option of waiting and seeing by the regulator, given information is likely to become available over time which can reduce uncertainty.
- Finally it includes, as an integral part of the analytical framework, the often neglected issue of regulatory safeguards.

The rest of the report is structured as follows:

Section 2 presents a general framework for analysing the regulators decision problem given the uncertainty faced by the regulator.

Section 3 contains a methodology for estimating the net benefit of forbearance based on the general analytical framework developed and presented in the Section 2. It details the direct and indirect costs and benefits of regulation, and develops a model for estimating the net benefit of forbearance or a “Wait and See” strategy.

Section 4 focuses on the nature, costs and benefits of various regulatory safeguards that may ensure better quality regulation. Regulatory safeguards discussed include:

- Procedural rules involving strict decision criteria, and strict evidence rules; and
- Substantive rules including payment of compensation for regulatory takings.

These safeguards critically affect the exclusivity and transferability of property rights and therefore investment incentives. Simply if an owner cannot appropriate the gains from an investment, they are unlikely to have an incentive to invest. Regulatory interventions on access, and price setting, attenuate private property and thereby deter investment.

Section 5 provides some further guidance to the implementation of the framework.

An annex outlines a decision theory and real option value theory approach to regulatory decision making in greater depth, details how it can be applied to regulatory decisions and discusses the methodology for valuing the “wait and see” option in detail.

2 A Framework for Analysing Regulatory Decision Making under Uncertainty

2.1 Introduction

This section develops a general framework for regulatory decision-making under uncertainty. This framework is based on a comparative institutional approach, and involves an application of decision theory and real option value theory. We elaborate this framework below.

2.2 The Comparative Institutional Approach

As noted already often regulatory intervention is justified by reference to “market failure” or failure of competitive conditions. Where a particular market design fails however, other institutions with either more, or alternative forms of regulation, may fail as well, or indeed may fail more spectacularly than the original market. Thus, the relevant question for the regulator is not whether market failure exists, but how to address an issue of concern using *the most efficient* institutional arrangement. This is referred to in the literature as the comparative institutional approach.² As noted the challenge is to find the most efficient institutional design, efficient in the sense that no feasible better alternative can be identified and implemented.

In the context of a regulator’s decision on whether to regulate, the task for the regulator is to compare two broad institutional alternatives: regulatory forbearance or regulatory intervention, and to identify the more efficient institutional arrangement, for both.

2.3 The Application of Decision Theory to Regulatory Decision Making

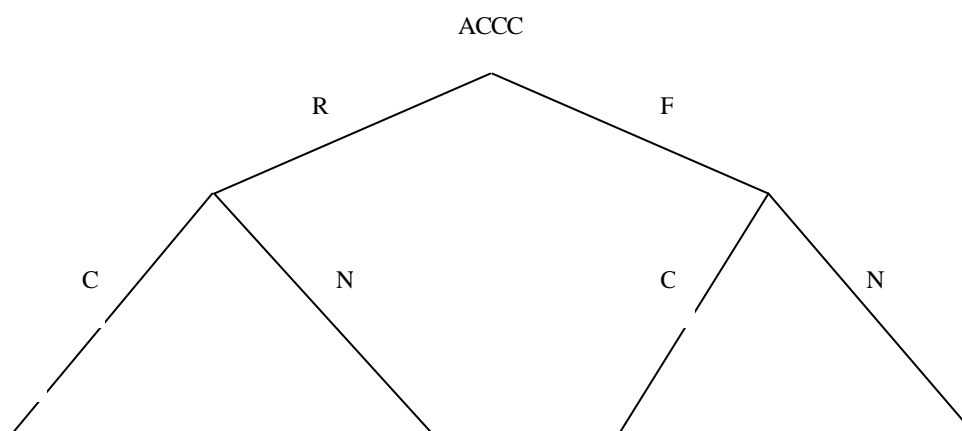
In real-life decision-making situations it is necessary to make decisions with incomplete information. The challenge facing a regulator is that decisions must be made when the state of future competition is unknown. This is especially important when the market is growing rapidly and new technologies are being continuously introduced, as for instance, in the mobile communications market. It could take years before relevant and reliable data becomes available.

² See for instance, Williamson, Oliver (1996), *The Mechanisms of Governance*, Oxford: Oxford University Press.

How do we reconcile uncertainties with the need for a decision now? Note that a decision not to act until more information is available is still a decision. We need to develop methodologies to assist with decision-making in the face of incomplete information. Risk analysis and statistical decision theory provide some guidelines.

The most basic technique in decision theory is the decision tree. Take, as an example, the question of whether to regulate a mobile termination service. Suppose you are asked to provide an opinion on whether or not there is a need to regulate this service. Your opinion depends on whether or not the market is competitive. With the help of a decision tree, we can facilitate decision making by laying out relevant alternatives, and their consequences more explicitly.

In the diagram below we use a decision tree to illustrate the regulator's decision about whether to declare a service or not. To gain familiarity with the decision tree in the diagram, look at it from the top down. The first branching shows that the regulator has a choice between regulatory intervention (R) (e.g., declaring a service), and regulatory forbearance (F) (i.e., not declaring a service).



The next level down on the tree shows that, flowing from each of those two regulator choices, there are two possible competitive conditions. The market is either competitive (C) or non-competitive (N). The tree indicates that the regulator can make two choices (regulate or not) but faces four potential outcomes as a result. Under either decision there is always a chance it is wrong. It may regulate a competitive market, and it might not regulate a non-competitive market.

It is the consequences of regulating or not regulating that concerns the regulator. However given it is only ever probable, not certain, that a non competitive state of the world may exist in the future, under either choice the ultimate outcome of regulating, or not regulating is never certain.

Upon analysis the preponderance of effects in one direction may however be so overwhelming that you don't need to do anything more than map out the decision tree. For example if in a particular case, regulation of a competitive market is likely to have no effect, but non regulation of a non competitive market is very costly, this may led one to err towards regulation.

In other cases it may be difficult to decide on a course of action based on the tree skeleton and consequences alone. In such cases it may be useful to do the analysis quantitatively by assigning probabilities to various outcomes along the decision tree, and by assigning numerical values that measure the welfare consequences under the four possible outcomes.

One can simply illustrate how this would be done by focusing on the four possible outcomes associated with the regulator’s possible decisions.

- The regulator regulates a service when the market for the service is competitive;
- The regulator regulates a service when the market for the service is not competitive;
- The regulator does not regulate a service when the market for the service is competitive; and
- The regulator does not regulate a service when the market for the service is not competitive.

The regulator’s decision problem then is to estimate the probability or odds of competitive conditions. In a close run case it might be 0.5 or 50/50.

The next step then is to estimate the net benefits (or the benefits less the costs) of regulating:

- First a competitive market; and
- Second a non-competitive market.

Thus in a close run case, the expected pay off from regulating might be 0.5 times the net benefits of the first outcome, and 0.5 times the net benefits of the second. This gives the *expected* pay off from regulating, which is the weighted gain (or loss) from the two likely states of the world under regulation.

The next step is to estimate the expected net benefits or pay off in a similar fashion if it chooses not to regulate:

- First a competitive market; and
- Second a non-competitive market.

Once again the regulator can calculate the *expected* pay off, but this time it is the pay off from *not* regulating, or the weighted gain from the two likely states of the world with no regulation.

Once it has estimated the expected values associated with each possible decision the regulator can then make a decision based on the **decision rule**: regulate a service if and only if the expected pay off from regulating a service is greater than the expected pay off from not regulating a service. An alternative expression of the same rule is: Regulate a service if, and only if, the odds that the market is competitive exceed the ratio of the benefit of not regulating a service in a competitive market, and the benefit of regulating a service in a non competitive market. Adopting the second formulation of the decision rule enables one to proceed to estimation in two steps:

- a) First calculate the ratio of net benefits from regulation under the two scenarios;
- b) Second compare this ratio to the assessed odds of a competitive market.

2.4 The ‘Wait and See’ Option

The preceding discussion assumes that regulation–forbearance decisions are made once for all time. A decision to regulate a service can, of course, be revoked by a subsequent decision. In the same way, a decision not to regulate a service now does not prevent a decision later in favour of regulation. The regulator has an opportunity to adopt a “wait and see” approach as a real option now, and reconsider its decision later. In other words it has the real option of regulating later when more information on competitive conditions may come to light, and this real option can be valued. The fundamental idea is the same as the real-options idea underlying modern thinking about investments.

Conventional emphasis on first-mover advantages has led strategic management researchers to advocate speed as a key to competitiveness. By contrast, real option theory emphasizes the

value of waiting when considering sunk investments under uncertainty. When irreversible real investments can be delayed, the option to delay may be valuable.

In the context of regulatory intervention, any early regulatory intervention foregoes the benefits by not waiting for additional information to arrive. In addition, the valuation of a regulatory intervention must take into account any asymmetry in regulatory decision-making: reversing a decision not to regulate appears easy, but reversing a regulation once it has been made may be costly owing to the incentives for “regulatory creep” by budget maximising regulators, the formation of stable coalitions dependent on the regulation and the free rider problems confronting those who may benefit from its removal.

Ideally, the regulator should consider the option of taking action to address problems if they emerge, compared with regulating at the outset to counter problems anticipated but which may never eventuate. For instance, the 3G market is not yet taken form, and so there is very little information available to determine whether it will be competitive or not, and the impact it will have on other markets. Deciding not to regulate will allow information to become available in the future, at which stage the regulatory authorities can decide whether the market is competitive or not. But regulating the 3G market now removes future information, making it more difficult for the regulatory authorities to make such decisions. A similar argument might warrant the revocation of any regulation of products that are currently regulated but which might face competition from 3G services.

To value the real option inherent in regulatory forbearance, the decision tree in the previous section should be extended downwards one more level. At each point at the bottom of the tree, the regulator has an opportunity to reconsider its own decision about regulation. If the original decision was not to regulate, the regulator will have more information later. It will have been able to examine the actual behaviour of market participants in the absence of regulation. On the other hand, if regulation was decided in the original decision, the regulator will be unable, in all probability, to learn anything about the extent to which carriers would compete in the absence of regulation. It may have no new information for any second decision. Waiting thus has benefits. It also has potential costs, since it runs the risk of not regulating in the non-competitive case during the waiting period.

As with any investment, the larger the magnitude and period of initial investments the larger must be the expected future payoff to justify accepting the “wait and see” proposition. Thus, if relevant information will take a long period to come available and the risks and costs of anti-competitive behaviour during these initial periods is high then the “wait and see” option will have low value.³ Recognising the value of the wait and see option decreases the probability that a decision to regulate a service can become the optimal decision.

3 A Methodology for Evaluating Alternative Regulatory Outcomes

3.1 Introduction

This section sets out the detailed steps for evaluating alternative regulatory strategies using the methodology elaborated in the previous section. It does this in three sections.

The first sub-section outlines a method for estimating the net benefits of regulation, ignoring the wait and see option. It therefore explores how to put numbers on key values including:

- a) the value of regulating a service when the market for this service is competitive;
- b) the value of regulating a service when the market for this service is non-competitive;
- c) the value of not regulating a service when the market for this service is competitive;
- d) the value of not regulating a service when the market for this service is non-competitive.

³ The annex outlines more formally the method for calculating the value of the real option.

From these we can calculate:⁴

- (c-a) the net benefit of not regulating a competitive market;
- (b-d) the net benefit of regulating a non-competitive market.

This gives us a basis for comparing the pay off from a regulatory forbearance strategy as opposed to a regulatory intervention strategy under different states of competition according to the decision rules outlined in Section 2.3 and elaborated in the Annex.

The second sub-section provides some guidance on how to assess the probability of the market being competitive, or the future state of actual competition in the market, before the decision to regulate is made.

The third sub-section provides guidance on how to estimate the value of the “wait-and-see” option.

3.2 Estimating the Net Benefits of Regulation

Estimating the values of a, b, c and d defined above requires us to estimate

- The direct costs and benefits of regulation; and
- The indirect costs and benefits of regulation;

for two scenarios:

- Scenario one: the market is competitive; and
- Scenario two: the market is non-competitive.

The direct costs of regulation are the intended and unintended opportunity costs of the scarce resources employed directly by the regulatory process whatever the regulatory outcome and its consequences. There are always direct costs in relation to regulation, and they are likely to be the same in both scenarios - in other words irrespective of whether the market is competitive or not in the future.

Thus direct costs include the opportunity costs of the regulatory agencies staff time, the costs any complainant incurs through their direct involvement in the regulatory process, the costs of any service provider who is the subject of regulation and therefore must become directly engaged by the process, and the direct costs of any other party directly associated with any initial regulatory process, including consultants, lawyers and those members of executive and legislative wings of Government that may have a direct role. Should any initial ruling be appealed then the direct costs of regulation include the direct costs associated with all stages in the review process, including subsequent litigation costs.

The direct benefits of regulation are more intangible, and harder to enumerate but might include the benefits of communication and information sharing. All the same, should such benefits exist they may well be appropriable by more cost efficient means. Moreover in many circumstances the direct risks and costs of disclosing commercially sensitive information, and the effects of misrepresentation and misuse of information in a regulatory process also need to be considered or factored in.

Regulation however also causes intended and unintended indirect costs and indirect benefits. We will focus on the impact of regulation on allocative, productive and dynamic efficiency. It is expected that the regulation will change productive and dynamic efficiency in both scenarios, but allocative efficiency in the second scenario (indirect benefits). These effects can arise through the impact of regulation on property rights, risk allocation and incentives.

The table below summarises the task at hand. Under each scenario of future possible states of the competition (competitive or non competitive as shown in the rows), there is a need to

⁴ The formal decision rule is outlined in the Annex.

calculate over time the net present value (NPV) of the sum of the direct net benefits (direct benefits less direct costs) *and* the indirect net benefits (indirect benefits less indirect costs) of regulation.

Table 1 Estimated benefits (costs) of regulation

	NPV of Benefits (Costs) of regulation versus forbearance
Competitive market Net Direct benefit of regulation Net Indirect benefit of regulation <ul style="list-style-type: none"> • Allocative efficiency • Productive efficiency • Dynamic efficiency Total: Net benefit of Regulation -(c-a)	NPVC
Non-competitive market Net Direct benefit of regulation Net Indirect benefit of regulation <ul style="list-style-type: none"> • Allocative efficiency • Productive efficiency • Dynamic efficiency Total: Net benefit of Regulation (b-d)	NPVN

In what follows we outline in more detail the issues that need to be addressed in estimating the payoffs from regulation as outlined above.

3.2.1 Direct Costs

Direct costs can be categorised as those opportunity costs borne by the government, service providers, seekers, and other relevant parties, who are directly engaged in the regulatory process which arise irrespective of the outcome of regulatory decision.

Costs borne by the government

The costs of a regulation to the government include:

- Costs to the regulator as regulatory agency – the regulator ruling in favour of regulation commits the regulator to apply the law to the facts of the case. Direct costs are imposed on the time of the regulator in making a decision whether to regulate and then in implementing any regulation.
- Costs to the legal system – where the regulator ignores relevant facts, or fails to properly consider all relevant material, it could lead to a wrong decision, which can be reviewed and appealed. This will impose costs on the legal system, including the time of the senior members of the judiciary and legal profession;
- Costs to executive government – including the cost of ministerial and staff time diverted to considering the regulation.
- Cost of legislator and staff time who initially formulated the law and need to monitor its performance;

Costs borne by service providers and seekers

These costs flow from (among other things):

- Demand on in-house senior management resources,
- Costly outside specialist advice, and

- Extended or complicated processes required to arrive at final access agreements.

Costs borne by other relevant parties

The regulation of one type of service will impact on other types of services within the same industry or in other industries. They may therefore make submissions on both public inquiries and draft recommendations. They will face costs similar to the service providers both in terms of time and the need to hire consultants with specific industry and legal expertise.

Monitoring and Enforcement costs

This cost is related to monitoring the compliance of regulation, a net incremental cost.

3.2.2 Indirect Costs and Benefits

The indirect costs and benefits of regulation, or the effects of a particular regulatory outcome may be traced through the contracts and institutions that govern the financial and physical flows of resources through the industry. The transmission of regulatory effects occurs through desired and undesired impacts on property rights, risk allocation, information, and incentives. Hence, properly conducted, the analysis would show how distortions in one market feed through into other output and input markets. The power of a regulator to create access obligations, and set prices can have important efficiency implications as discussed below.

Allocative Efficiency

The level of allocative efficiency refers to the extent to which resources are channelled to their highest value use. When a firm with market power charges a higher than competitive market price for a product, customers purchase less of that product than they would have done at the competitive market price. Since the value of the un-purchased product is higher than the production cost, there is a net loss. This loss is referred to as a loss in allocative efficiency. If entry or the threat of entry increases competition which leads to a fall in market price and a corresponding increase in the quantity demanded, then some (or all depending on the extent of the price fall) of the allocative efficiency loss will be avoided. This avoided loss is regarded as an allocative efficiency gain attributable to the entry or the threat of entry by a competitor.

Allocative efficiency effects occur when the use of a service changes when the service is regulated. For the purposes of our assessment, we assume that the use will change only if prices differ. Also, for the sake of tractability with the available information, the analysis assumes one generic service, perhaps best thought of as mobile termination.⁵

The use of the mobile service or the impact of regulation on allocative efficiency depends on the competitiveness of the broader market. If the market is competitive, the following assumptions can be made to keep the analysis as simple as possible.

- High substitutability between the services. In the mobile sector the substitutability of any service needs to be assessed in the context of electronic communication services, including fixed telephony. This is particularly relevant for call termination as a possible substitute for calling a person on a mobile is to call him or her on a fixed line.

⁵ Ideally, one shouldn't assess the net benefit of regulatory intervention on a service in isolation from the broader sector. Price controls on termination may well have impacts on prices of other services. Hence, any allocative efficiency measured in call termination may be lost elsewhere.

Further, because of the large proportion of common costs across all mobile services—and all mobile subscribers and roaming users of a network—the efficient allocation of common costs across different services is difficult to assess. Ramsey pricing rules indicate that mark-ups over marginal costs should reflect relative elasticities of demand of different services. Allocative efficiencies of one service, hence, cannot be identified in isolation.

- The service provided by one carrier is substitutable with the service from another carrier.
- The regulator maximises net welfare.
- Regulators are often given considerable flexibility in setting prices, provided such tariffs are consistent with the objectives and conditions in any empowering legislation. To simplify our analysis, it is assumed that the pricing rule used by the regulator establishes a profile for prices that maximises net welfare subject to the ‘cost of service’.

The task is now to calculate the price of the service when it is not regulated and when it is regulated. When it is regulated, there are three possible scenarios for the price:

- The price is above the “unregulated” market price throughout the entire life of the network;
- The price is always below the unregulated price; and
- The price is initially higher (lower) than the unregulated price but reduces below (above) the unregulated price at some future date (but with the NPV of expected revenue net of costs being zero).

In the first scenario, the price is always above the unregulated price. A decision to regulate has no impact on market prices or allocative efficiency (since the level of usage would not change if regulation were removed).

In the second scenario, the price is always below the unregulated price and this increases allocative efficiency provided the price is above short-run marginal cost. However, given that prices are set on an efficient cost of service level, this scenario is possible only if the cost assumed by the regulator is below the equilibrium market cost that would arise from competitive outcomes. Such an approach would deter investment in regulated investments to the detriment of the long run welfare of consumers.

In the third scenario, the price is below the unregulated price for some periods and above during other periods. Again, allocative efficiency may be improved but only through a below-market cost. This follows since the market price prevailing in each period would be the lesser of the price and the unregulated price. Thus, because the NPV of revenue assumed when setting the price cannot be fulfilled, the actual price achieved will be below the market price.

In summary, as might be expected, for the case of the competitive model, allocative efficiency would be unaffected by a decision to regulate the termination service provided the regulator does not force a below-market cost.⁶ We therefore conclude that regulation has minimal allocative efficiency effects.

However, if the regulator has inaccurate information on the variables above it follows that mistakes may be made and that the probability of such mistakes may deter investment in regulated industries to some extent, to the detriment of the long run welfare of consumers. This adds weight to the principle of cautionary regulatory behaviour. Nevertheless, for the purposes of this case we do not attempt to estimate the magnitude of such losses.

If the market is non-competitive, analogous with the case of competitiveness, a range of additional assumptions is made to enable conclusions to be drawn. In contrast to the competition model we make the following assumptions:

- High substitutability between the services (same as previous section); and
- Market power.

⁶ If the regulator does impose a below-market cost the costs in terms of dynamic efficiency may be large.

The extent of non-competitiveness is assumed sufficiently strong so as to enable the service provider to behave like a monopolist, but subject to any regulatory constraints imposed. Non-competitiveness is interpreted to mean that the service providers specify the same prices except in circumstances where a higher price by one company does not reduce returns to the other company.

- Regulatory assumptions (same as previous section)

It is anticipated that the anti-competitive behaviour would result in prices higher than competitive prices. But given that the threat of regulation is always in place and higher prices would create strong incentives for service seekers to apply for regulation, the ability to charge higher prices by service providers is limited.

It is worthwhile mentioning here that getting the regulated price too low can result in an important loss of long run welfare which may not be assessed under a static model. In a static model, if prices are too low—below the real cost (adjusted for risk) of the services in question—allocative inefficiencies may not be too large. The inefficiencies would stem from too much purchasing of the services relative to the socially optimal level.

However, in an expanding market with new entry, the dynamic repercussions could be much greater. If prices for new entrants access are set too low, too much entry may be taking place. This is good in a static competitive model, but if the entry is not sustainable it can be costly in the long run.

This is, arguably, what has occurred in the US where the price of unbundled elements (the loops) may have been set too low by regulators, providing incentives for entry by multiple CLECs including Northpoint, Covad and others who, eventually went bankrupt. Some believe that they went bankrupt, because they entered quite easily without developing the necessary customer service and technical platform to deliver the services promised to consumers. The long run repercussions for incentives to invest in the sector are hard to measure but arguably, regulatory bias towards entry is partly responsible for the uncertainty in the sector. Such dynamic risks play an important part in a cost and benefit analysis of any form of regulation.

Productive Efficiency

Productive efficiency is a measure of how few resources a firm uses to produce a given level of output. Pressures for productive efficiency are strongest when firms operate in competitive (or contestable) output and input markets and are subject to pressure to perform by the threat of being taken over by new owners. Firms that do not face these pressures are more susceptible to “organisational slack” creeping into their operations as a satisfactory level of profit may be achieved at less than full efficiency.

The detail of pricing rules used by regulators is important here. For example, the so-called TSLRIC or the retail benchmark pricing approaches may encourage service providers to improve productive efficiency but these approaches are vulnerable to weak incentives for dynamic efficiency.⁷ For mobile termination service the proportion of fixed cost to total cost is very high. For this reason the scope for productive inefficiencies from regulation will tend to be smaller than in some industries. Nevertheless, they may not be insignificant. The impact of regulation on operating costs can be estimated.

Dynamic Efficiency

Dynamic efficiency is concerned with the speed with which an industry adopts superior new technology and produces improved new products and services. Adoption of new technology has

⁷ Another reason why productivity efficiencies stemming from price controls on say call termination are unlikely is that one of the main competitive pressures in the sector is dynamic competition or Schumpeterian creative destruction. Price caps are not going to benefit such process—and they may in the long run delay it.

supply-side effects through reductions in cost, while product innovation has demand-side effects by bringing the benefit of meeting buyer wants more fully.

Maintaining a clear distinction between production and product innovation is important in the case of telecommunications where fixed costs account for a large proportion of total cost. These high fixed costs imply that scope for production innovation is likely to be limited once the network has been constructed. In contrast, the scope for product innovation is much wider.

In terms of dynamic efficiency, pricing regulation has two fundamental problems:

- Prices are not based on firms' *ex ante* risk/return choices; and
- Prices are based on costs rather than the value created.

The first problem arises because investment in innovation is an inherently risky activity and no regulatory regime has yet been devised that replicates firms' *ex ante* risk/return choices. The key problem is that the firm's *ex ante* risk bearing is extremely difficult to verify *ex post*. For these reasons, the regulator specifies an assumed risk level when determining the cost. Hence, irrespective of the precise approach to price setting, the result is to cause firms to focus on investments where costs are explicit and verifiable to regulators and risk is lower than the regulator's assumed cost. Both the level and timing of investment may be distorted.

The second problem arises because the added value to users from successful product innovation is observed only highly imprecisely by regulators (if at all). And, importantly, value creation is rarely verifiable and therefore not able to be used as a basis for setting appropriate prices.

It may be argued by some that regulation does not discourage product innovation because such innovations typically lead to new services not regulated by the defined services. They would argue that companies are not restricted in the prices they may charge for such services.

However, this argument ignores the fact that product innovations often have a feed back effect on the value of any regulated services. Often the innovation may have positive impacts on the value of multiple services. The inability of carriers to receive a share of these gains reduces their incentive to invest in such services. Hence, regulation will reduce growth of productivity.

Furthermore, regulatory intervention may have an affect on carriers' incentives to invest in building other networks such as 3G. This effect would occur if the regulator subsequently set prices too low to allow carriers to earn a return on their investment. The potential efficiency costs are very high.

Regulatory models are often based on static neoclassical economic analysis that assumes a mature market and no significant dynamic competition. Under this scenario, regulators are concerned with allocative or X-inefficiencies stemming from 'too high prices' or prices being above 'the competitive level'. A cost benefit analysis of regulation takes into account the benefits from lower dead-weight loss, more efficient allocation of social resources and/or income distribution concerns, but fails to assess the impact of regulation in a dynamic framework.

Competition in the mobile sector, like in other technology intensive sectors, is largely driven by the process of innovation of new services and technologies. The process of 'creative destruction' is described by Schumpeterian competition. In these markets, competitive pressure can be discrete stemming not from the progressive erosion of market power rents through price competition or product differentiation, but from the introduction of new services or technology that substitute existing value generating products or services. Innovation in these markets is the key to survival.⁸

A traditional static framework is missing the point. It is providing a myopic assessment of the market that fails to capture the key competitive factors. A cost benefit analysis based on such

⁸ D Evans and R Schmalensee: "Some economic aspects of antitrust analysis in dynamically competitive industries", May 2001.

model is likely to have large error margins. As such, so called Type I errors in regulatory decision-making (or false positives that arise when a competitive market is regulated) could be considerable and not measured at all.

Also as pointed out by Littlechild⁹ that under this dynamic competition model, economic rents at any given point in time –i.e. the existence of market power—is not only expected, but necessary to the competitive development of the sector. Hence, regulation that erodes this static market power will affect the dynamic competition of the market. A cost benefit analysis of regulatory intervention needs to assess this risk.

3.3 Estimating the Threshold Competitive Probability

Having estimated the direct and indirect costs, we can calculate the ratio of the value of not regulating a competitive market to that of regulating a non-competitive market with or without taking into account the wait and see option.

Following the decision rule we derive in the Annex and outlined in Section 2.3, the decision to regulate should be made only if the odds of the non-competitive market are higher than the calculated ratio.

To determine whether this condition is satisfied, it is necessary to assess the state of actual competition in the market. This would enable the regulator to form a view as to the likelihood that the market is competitive, and compare that to the calculated ratio.

The first step in assessing the state of market competition is to define the market. Once a market is defined, one can examine a number of aspects of the market, such as the level of barriers to entry, to understand the state of competition in the market.

3.3.1 Defining the Market

The key principles in defining a market include the following:

- The “market” is an “instrumental” concept, designed to focus attention on factors that influence the competitive process. It is a starting point for studying market shares, barriers to entry, and other indicators of market competition.
- Markets are defined based on substitutability between goods and services, measured using a “ssnip” test. That is, we consider how buyers and sellers would likely react to a notional small but significant, non-transitory increase in the price (ssnip) of product A. If they would switch in such large numbers to purchasing or producing product B that the price increase in product A would be unprofitable, then products A and B are in the same market.
- Markets are defined by reference to several dimensions.
 - The product dimension defines the goods or services and their close substitutes.
 - The geographic dimension is the area within which demand and supply substitution is feasible.
 - The functional dimension divides separate stages of the production process. In most cases, different stages in the supply chain are complements rather than substitutes. A key concern is whether substitution between products and geographic areas at one stage serves as a constraint at another stage.
 - The time dimension concerns the time over which substitution is considered. When a longer time is allowed for consumers and producers to respond to price incentives, more substitution opportunities will be found.
- In the case of expanding markets, a better approach is to look at the market in a dynamic way. That is, one must explicitly acknowledge that the market boundary moves with

⁹ S C Littlechild: “OFTEL's approach to competition in mobiles”

time, and that one needs to look at not only the state of the current market, but also the market as it would be in the foreseeable future.

As applied to the mobile sector, market definition can be problematic. There is a tendency among regulators to define markets narrowly. OFTEL, for example, defines markets very narrowly as each individual mobile service. It goes as far as defining call termination on each mobile network operator as a separate market. The implications are serious: the narrower the market the more justification for intervention.

Market definition must clearly take into account substitutes from fixed telephony implying a wider market definition. If however, one accepts that the fundamental service rendered is electronic communications then all forms (fixed voice telephony, data –internet, etc) are relevant. Narrow definition of markets in the context of mobile communication services makes no sense for other reasons. Costs to all services (incoming and outgoing voice and data services) are mostly common and hence splitting the services into discrete markets is an artificial construction. Mobile network operators moreover offer a bundle of services that cannot be offered (at least not commercially viably) in isolation. Hence talking about ‘a market for call termination’ makes no sense. Applying a snip test to the services is even more incongruous: the hypothetical monopolist of call termination is not a feasible proposition to begin with. Hence, it is not rational to ask whether a non-feasible monopolist could sustain higher prices than a provider of bundled services.

Given the dynamism of the sector and the rapidly declining price trends market definition assumptions must be revised on a continual basis.

3.3.2 Assessing The State of Competition

A number of factors are important in understanding the state of competition in a market, including the following.

Market performance

Prices, especially price changes over time are good indicators about the state of market competition. Competitive markets tend to push prices to the level of marginal costs. As the cost of production falls, prices tend to fall. Of relevance in the mobile sector are not just price levels but pricing structures. In particular innovation in pricing bundles: pay-as-you-go, various types of multi-part tariffs and volume discounts undertaken by the carriers, various bundling options.

Quality of product, for instance, response time to meet customer needs is another good indicator. In a competitive market, a lower quality provider risks losing customers to competitors, thus the incentive for providing quality services is higher. Mobile carriers do not just compete on price levels and technical quality but are increasingly effective at catering to different customers. An important competitive factor for business customers is the overall package, including roaming services.

Related to the need to provide quality services and to reduce costs, a competitive market would also encourage efficient investment and innovation. Thus, the level and speed of investment activity and emergence of new products/services are also indicators of the state of competition in the market.

Another important source of competitive pressure is dynamic competition or Schumpeterian competition, i.e., the competitive pressure from the continual innovation in technology, services and/or ways of doing business, which can result in discrete erosion of market positions (as opposed to the continuous erosion of margins that is modelled in static neo-classical economic frameworks). This form of competition is very relevant in the mobile sector and other technology-intensive sectors given the observable rapid changes in technology, services and business organisation.

Substitution possibilities

A critical aspect of market competition is the availability of substitution possibilities. As a rule, the more substitute products/services and suppliers there are, the more competitive the market tends to be. It should be noted that the assessment of substitution possibilities includes the assessment of switching costs – it is not sufficient that substitution opportunities exist, the cost of switching needs to be low enough to make switching economical, and therefore the threat of switching credible. In this regard number portability contributes to lower switching costs for consumers, as when they change service provider they do not need to incur the costs of notifying their friends, family, or customers of their number change, nor the costs of changing their business cards or other marketing material.

The increasing ability to substitute a wide variety of forms of electronic communication (fixed voice telephony, data –internet, etc) for mobile services further widens the appropriate market definition. This broader market definition could be defined as access to and conveyance of electronic communications (data or voice) via fixed or mobile communication networks.

Barriers to entry

The state of competition in the market refers to both existing competition and potential competition. Where the number of suppliers in the market is low, and the existing competition does not appear to be intensive, the market can still be competitive if it is contestable, or if the barriers to entry are low. A contestable market can produce as efficient market outcomes as a market with many active rival players.

A well-accepted definition of barriers to entry is that a barrier to entry is a cost of producing (at some or every rate of output) which must be borne by a firm, which seeks to enter an industry, but which is not borne by firms already in the industry (Stigler, 1968, p.67).¹⁰ Thus even though there may be high fixed costs of entry not all of these costs may constitute a barrier, if some part of these costs had to be incurred by the incumbent. Regulatory changes (such as environmental law changes) which impose compliance costs that did not affect an incumbent at the time of their network roll out, but which do affect a new entrant would constitute a barrier to entry.

3.4 Estimating the Value of the “Wait and See” Option

Generally once one introduces the value of the “wait and see” option into an analysis of regulatory decision making the probability that a decision to declare a service can become the optimal decision decreases. The value of the “wait and see” option in a particular case however depends on, among other things, the future state of the market and the time horizon for regulatory review.

We provide an example of how to value the wait and see option in the Annex, assuming that the service is not regulated and the market turns out not to be competitive after a few years. At that point, the decision not to regulate is reviewed and the service is regulated. Thus we assume that the costs of not regulating the non-competitive market are incurred only for the waiting period, not for all time. The ability to review decisions over time thus enables the regulator to limit the losses from not regulating. It also creates a regulatory threat and therefore incentives on market participants to minimise social losses from monopoly behaviour in any interim period, in order to avoid regulation.

4 Regulatory Safeguards

The sheer complexity of the task facing a regulator as outlined above, implies high direct costs from regulation. The indirect costs of regulatory error however are likely to be higher still, particularly given the fact that a regulatory decision not only affects the instant case, but also sets a precedent and affects general market behaviour through time.

¹⁰ Stigler, George J. (1968), *The Organisation of Industry*, Homewood: Richard D. Irwin.

These costs of regulation create benefits from regulatory safeguards that effectively

- limit regulatory activity to those areas where the potential benefits are significant;
- minimise the potential losses incurred in any regulatory error;
- minimise the likelihood of regulatory error; and
- minimise the frequency of regulatory intervention.

The benefits of regulatory safeguards are reinforced further once one recognises that the value of the wait and see option decreases the probability that a decision to declare a service can become an optimal decision.

It is thus not surprising to discover that one can identify regulatory safeguards in the fundamental law or the constitution, and other public law rules that govern the behaviour of legislatures, courts and the executive wings of Government (including regulators) in the exercise of the coercive powers of the state. Regulators are not above the law.

In this section we review

- the social and economic objectives of competition regulation;
- the general relationship between competition law and the fundamental protections of property rights contained in the common law, constitutions and public law rules of most countries with an Anglo-Saxon legal tradition;
- The role of procedural safeguards in protecting property rights including
 - strict decision criteria for regulators and
 - evidence rules; and
- finally the potential role substantive safeguards including compensation for regulatory takings.

4.1 Regulatory objectives: public choice and distributional analysis

To the extent efficiency is taken as the sole objective of policy, the high potential costs and inevitable uncertainty surrounding regulation suggest a high degree of care should be imposed on regulators, and that a guiding principle of regulatory policy should be “first do no harm”.

Economic efficiency however may not be the sole goal of regulation. Indeed although it is often promoted as the main rationale for regulation of telecommunications, theoretical and empirical evidence casts considerable doubt on core assumptions required to support such conclusions (including the existence of natural monopoly and barriers to entry). Moreover economic theory and evidence also indicates scope for significant dynamic and productive efficiency gains from regulatory forbearance, that are likely to far outweigh tiny potential allocative efficiency benefits ever likely to emerge from regulation.

Increasingly therefore economists are coming to see regulatory frameworks as driven not by efficiency objectives, but primarily by distributional objectives. The main and largely latent aim is to distribute wealth from one group to another. If this is true then the core task is to identify ways to clarify these distributional objectives, identify the least cost ways of achieving them and ensure the least cost alternative is on average more likely to be followed. This requires the careful design of regulatory safeguards, as quite often fiscal interventions involving explicit subsidies to particular groups, financed out of general taxation may be more efficient.

4.2 The Common Law and the Right To Set Prices

The protection of property rights must be viewed as essential for the effective operation of business. The exclusivity and transferability of property rights critically affects incentives for

investment. If an owner cannot appropriate the gains from an investment they are unlikely to have an incentive to invest, and this will be to the detriment of consumers long term interests. The common law has for a long time protected private property rights. Property rights can moreover be subject to further protection under the formal Constitution of a country as we discuss below.

The common law protection of property rights recognises that the concept of "property" is comprised of a 'bundle' of different property rights, including the right to active use, the right to income, and the right to transfer property. Thus the common law recognises it is a right of the owner of property to set the price for the use of that property, and therefore the income they derive from it.¹¹ Further under the common law the right to set prices is only limited (to a duty to charge on reasonable terms) when the public have a right to use the owners property for a particular purpose and the owner has a monopoly in the property for such purpose.¹²

Occasionally, Governments may consider that it is necessary to interfere with a person's property rights through regulation of access obligations and price setting controls. In these circumstances, appropriate common law and constitutional safeguards of private property however would ensure property rights may only be 'taken' in this way if

- procedural justice rules, or the rules of natural justice are complied with including the right to notice, the right to be heard etc, and
- compensation is provided.

At common law, the requirement for natural justice and just compensation when property is 'taken' traces back to the Magna Carta, Art 52 of which provides

“To any man whom we have deprived or disposed of lands, castles, liberties or rights, without the lawful judgment of his equals, we will at once restore these”.

Under the Australian Constitution for example, the requirement for just compensation is contained in s51(xxxi) which empowers the Commonwealth Parliament to make laws with respect to:

“The acquisition of property on just terms from any State or person for any purpose in respect of which the Parliament has power to make laws...”

Section 51(xxxi) serves a double purpose. On the one hand it provides the Commonwealth Parliament with the legislative power to acquire property. But it also gives the State or individual affected by such acquisition a protection against interference with their right with just recompense. Thus, s 51(xxxi) can be seen as a constitutional guarantee of just terms for the compulsory acquisition of property. Australian Courts have held that s 51(xxxi) is to be given a liberal construction that is appropriate for such a constitutional guarantee.¹³ A Commonwealth law which authorises the acquisition of property on terms that are not 'just terms' will not be authorised by the Constitution, s 51(xxxi), and will, therefore, be invalid. The concept of 'just

¹¹ This has been established, most famously, by Lord Ellenborough CJ in *Allnutt v Inglis* (1810) 12 East 527; 104 ER 206:

"There is no doubt that the general principle is favoured in both law and justice, that every man may fix what price he pleases upon his own property or the use of it: but if, for a particular purpose, the public have a right to resort to his premises and make use of them, and he have a monopoly in them for that purpose, if he will take the benefit of that monopoly, he must as an equivalent perform the duty attached to it on reasonable terms."

¹² Protecting a persons right to charge what they will of course does not provide them a guarantee they will get what they ask. In most cases where people wish to sell services the price they secure will be limited by the alternatives consumers have available and consumers willingness to pay.

¹³ *Clunies-Ross v Commonwealth* (1984) 155 CLR 193, at 202.

terms' requires a balance to be drawn between the interest of the entity whose property is acquired and the interests of the community.¹⁴

US case law on the takings clause in the US constitution provides a basis for appreciating the relationship between competition law and fundamental private property protections.¹⁵ US cases make clear that where competition law enables state regulation of prices and therefore the return a public utility can earn, such rate regulation is subject to the takings clause in the US constitution. Rate regulation by affecting returns to investment, affects the value of property, and therefore must not be confiscatory.¹⁶ The rate of return allowed must be sufficient to compensate investors,¹⁷ or sufficient to enable the regulated firm "to operate successfully, to maintain its financial integrity, to attract capital and to compensate its investors for the risk assumed."¹⁸ A taking occurs if regulatory authorities interfere with a company's opportunity to earn a fair return on prudently incurred investment. Uncompensatory, or confiscatory rate regulation thus requires compensation of the utilities investors for any forgone expected returns. Furthermore formal regulatory proceedings with hearings on the record is required to fulfil the constitutional guarantee for due process.¹⁹

It is finally worth noting that were a particular piece of competition legislation, or its administration shown to be inconsistent with fundamental constitutional law it could be struck down. The Australian Communist Party²⁰ case, illustrates how this could happen. In the Communist Party Case the High Court of Australia held that the Commonwealth Parliament could not make a law seeking to ban the Australian Communist Party as it was unconstitutional, and struck down the offending legislation. This decision is highly significant in that it shows the ability of Courts to go so far as striking down commonwealth legislation in order to defend fundamental rights – in this case the right of a person to believe, and to be, what he or she wished.²¹

In the remainder of this section we outline and discuss in more detail how to better operationalise the two lesser types of regulatory safeguards namely:

- first the due process or procedural justice rules. On this we discuss the role of:
 - strict decision criteria, A key regulatory safeguard is to clearly specify strict criteria that must be satisfied before the regulator can exercise the regulatory power;
 - strict evidentiary rules or rules relating to the appropriate presumption in a case, the burden of proof and standard of proof. These affect the extent to which a regulator intervenes only when it is appropriately satisfied that such an intervention is required: and
- second compensation safeguards for regulatory takings; If a regulator is to be given the power to interfere in common law property rights (eg the right to set prices) then a right to secure compensation for such regulatory takings should be enforced.

¹⁴ *Nelungaloo Pty Ltd v Commonwealth* (1948) 75 CLR 495, Latham CJ at 541-2.

¹⁵ For a discussion of the categories of takings cases see Richard Epstein *Takings: Of Property Common and Private* 64 U. Chi. L. Rev 21 (1997). For a more recent discussion of the case law see J. Gregory Sidak and Daniel F. Spulber "Deregulatory Takings and the Regulatory Contract" Cambridge University Press 1998 chapter 6.

¹⁶ *Covington & Lexington Turnpike Road Co. v Sandford* 164 U.S. 578, 597 (1896) "a rate that is too low can destroy the value of (the) property."

¹⁷ *Duquesne Light Co. v Barasch* 488 U.S. 299, 308 (1989); *Smyth v Ames* 169 U.S. 466 546 (1898)

¹⁸ *FPC v Hope Natural Gas Co* 320 U.S. 591, 605 1944; *Southwestern Bell Tel. Co v Public Serv. Comm'n* 262 U.S. 276, 291 (1923)

¹⁹ See J.G. Sidak and D. F. Spulber (1998) op cit pp 240-241

²⁰ *Australian Communist Party v Commonwealth* (1951) 83 CLR 1

²¹ At about the same time, courts in South Africa and in the United States of America, facing similar challenges did not strike down legislation largely because it was thought to include better safeguards or protections.

4.3 The Role of Strict Decision Criteria

Where a regulator is given the power to interfere with property rights, it is important that the exercise of such power should only occur when clear criteria are met. A framework that only weakly limits regulators decision rights, only weakly protects property rights, and will tend therefore to weaken incentives to invest, to the detriment of future consumption possibilities, or long term consumer welfare.

Our analysis thus far suggests that in determining whether regulating for example a communications service would promote the long term interests of end-users all of the following criteria should be addressed by a regulator:

- a) the communications service is of significance to the national economy;
- b) there are substantial entry barriers to new entrants;
- c) entry to the market of a second provider of the service would not be economically desirable or feasible;
- d) no substitute service is available under reasonable conditions that could be used by an access seeker;
- e) competition in downstream markets is insufficient to prevent the provider of the service from exercising substantial market power;
- f) addressing the denial of access, or the terms and conditions of access, to the service concerned is likely to improve economic efficiency significantly; **and**
- g) access (or increased access) to the service would not be contrary to the public interest.

All seven of these criteria should be met before regulation is adopted. In this framework of law, the regulator should not be allowed to any extent to declare a service if it concludes that one or more of those criteria has not been satisfied.

It is easy to understand the economic reason for this very restrictive position. Where the consequences of a decision are few and low-value, decision-making standards can, without harm, be equally low. The long term potential economic consequences of access and price regulation of communications services however are many and substantial and warrant strict safeguards. The key economic rationales for the strict decision criteria are that

- the direct costs of regulation are high;
- the potential indirect costs of regulation are immense; and
- the distributional consequences of regulation inevitably encourages so-called rent-seeking, or the expenditure of money and effort by those affected for distributional gain - even where there is no net social benefit.

The potential magnitude of these costs explains why a regulator should not be permitted to make a decision in favour of regulation unless all seven criteria hold and one can be confident of a net social gain from regulation. This requirement resembles the first rule of the Hippocratic oath observed by doctors: “First do no harm”.

4.4 The Role of Evidentiary Rules

As noted earlier establishing whether the relevant criteria hold in any case, requires prior decisions on :

- The presumption that should be made, as to regulation or forbearance.
- Who should bear the burden of proof ? and
- What standard of proof should be applied, and how it should work?

On each of these questions the appropriate answer would appear to be:

- The regulator should initially presume forbearance. This is the interpretation most consistent with the protection of private property and a requirement that a regulator

cannot make a decision for regulation if any one of the relevant decision criteria does not hold. It is further consistent with a presumption of innocence in the general law. The economic rationale for the presumption however is the proposition that a less regulated competitive process, or one where there are fewer barriers to trade, is likely to yield better outcomes than a regulated one. Unless clearly shown otherwise on the facts of the case regulatory forbearance is most likely to lead to the maximisation of net long term consumer welfare.

- The burden of proof should be on the regulator to show clearly that each criterion holds separately. The problem addressed by this rule is that the regulator bears few of the potential costs of its decisions. It therefore stands in need of incentives to ensure that it will make the right decision.
- The standard of proof required should be high to create incentives for better decision-making and minimise the costs of regulation. In this regard, the standard of proof required for a decision to regulate should be significantly greater than 50% overall - or on the *balance of probabilities*.

An important corollary of the last point is that if (for example) one assumed there were five independent decision criteria, all of which must be satisfied, then to exceed the balance of probabilities (or 50%) standard *across all five criteria*, the standard of proof required for *each* single criterion is much greater than 50%. Under the simplest assumptions, it is in fact around 88% ($88\% \times 88\% \times 88\% \times 88\% \times 88\% \cong 50\%$)^{22,23}. In short, the regulator must adduce facts, which establish that each particular criterion holds with a degree of certainty that puts the matter as it relates to each criteria *beyond reasonable doubt* – or with a likelihood greater than 88%. To deal with this high evidentiary threshold, the regulator will need to take time over decisions, and ensure it uses relevant and reliable information, and ignores the irrelevant and unreliable.

4.5 Compensation for Regulatory Takings of Property Rights

Even if a regulator satisfied itself that each of the criteria set for its decision making have been met to the appropriate standard of proof, then under a just compensation clause a service should only be regulated if just compensation has been provided to the property owner.

How do we measure that 'just' compensation is being paid? The High Court of Australia has defined 'just terms' as requiring 'full and adequate compensation' where the acquisition is a compulsory taking.

The Privy Council accepted (in *Telecom v Clear* (1994) 6 TCLR 138) that the Baumol-Willig rule (i.e. the payment of direct incremental cost plus opportunity cost) simulates the result that would arise if the market were perfectly contestable. Thus, 'just' compensation would

- Ensure that if a companies prices met the Baumol Willig rule its prices should not be regulated; and
- Ensure compensation would be paid to any company deprived of the right to set price according to the Baumol-Willig rule,

²² The simplest assumption is of equal and independent probabilities. If the regulator is more than 88% sure of the satisfaction of one criterion, such as (e), the probabilities required for the other four criteria will be somewhat less than 88%. Further, if the probabilities are not independent, the standard will be different. Let $p(A)$ denote the probability that criterion (a) is satisfied and $p(A \wedge B)$ denote the probability that both A and B are satisfied. Then $p(A \wedge B \wedge C \wedge D \wedge E)$ can be written as $p(A | B \wedge C \wedge D \wedge E) \times p(B | C \wedge D \wedge E) \times p(C | D \wedge E) \times p(D | E) \wedge p(E)$.

²³ The test of whether the regulator is satisfied with the criteria is not merely one of whether on balance regulation is desirable or convenient, the test is whether regulation is essential and the regulator must be satisfied that regulation is essential in terms of each of the criteria 'clearly, access to the facility should be essential, rather than merely convenient'. (National Competition Policy; Report by the Independent Committee of Inquiry, August 1993 (Hilmer Report, page 251)

Only in this way could a court safeguard or mimic a competitive market result, and ensure regulation was actually in the long term interests of consumers.

5 Conclusion: A Regulators Guide to Implementation

The application of the decision theory and real option value theory outlined in Chapter 3 to regulation of access obligations and price setting requires the following practical steps:

Step 1: Define the set of regulatory choices or decisions

This step requires a list of possible regulatory decisions. Ideally we need to lay out all the alternatives which are available to a regulator, including but not limited to:

- Deciding to regulate a service
- Deciding not to regulate a service

Step 2: Define the set of possible outcomes from these decisions with probabilities

Having listed the regulatory decisions, this step requires all possible outcomes from these decisions be defined. The benefits or costs associated with each possible outcome need also to be estimated. Furthermore, probabilities associated with each branch on the decision tree need to be determined. These probabilities should reflect the probability of a particular outcome, given the events that have preceded it in the decision tree.

Determining these probabilities requires an assessment of the state of market competition. The assessment involves:

- Defining the market
- Assessing the state of competition by analysing
 - Market performance;
 - Barriers to entry;
 - Substitution possibilities.

Step 3: Calculate the expected value of the decisions

Stage 1: calculation without option

Now that values associated with each possible outcome and probabilities associated with each branch of the decision tree have been decided, it's possible to calculate the expected values associated with each possible decision. The expected value of a decision is the weighted average of all outcomes associated with that decision, where the weights are the probabilities associated with each step in the decision tree.

Stage 2: calculation with option

Applying the decision rule to the results from stage 1 would indicate which decision is in the public interest. If a decision not to regulate a service is adopted on the basis of the stage 1 results, and the regulator adopts the “wait and see” approach for a few years before the next review, the stage 1 decision tree is extended one more level, and the expected value associated with each possible decision are recalculated. It is expected that the net benefit from a decision to declare a service would be reduced when the value of the “wait and see” option is incorporated.

Annex: Decision Theory and Real Options

The Decision Theory

In real-life decision-making situations it is necessary to make decisions with incomplete information. The challenge facing a regulator is that decisions must be made when the state of competition is unknown, and especially when the market (eg, mobile market) is growing rapidly and new technologies are being continuously introduced. It could take years before the data become available. How do we reconcile uncertainties with the need for a decision now? The decision theory provides a solution.

Consider regulating a service as an example. There are two types of errors that may be made: rejecting the null hypothesis when it is true, or accepting it when the alternative hypothesis is true. These are termed Type I and Type II errors respectively. The following table outlines the possible outcomes of the statistical test:

Table

	H₀ is true (competitive)	H_A is true (non-competitive)
Accept H₀ (not regulate)	Correct decision	Type II error
Accept H_A (regulate)	Type I error	Correct decision

H₀ is the hypothesis that a service market is competitive and therefore the service should not be regulated. H_A is the hypothesis that the market is non-competitive and the service should be regulated to promote competition in the market. As indicated in the table, a Type I error arises when a service in a competitive market is regulated. Conversely, a Type II error involves not regulating a service when a market is non-competitive.

Decision-makers need to understand the consequences of each of the two types of errors and make some judgement about which is potentially more costly. A Type I error involves regulating a service in a competitive market. This represents an abrogation of property rights and contravenes a fundamental and significant principle of private property. This can create undesirable demonstration effects and severe disincentives for investment in competing facilities and in the economy more generally.

On the other hand, there are two consequences of making a Type II error or not regulating a service when the market is in fact non-competitive. First, the service provider will be able to exercise its market power and this will entail the conventional monopoly problems of restriction of output, higher prices and appropriation of monopoly rents, little pressure to innovate and sub-optimal quality. Second, without regulation there will be limited opportunity for competition to develop in downstream markets. Hence, all the economic benefits of competition will be foregone.

The greater weight should be placed on avoiding Type I error. Regulation of a specific service only one arm of regulation, and monopoly concerns can also be addressed through general competition law. However, no immediate remedies are available if a competitive market has been subjected to regulation, while the disincentive effects on investment can be quite direct and severe. In other words, we have judged the cost to economic welfare of making a Type I error to be greater than the cost of committing a Type II error.

Decision theory provides a useful framework to explore alternatives using the technique of the decision tree. It forces us to recognize that deciding not to take action is just as much a decision as deciding which action to take. It forces us to recognize that we may make a mistake either by taking an unnecessary action or by failing to take a necessary action. It also helps us formalize and categorize our thinking to make sure that we have considered all relevant possibilities. Quantitative analyses in this context must be viewed as explorations of possibilities, not hard predictions. However the process of quantification may help us clarify our thinking, and provide us with a way of assessing which parts of the decision tree have a particularly large impact on

- False negative

This is the situation the regulator does not regulate a services when the market for the service is not competitive. This is a wrong decision (assuming regulation would enhance competition in the market).

The diagram in this form assumes that the regulator's choice of regulation or forbearance does not affect the probability of the state of competition. The role played by any access arrangement for example is demonstrated in the way it affects economic and social payoffs, which are represented in the scenarios of the diagram by the four different possible values (V) emerging from it.

The regulator will inevitably remain uncertain about whether the market is competitive or non-competitive. It can, however, form a judgement about three issues:

- p , which is the probability of the non-competitive market in the absence of regulation;
- $V(F|C) - V(R|C)$, the benefit of not regulating a competitive market; and
- $V(R|N) - V(F|N)$, the benefit of regulating a non-competitive market.

Based on its judgement, the regulator can use the following decision rule:

regulate a service if and only if the odds that the market is competitive exceed the ratio between the benefit of not regulating a service in a competitive market and the benefit of regulating a service in a non-competitive market.

The derivation of the decision is presented in the following box.

The Decision Rule

Assume the regulator wants to maximise the expected value of the outcomes.²⁴
Regulation is better than forbearance if

$$pV\langle R|N\rangle + (1-p)V\langle R|C\rangle > pV\langle F|N\rangle + (1-p)V\langle F|C\rangle$$

Under certain assumptions,²⁵ this can be re-expressed as a formula relating the probability of non-competitive to the values of the various outcomes:

$$\frac{p}{1-p} > \frac{V\langle F|C\rangle - V\langle R|C\rangle}{V\langle R|N\rangle - V\langle F|N\rangle}$$

The values on the right-hand side of the inequality have a simple interpretation:

- $V(F|C) - V(R|C)$ is the benefit of *not* regulating a service when the market will be competitive (i.e. of not regulating a competitive market).
- $V(R|N) - V(F|N)$ is the benefit of regulating a service when the market will be non-competitive (i.e. of regulating a non-competitive market).

Option Value

This section records a concise description of the decision problem facing the regulator. It derives the key decision criterion for choosing between regulating and not regulating a service

²⁴ We assume risk-neutrality and ignore the possibility that the values are equal.

²⁵ Relating to the signs of the various terms in the first formula.

given uncertainty and information flows about whether the market will be competitive or non-competitive.

The key variables are as follows:

$s = \{C, N\}$	is the state of nature, where C denotes a competitive market and N denotes a non-competitive market
p	is the probability of a non-competitive market and $1-p$ is the probability of a competitive market
$d = \{R, F\}$	is the regulator's decision, where R denotes regulation or regulate and F denotes Forbearance
$v(d/s)$	is the annual payoff to consumers in net welfare terms when the state is s and the regulation decision is d
β	is the discount factor reflecting the social rate of time preference ($\beta < 1$)

Since regulating a competitive market should reduce welfare, we assume $v(F/C) > v(R/C)$. It may also be the case that regulating a non-competitive market could be more costly than the benefits, so it is an empirical question whether $v(R/N) > v(F/N)$ or the reverse inequality.

The structure of information and decisions is as follows:

Time $t = 0$:

- The market could be competitive (i.e. $s = C$) or non-competitive (i.e. $s = N$)
- The regulator does not know which state holds but has a view about the probability p
- The regulator decides either to regulate (i.e. $d = R$) or not to regulate (i.e. $d = F$)

Time $t = T_1$:

- Payoff $v(d/s)$ has accrued for each period $t = 0, T_1-1$
- The regulator observes the state of the market 's' if and only if it chose not to regulate (i.e. $d = F$) at time $t = 0$
- The regulator reviews its earlier decision and changes the regulate/not regulate decision if this would increase the payoff. The cost of changing its decision is zero

Time $t = T_2$:

- There is a fundamental change to technology or the competitive environment that require a completely new decision. This is considered beyond the scope of this construction and no salvage is assumed.
- Payoffs $v(d/s)$ accrue in each period $t = T_1, \dots, T_2-1$

The analysis of this problem proceeds as follows. Begin with the decision at time T_1 before considering the decision at time $t = 0$.

At time T_1 the regulator will make a “final” decision on whether to regulate or not regulate the service based on the information it has available at that time (though, of course, other new information not specified above may come available at later dates and may lead to a change in decision):

- If the regulator chose regulation at time 0 then it has no new information and will not change its decision. Let the expected *annual* payoff from regulation when s is uncertain be $V_0(R)$, where:

$$V_0(R) = (1-p)v(R/C) + pv(R/N)$$

- If the regulator chose no regulation at time 0 then it receives new information by observing whether the market has behaved competitively or anti-competitively. If the market behaved competitively then the best decision is to continue with the ‘no regulation’ decision, with annual payoff of $v(F/C)$ (since this exceeds $v(R/C)$). If the market behaved anti-competitively then the best decision is to switch to regulate the service, with annual payoff $v(R/N)$ (since this exceeds $v(F/N)$). Given that this decision rule will be followed, the *ex ante* expected payoff for each period T_1 to T_2 is

$$V_1(F) = (1-p)v(F/C) + pv(R/N)$$

At time $t = 0$ the regulator maximizes welfare by choosing the decision that maximizes the discounted expected value of payoffs. If it chooses regulation then the payoff is $V_0(R)$ in every period. Therefore the total expected value of choosing regulation is:

$$V(R) = \sum_{t=0}^{T_1-1} b^t V_0(R)$$

If the regulator chooses no regulation at time 0 then the expected payoff for each period 0 to T_1-1 is:

$$V_0(F) = (1-p)v(F/C) + pv(F/N)$$

and the expected payoff for periods T_1 to T_2-1 is $V_1(N)$. Hence, total expected payoff is:

$$V(F) = \sum_{t=0}^{T_1-1} b^t V_0(F) + \sum_{t=T_1}^{T_2-1} b^t V_1(F)$$

The regulator should choose “regulation” if and only if:

$$V(R) \geq V(F)$$

Substituting in the value functions and re-arranging gives the condition:

$$\begin{aligned} \Leftrightarrow \sum_{t=0}^{T_1-1} b^t [V_1(F) - V_0(F)] &\geq \sum_{t=0}^{T_2-1} b^t [V_1(F) - V_0(R)] \\ \Leftrightarrow \frac{p}{1-p} &\geq \frac{\sum_{t=0}^{T_2-1} b^t b(C)}{\sum_{t=0}^{T_1-1} b^t b(N)} \quad \text{-----(1)} \end{aligned}$$

where:

- $b(N) = v(R/N) - v(F/N)$ is the annual net welfare benefit of regulating a collusive/monopolistic market. Note that $b(N)$ may be positive or negative;
- $b(C) = v(F/C) - v(R/C)$ is the annual net welfare benefit of *not* regulating a competition market. $b(C)$ will always have positive value.

The Value of the ‘Wait and See’ Option

The value of the option to “wait and see” is subsumed in the above calculations. An explicit value may be derived as follows:

- The cost of delaying any decision to regulate until time T_1 is the possibility that the market may be non-competitive and that welfare could be lost by not regulating. In expected value terms the cost is $V_0(R) - V_0(F)$ per year for periods 0 to $T_1 - 1$;

- The payoff from delaying the decision is the avoidance of regulating a competitive market, $v(F/C) - v(R/C)$, during T_1 to $T_2 - 1$, while still being able to regulate a non-competitive market (with zero net gain compared for an earlier decision to regulate). With probability $1-p$ it is a competitive market.

Hence, value of the “wait and see” option is:

$$\text{Option value} = - \sum_{t=0}^{T_1-1} \mathbf{b}^t [V_0(R) - V_0(F)] + (1-p) \sum_{t=T_1}^{T_2-1} \mathbf{b}^t [v(F/C) - v(R/C)]$$

Substituting value equations for $v_0(R)$ and $v_0(F)$ gives:

$$\text{Option value} = - p \sum_{t=0}^{T_1-1} \mathbf{b}^t b(N) + (1-p) \sum_{t=0}^{T_2-1} b(C) \quad \text{-----}(2)$$