

Productivity Commission draft report: telecommunications competition regulation

NECG submission

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1 Executive summary

The Network Economics Consulting Group (NECG) welcomes the opportunity to give the Productivity Commission (the "Commission") further details of our views in response to the Commission's Draft Report on Telecommunications Competition Regulation dated March 2001 (the "Draft Report"). This submission builds on the views expressed to the Commission at the oral hearings in Sydney on 16 May 2001.

This submission focuses on three major areas, which we believe will be of particular importance to the Commission in finalising its report: the development of access pricing principles; the welfare effects of regulatory error in pricing access; and proposals surrounding access holidays.

1.1 Access pricing principles

NECG agrees with the access pricing principles that the Commission has set out in its Draft Report, but believes that to effectively reduce uncertainty and ensure economic efficiency the principles must be supplemented.

Financial Capital Maintenance ("FCM") ensures that funds prudently invested in regulated assets will be recouped. No regulatory arrangement can be sustainable if investors in regulated assets cannot reasonably expect the regulatory contract to ensure FCM. NECG recommends that FCM be used as a guiding access pricing principle.

Regulatory risk arises when the interaction of uncertainty and regulation changes the cost of financing the operations of a firm. Though there is scope to reduce the extent of regulatory risk, it cannot be eliminated altogether. NECG believes that ensuring that the telecommunications regulatory regime recognises the costs regulatory risk imposes, and recompenses appropriately, should be a central element in the recommendations of the Commission's current inquiry.

Appropriate application of the FCM concept clearly needs to be inclusive of costs associated with the regulated firms service obligations, such as customer service guarantees (CSGs) and retail price controls. Current regulatory practice often excludes from access prices, the legitimate costs associated with meeting such service obligations. NECG therefore supports the introduction of a specific pricing principle that ensures that access prices fully reflect the costs of service obligations.



1.2 Welfare effects of regulatory error

NECG has previously argued that, in the long run, regulatory underpricing reduces overall welfare by more than overpricing. In its submission to the Commission, the Australian Competition and Consumer Commission (the "ACCC")¹ appears to argue that NECG is mistaken. The ACCC's assertion is wrong as a matter of economics. The potential welfare loss of failing to allow investors to recover their opportunity cost means efficient investments will not be undertaken. The welfare cost of a loss of service due to setting prices below cost dominates the welfare loss due to too little consumption when prices are set above cost.

1.3 Access holidays

NECG supports the Commission's proposals regarding access holidays, but emphasises that exempting new infrastructure from access regulation for some initial period does not, by itself, constitute the most effective way to reduce regulatory risk. NECG encourages the development of a 'menu' approach to awarding access holidays.

2 **Pricing principles**

The Commission has recommended that the following access pricing principles be legislated for in the telecommunications access regime under Part XIC of the Trade Practices Act 1974 (Cth) (the "Act"), namely that access prices should:

- (a) generate revenue across a facility's regulated services as a whole that is at least sufficient to meet the efficient long-run costs of providing access to these services, including a return on investment commensurate with the risks involved;
- (b) not be so far above costs as to detract significantly from efficient use of services and investment in related markets;
- (c) encourage multi-part tariffs and allow price discrimination when it aids efficiency; and

Australian Competition and Consumer Commission, "Response to the Productivity Commission Draft Report, Telecommunications Competition Regulation", June 2001.



(d) not allow a vertically integrated access provider to set terms and conditions that discriminate in favour of its downstream operations, unless the cost of providing access to other operators is higher.²

NECG welcomes the introduction of legislated pricing principles and agrees with the Commission that such access pricing principles could be valuable in limiting regulatory discretion and providing greater *ex ante* certainty to investors.

Under the current regime, the ACCC has a significant degree of flexibility in determining the methodology used for setting regulated access prices. Indeed, the ACCC has implemented vastly different and seemingly mutually inconsistent methodologies in determining access prices. For example, the ACCC has used a single TSLRIC estimate in setting prices for PSTN originating and terminating access, while utilising an RMAC methodology for local carriage services (LCS).

Uncertainty over the approach that the ACCC will use to determine access prices makes it hard for both access providers and access seekers to anticipate the access regime that will be implemented and as such increases uncertainty in their investment decisions. Moreover, by increasing uncertainty as to eventual outcomes, the current regime makes it difficult for the parties to reach commercial agreement, and hence increases the costs and delays associated with dispute resolution under the regulated access arrangement. Compounding these problems is the fact that the ACCC has not felt itself committed to a particular approach, and in the event of disputes, has taken considerable time in reaching a view as to the broad approach it will adopt (the LCS and non-dominant termination disputes being cases in point).

NECG agrees with the pricing principles that the Commission has set out, but believes that to effectively reduce uncertainty and ensure economic efficiency the principles must be supplemented. NECG proposes the following additional principles, namely that access prices should: ensure financial capital maintenance, include compensation for regulatory risk; and recognise the impact of social obligations. Each of these is discussed in turn below.

2.1 Financial capital maintenance

No regulatory arrangement can be sustainable if investors in regulated assets cannot reasonably expect that funds prudently invested in regulated assets will be recouped. This condition,

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Draft Recommendation 10.1 (Draft Report, pages 10.23-4).



generally referred to as FCM, is no more than the equilibrium condition that must characterise investment in competitive markets: in equilibrium, investors must expect that the opportunity cost of the funds being committed will be recouped over the service life of the investment. By the same logic, no regulatory commitment can be incentive-compatible if it is inconsistent with FCM.

FCM is consistent with a broad range of asset valuation methodologies. Each of these methodologies generates a period-specific asset value; the depreciation charge can then be used to reconcile that asset value with FCM. The only effect of asset valuation is then on the timing of revenue receipts, rather than on the net present value ("NPV") of the revenue stream. This is the so-called "invariance theorem" generally associated with Schmalensee³ and Panzar.⁴

In principle, the efficient time-path for the revenue stream ought to be determined by treating the amount originally invested as a common cost to the N periods the relevant assets serve. This common cost can then be recouped through Ramsey-Boiteaux optimal prices, subject to the constraint of *ex ante* FCM. This is the method recommended by Littlechild and then by Baumol.⁵ In practice, however, the feasibility of this approach will depend on the credibility of the regulatory contract and on the presence or absence of competitive constraints.

Where the credibility of the regulatory contract is low – in the sense that regulators find it difficult to commit credibly to making good deferred income – then the set of incentive-compatible period-by-period income sequences is tightly constrained. This is most obviously seen by considering the extreme case of a regulatory contract with no credibility: such a contract must compensate the firm immediately for any sunk costs it incurs. In this case, the only asset valuation methodology consistent with continued investment is Continuously Contemporaneous Accounting (CoCoA).⁶ Conversely, a very high credibility regulatory contract, such as US "cost of service" regulation in the period up to the 1970's, could attract investment even with very substantial deferral of income.

³ Schmalensee R, (1989) "An expository note on depreciation and profitability" Journal of Regulatory Economics 1: 293-297.

⁴ See the discussion of an unpublished note by Panzar in E Zajac (1995) *The Political Economy of Fairness* The MIT Press, at 237 and following.

⁵ S Littlechild (1970) "Marginal Cost Pricing with Joint Costs" The Economic Journal and W. J. Baumol (1971) "Optimal Depreciation Policy" The Bell Journal of Economics and Management. Sci 2: 638-656.

⁶ R J Chambers (1966) Accounting, Evaluation and Economic Performance, Prentice Hall, NJ.



The link between regulatory commitment and asset valuation is readily dealt with in terms of standard accounting theory for the case when regulated firms have an obligation to serve.⁷ In these instances, the firm in fact has a contingent liability attached to the need to ultimately renew assets – that is, to maintain operating capability intact. The cost of that liability can be measured by the replacement cost of assets on an efficient basis, and should be recorded as such in the firm's balance sheet. A regulator committed to FCM must then ensure that the firm has a corresponding asset – that asset is the "bond" associated with the regulator's promise to allow the firm to recoup prudent investment. In an NPV sense, the liability and the asset must match. However, there is obviously no requirement that the time profile of the two be identical – it is only the NPV that counts. A regulator with no credibility will need to ensure that the firm recoups sunk investments as soon as made; a high credibility regulator can defer, or in other ways alter, the profile of recovery.⁸

The degree of discretion in the time profile of FCM is also affected by competitive conditions.⁹ If the regulated firm is sheltered from by-pass, then revenue requirements can more readily be set in Ramsey-Boiteaux terms. However, where there is the risk of by-pass, the time path of income must be such as to prevent inefficient entry. This requires the use of economic depreciation, with the revenue requirement in each period being paced to the cost of the most efficient by-pass technology.

Overall, an assurance of FCM is a *sine qua non* for incentive compatibility of the regulatory scheme. We would recommend that it be used as a guiding principle, and specifically identified as such, in the Commission's final recommendations for legislated access pricing principles.

⁷ This is the essence of the approach adopted by P W Bell and L T Johnson "Current Value Accounting and the Simple Production Case" in R Sterling and A Thomas (ed.s) *Accounting for a Simplified Firm Owning Depreciable Assets* Scholars' Book Company, at page 95 and following.

A striking example of the complete failure to take account of the need for credibility in respect of future income promises is the ACCC's treatment of excess capacity in its decision with respect to charges for PSTN interconnection. In essence, the ACCC reduced the allowed cost pool, supposedly because the cost of efficiently held capacity that was currently in excess of requirements ought to be met in future time periods (once demand has increased to the point where it is being utilised). However, the ACCC provided no mechanism whereby the holding cost would be recognised and eventually brought to account. As a result, the ACCC effectively deferred income associated with operating capital maintenance to future periods, without any mechanism for ensuring that the associated costs could ever be recognised and recouped.

M Crew and P Kleindorfer (1992) "Economic Depreciation and the Regulated Firm under Competition and Technological Change" *Journal of Regulatory Economics* 4: 51-61.



2.2 Regulatory risk

Regulatory risk arises when the interaction of uncertainty and regulation changes the cost of financing the operations of a firm. Regulatory risk impacts financing costs in four distinct ways:

- inability to react to market conditions;
- symmetric regulatory errors;
- asymmetric rules of the game; and
- regulatory discretion.

Each of these is addressed in turn, below, followed by a discussion analysing the impact of regulatory risk and how it should be dealt with.

2.2.1 Inability to react to market conditions

In order to create value, firms must effectively utilise their information resources to respond to changing market conditions. As a result, all successful firms place a premium on the collection and retention of knowledge about customers, competitors and technology.

Even the best-informed regulator will not enjoy the same level of information and knowledge as the firm that it seeks to regulate. When the regulator sets prices, outputs and even in some cases the technological solutions, the outcome will consequently be inefficient.¹⁰ The costs this imposes can be compounded by the inability of the firm to efficiently utilise its informational resources given the regulatory constraints placed upon it.

Generally speaking, regulated firms are constrained from fully optimising the price and/or the quantity and quality of the services they provide as market conditions fluctuate, restricting their ability to manage and control non-diversifiable risk. This in turn affects investors' *exposure to market risk*, as the range of the firm's responses to new information is constrained.

It is for this reason that the length of the regulatory lag (the time period between regulatory resets) can be an important determinant of a regulated firm's cost of capital. To the extent to which the firm is prevented from fully re-optimising its behaviour between regulatory resets,

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Indeed, as discussed below, the efficiency loss associated with regulation can exceed the efficiency loss of the market failure the regulation is attempting to correct.



the longer the gap between resets, then the higher the costs that regulatory constraints can impose.¹¹

2.2.2 Symmetric regulatory errors

Even if regulators did not suffer from informational asymmetry, the natural uncertainty of the market means that regulatory error is inevitable. The best that a regulator could hope to achieve would be to be correct on average, that is to make errors that are symmetric. It can be shown that, even if there is no bias in the regulator's estimate of the best course of action (that is, the errors are symmetric), the consequences of these errors can be asymmetric, to the detriment of the regulated firm.¹² The argument is based simply on the concavity in price of the profit function, which relies only on very weak assumptions about the properties of cost and revenue functions.

The direct consequence of this is that an underestimation of the relevant price will cause a loss that is higher than the profit from an overestimation of similar amount.¹³ In other words, under weak assumptions about the profit function, the symmetric errors in the regulator's decision-making will generate asymmetric consequences for the firm's earnings.

2.2.3 Asymmetric rules of the game

Further problems arise when the rules themselves are asymmetric – that is, they mandate or permit an asymmetric response to deviations from some base state.

One of the key objectives of regulation is to prevent monopolists from exploiting market power while ensuring that there are efficient incentives for investment. Thus regulation should be designed so as to offer the firm an appropriate return on its investment, and *not more*.

¹¹ Of course, longer gaps between resets can also contribute to efficiency. This is most notably the case when longer reset periods are associated with a more credible commitment by the regulator not to expropriate supra-normal returns associated with productivity gains.

¹² Ergas, Hornby, Little and Small "Regulatory Risk". Presented at ACCC Regulation & Investment Conference March 2001, <u>http://www.necg.com.au/pappub/papers-ergas-regrisk-mar01.pdf</u>.

¹³ Effects of symmetric regulatory error are discussed in more depth in section 3.



A regulated firm is subject, as all firms are, to some risks; that is, in some states of the world "it wins" and in other states "it loses". The fundamental logic of a prudent, rational investor is, first, to diversify his or her portfolio so as to lower overall risk, and, secondly, to bear (for an appropriate return) that part of the risk that is not diversifiable. However, in regulated industries, the regulator (and society) may not readily accept those outcomes (states of the world) in which the regulated firm secures supra-normal returns. Regulators may, in other words, find it difficult to allow regulated firms to secure what appear to be supra-normal earnings from an essential facility – even where these come as a return for a socially desirable action, such as efficient investment or superior business skill. To the extent to which this is the case, the regulator will expropriate the "excess profits" associated with favourable states of the world. Conversely, when the regulated firm suffers from unfavourable conditions, it has to bear the full consequences. Regulation of this kind can be seen as involving a game of "heads you lose, tails you break even".

A similar result will emerge from a regulatory rule that is one-sided in its consequences. For example, optimisation-based approaches to asset valuation – that is "efficient cost" methods – will differ from inflation-adjusted historical cost by an amount that depends on two terms:

- the extent to which asset-specific price indices vary from CPI over time (the "price term" in the revaluation process); and
- the degree of optimisation, or rationalisation that is, the change in the quantity of inputs assumed to be required (the "quantity term" in the revaluation process).

With the first of these components (the price effect), there is no *a priori* reason to assume that the effect on the replacement value of assets will necessarily be positive or negative. By contrast, optimisation (the quantity effect) must always lead to a writing-down of the asset base—if there is a choice between continuing with the existing way of doing things and a new alternative, and if the least-cost option must be chosen, then the quantity chosen can never be greater than that currently in place. As a result, even without any conscious bias by the regulator, such a rule can generate an asymmetric pattern of valuation changes.

The issue then is the consequence this one-sided type of regulation has for investors. This obviously depends on the scope investors have to manage the types of risk thus created.

It is useful in this respect to distinguish between hedging and pooling of the risk. As a general matter, asymmetric risks of the kind discussed here are difficult to hedge, as hedging would require the equivalent of a lottery that provided for "heads you win, tails you break



even".¹⁴ In contrast, pooling this asymmetric risk into a large portfolio is possible and may lower the impact on a risk adverse investor.¹⁵ However, it is obvious that pooling has no effect on a risk neutral investor: no matter how many regulated firms are invested in, the expected negative impact is constant. In addition, pooling is not costless. To properly pool the risk, a portfolio will require many uncorrelated regulated firms. This portfolio will be difficult to develop and more costly than investment in unregulated firms. As a result, the NPV or actuarial expectation of the income stream from the pooled investment will be no greater, and will generally be less, than the NPV of the un-pooled income claim. The best pooling can do, in other words, is reduce the utility consequence of the loss, but it will obviously not reduce (and may actually increase) the loss itself.

Given this, an investor will not invest in an asset exposed to this risk of asymmetric treatment without some mark-up to the allowed cash flows. The extent of this mark-up will need to be sufficient to cover the least-cost form of insuring against the loss.

2.2.4 Regulatory discretion

While the sources of regulatory risk discussed above come from the asymmetric results of a given regulatory 'game', there is also scope for the rules of the game, or the interpretation of those rules, to be changed by the regulator. This scope may create risks that are asymmetric, in the sense that the expected outcome of changes in regulatory rules or in their interpretation is biased in one direction or another.

The scope for changes in rules and in their interpretation is the essence of *regulatory discretion*. Some regulatory discretion is inevitable, and indeed may be desirable. The principal issues, however, are the extent of that discretion and the degree to which the costs it gives rise to are recognised.

Both the inevitability of some regulatory discretion, and the costs it imposes, reflect the salient features of the provision of infrastructure facilities.

¹⁴ Note, however, that the risk can be hedged to some degree if it involves a pure transfer between entities in which investors can obtain claims on residual income. In that case, a reduction in the income of the one will be offset by a gain in the income of the other. However, the social costs of the transfer (for example, in terms of defensive action, as well as the administrative costs involved) will be lost, so that the NPV of the hedge will be negative.

¹⁵ If she holds lots of utilities, she will suffer a small loss every period, rather than a big loss once in a while.



At the time major infrastructure investments are made, it is usually impossible to determine accurately the benefit of the investment – and sometimes even its costs. The profitability of investments in assets with very long lifetimes, such as those used in telecommunications, cannot be assessed with certainty before investment. Therefore, *ex ante*, only incomplete contracts can be written; that is, the whole stream of regulated revenues cannot be decided at the time the decision to invest is made. Instead, these (regulated) revenues will be reviewed at some later points in time, when the parties to the regulatory contract have been able to observe some greater part of the realisations of benefits and costs.

However, the firm's investment is a sunk cost by the time parties renegotiate the terms of the "regulatory contract" which splits the surplus that results from the investment. Once the firm has invested in specific assets, it is no longer protected from opportunistic behaviour by the regulator and, indeed there is a strong incentive for the regulator to expropriate the firm's income and not let it recover its opportunity cost. The firm is, in other words, exposed to the risk of retroactive taxation of its income.

In unregulated markets, firms use a variety of means to protect against the risk of expropriation of quasi-rents. For example, the parties benefiting from the joint use of specific assets may integrate, thus internalising any redistribution of the quasi-rents those assets provide. In other circumstances, the risk of opportunism may be managed through long term contracts between buyers and suppliers, with those contracts eliminating the scope for pure transfers. Finally, where these other means of dealing with the risk of post-investment opportunism are unavailable, the firm that bears the expropriation risk will typically price protect, with the equilibrium price being marked up to a level that provides compensation against that risk.

Regulated firms rarely have these options open to them. To the extent to which they do not, the risk associated with regulatory expropriation of quasi-rents will weigh on their expected income stream. Moreover, even if such retroactive taxation proves to be a surprise (that is, occurs when it was unanticipated by investors), any degree of regulatory bias will be observed over time, and expectations updated. Rational expectations mean that regulators cannot systematically exploit *ex post* surprise, any more than they can implement "proposals for perpetual motion machines or free lunches".¹⁶ Rather, for continued investment to be forthcoming at levels consistent with economic efficiency, the risk of expropriation and its costs will need to be covered in the income stream allowed to the firm.

Robert J Barro (1996) Getting It Right: Markets and Choices in a Free Society_The MIT Press, Cambridge Mass., at page 124.



2.2.5 Impact of regulatory risk

The reality of Australian regulation is that regulators, most notably in telecommunications, enjoy wide-ranging discretion. Moreover, the use of that discretion has been associated with a degree of *regulatory bias*, in which a majority of decisions are made in favour of lower prices.¹⁷ This skews the distribution of expected returns, limiting upside earnings potential and increasing the probability that revenues will fail to cover efficiently-incurred costs.

These statements are readily borne out by experience with respect to Part XIC of the Act. Prominent recent examples of regulatory risk include:

- the ACCC's decision to adopt different and inconsistent approaches (TSLRIC and retail-minus average retail cost) to assessing the cost of PSTN and LCS services, which appears to enable the ACCC to pick and choose between methodologies according to which produces the lowest answer without any consideration of whether overall cost recovery is being provided for;
- inconsistencies in the application of the TSLRIC approach over time, seen best in the successive changes in the ACCC's estimate of the cost of PSTN services, which have arisen largely from the ACCC making small, but significant, changes to the assumptions underpinning its cost model; and
- inconsistencies in the application of the TSLRIC approach across different services, which has enabled the ACCC to reach seemingly contradictory decisions in different access price reviews.

There is great scope for regulatory decisions to be taken in a manner that is both less discretionary and more naturally consistent with efficient outcomes. A move, for example, to clearer, more economically rational pricing principles would both reduce uncertainty and limit the risk that decisions would be taken on a basis inconsistent with efficiency. This would clearly reduce regulatory risk. Nonetheless, all regulatory systems involve some discretion and scope for error, so that the types of risk identified above cannot be entirely eliminated. Moreover, precisely because there is no free lunch, those risks that remain will need to be compensated.

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As noted above, bias in decision-making can arise quite independently of any predisposition for decisions to be made in one direction or another. This is because bias can arise merely from the process by which regulators are seized of some problems but not others – that is, from bias in the selection of the sample of issues that proceed to regulatory determination.



This compensation has not been provided to date, with regulatory decisions about the allowable revenue to the regulated firm typically failing to account for the risks set out above. This is partly the result of a simplistic application of the Capital Asset Pricing Model ("CAPM"), which is favoured by most regulators, including the ACCC. That model does not, by assumption, measure the impact of any skewness in the distribution of returns. Hence, whenever there is an asymmetry in returns, the regulated firm will face a source of risk that is not taken into account by the basic CAPM.

No regulatory decision regarding the cost of capital can be efficient or even sustainable if the model on which it is based ignores factors as fundamental as those described above. It would be inappropriate to judge the *ex post* profit of a regulated firm *as if* it were *ex ante* in a competitive business. As Demsetz notes, "[i]f one were to gauge competitive intensity by the rate of return on investment made by winners in a lottery game, the rate of return would be quite high, but a negative return is obtained if the calculation includes the wagers made by losers".¹⁸ Therefore, to use the rate of return criteria to evaluate the economic value of a regulated investment, the calculation should also include costs incurred because of the additional risk generated by regulation.

In principle, the cost of this risk could be covered in two ways.

First, direct compensation could be provided for losses imposed. For example, the ACCC could compensate the regulated firm through a supplementary depreciation provision for the stranding of assets prudently acquired. The regulator would, by this means, have insured the regulated firm against the risks, thereby eliminating the need for further compensation. While feasible in theory, this approach encounters several problems. To begin with, it may induce a degree of moral hazard, as the regulated firm loses the incentive to correctly anticipate changes in the economic value of assets. Moreover, if compensation is provided for losses, then so too should there be taxation of windfall gains. Yet, determining these gains may be even more complex than measuring any losses, making the system even more uncertain and conflict-prone.¹⁹

The second option is to provide compensation *ex ante* – that is, to essentially build an insurance premium into the regulated firm's allowed cash flow. Making the adjustments

¹⁸ Demsetz, H. (1995) *The Economics of the Business Firm*, New York: Cambridge University Press.

¹⁹ Analytically, the problems posed by stranded asset compensation are similar to those that arise in respect of compensation for retroactive changes in tax policy. See D Shaviro (2000) *When Rules Change: An Economic and Political Analysis of Transition Relief and Retroactivity,* Chicago University Press.



involved requires a somewhat more sophisticated approach to the modelling of the cost of equity than has been adopted by the ACCC.

Without reviewing the merits and demerits of the CAPM, it is clear that it can only be used if the cash flows being discounted correspond to the CAPM model's assumptions. As noted above, the expected future cash flows being discounted must come from a stationary normal distribution. Where there is some NPV to the option of delaying investment,²⁰ then the resulting expected cash flows need not be stationary normal.²¹ The problems this creates are especially acute when the CAPM is being applied where regulation makes the distribution of risks one-sided.

In these circumstances, the expected cash flows need to be transformed to be consistent with the CAPM. This is best done by including, as an outlay in the cash flows being modelled, the actuarial value corresponding to the risk of stranding. In practice, this is equivalent to assuming that the firm needs to self-insure against those risks whose cash flow consequences are not normally distributed, and that the costs of this self-insurance need to be included in

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In practice, an investment in new assets can almost always be delayed. Furthermore, under some conditions, an investor will prefer to delay the project while demand evolves, because immediate investment incurs a risk that the project will fail to earn the cost of capital. If the expected value of delaying investment is positive, the ability to delay has the same advantages as a call option in finance. Because it is defined over a real asset, however, it is referred to as a real option. The value of a real option is simply the expected additional profit from delaying the investment. Equivalently, it is the expected value of the profit that would be lost by investing immediately. The source of this loss is the risk that the asset will be incapable of earning the cost of the capital employed. In other words, an appropriately calculated real option value is also the expected cost of the asset becoming stranded. See H Ergas and J Small, "One Way Bets on Regulated Monopolies: Theory and Evidence", CRNEC, University of Auckland, 1998.

For option values to be positive, the earnings series must display first-order stochastic dominance. The series may be stationary but autocorrelated. The inconsistency with the underlying CAPM assumptions arise when the series is not stationary. See for example M.C. Ehrhardt, *The Search for Value: Measuring the Company's Cost of Capital Harvard Business School Press*: Cambridge, Mass. 1994 at 212 and follows.



the relevant cost base.²² Equivalently, the required grossing-up of outlays can be expressed as a mark-up over the weighted average cost of capital.²³

In the long run, the costs of regulatory risk cannot be avoided or ignored. Moreover, though there is scope to reduce the extent of regulatory risk, it cannot be eliminated altogether. Ensuring that the telecommunications regulatory regime is mindful of the costs this type of risk imposes, and recompenses them appropriately, should be a central element in the recommendations of the Commission's current inquiry.

2.3 Impact of social obligations

Appropriate application of the FCM concept discussed above clearly needs to be inclusive of costs associated with the regulated firms service obligations, including the customer service guarantees (CSGs) and retail price controls.

For example, current regulatory practice does not allow Telstra to fully recover the costs associated with provisioning its network to meet CSGs or complying with retail price regulations. For example, the ACCC excludes an access deficit contribution from LCS and ULL prices, without allowing Telstra to recover these costs elsewhere.

The fact that the current regime does not require that these costs be fully reflected in charges to access seekers creates a type of "fiscal illusion" in which the benefits of proposed social obligations are highly visible relative to the burdens and inefficiencies they impose. Moreover, as the benefits are both more widely spread than the direct costs and more immediate, too little weight is placed in the decision-making process on the overall economic consequences of the decisions being taken. Access seekers in particular, have too little incentive to oppose the imposition of obligations which will be seen as creating costs mainly for Telstra and its shareholders.

²² For example, under a TSLRIC rule, firms would need to insure against stranded asset risk, since (in a TSLRIC world) this is not a risk that investors can diversify. However, there is no market for third-party provided insurance against asset stranding, and any instruments which attempted to provide such insurance would be vulnerable to moral hazard. As a result of these transactions costs considerations, efficiency requires that firms self-insure.

It is sometimes claimed that the same effect can be achieved by accelerating the depreciation schedule. Even in the circumstances in which this can be done (and it depends on accelerated depreciation increasing the NPV of the firm – which it does not always do), the correct amount of the acceleration needs to be determined by calculating the charge referred to in the text. In other words, the cost associated with the option value (the value of the ability to defer investment) needs to be computed explicitly.



This situation makes for poor public policy. It can only be rectified by ensuring that the costs of any social obligations are made transparent and are fully passed on to all those using the regulated assets.

NECG therefore supports the introduction of a specific pricing principle such as that recommended by Telstra,²⁴ which ensures that access prices fully reflect the costs of service obligations. Such a provision would require the ACCC to take account of the access deficit, as well as of the costs of any other constraints the government decided to impose, in the setting of third party access charges.

3 Welfare effects of regulatory error in pricing access

In its submission to the Commission, the ACCC²⁵ appears to argue that NECG is mistaken in stating that, in the long run, regulatory underpricing reduces overall welfare by more than overpricing.

The ACCC's assertion is wrong as a matter of economics. This is most simply seen by noting that the potential welfare loss of failing to allow investors to recover their opportunity cost means efficient investments will not be undertaken. The welfare cost of a loss of service due to setting prices below cost dominates the welfare loss due to too little consumption when prices are set above cost. Inefficiently low investment quickly occurs if any costs that are not sunk are not recoverable. Further, if the regulator has a record of not allowing the recovery of sunk costs, then too little investment will occur whenever new investments are required.

Given that the matter has generated some controversy, it is sensible to make this point again. Moreover, while NECG's earlier submission did not go into detail (as the point being made seemed fairly self-evident), it is clear from the ACCC's comments that a fuller explanation is needed.

To do so, the single output case is considered when marginal costs are constant, rising and falling, in the absence and presence of fixed and sunk costs. The single output case, of course,

"Access prices should fully reflect service obligations and community expectations about service levels." in Telstra Corporation Limited, Productivity Commission's Draft Report on Telecommunications Competition Regulation: Final Submission, pp75-76, available at: http://www.pc.gov.au/inquiry/telecommunications/subs/subdr101.pdf

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 ²⁵ Australian Competition and Consumer Commission, "Response to the Productivity Commission Draft Report, Telecommunications Competition Regulation", June 2001.



is not the only possibility, and indeed is somewhat artificial. However, the basic result carries through to the multiple output case. A price below cost recovery, sooner or later affects investment decisions and hence service levels. The welfare losses of failure to supply due to underpricing are typically very large in comparison with the allocative welfare losses of overpricing by the same amount.

In the simplest case of constant marginal cost (see Figure 1), if price is set below marginal cost (which by definition equals average cost), the firm will prefer not to operate.²⁶ The deadweight loss of such an error is the triangle PRS. This triangle is large in comparison to the monopoly deadweight loss triangle (the shaded triangle), which is the largest deadweight loss that can occur due to overpricing (assuming the regulator's price is not required, but is an upper bound). This implies that if the prospect of regulatory error is symmetric, then regulators must aim to set price above cost to minimise the expected efficiency losses of regulation. In aiming for a cost-recovering price, the regulator is not targeting welfare and, as a result, is likely to get a poor result in terms of maximising expected welfare. To maximise welfare, the regulator needs to target above the cost-recovering price, because welfare losses from prices below the cost-recovering price are, on average, much higher than welfare losses on prices above cost.

In reality, decision to shut-down is unlikely. Instead, efficiency losses are likely to manifest themselves in reduced output and poor service quality, including potential catastrophic system failures, and on-going and costly legal, regulatory and political bickering.



Figure 1—Constant marginal cost

Indeed, if the regulator does not aim to set price above cost, and regulatory errors are symmetric, then it is highly plausible that regulation is worse than monopoly. With no regulation the monopoly deadweight loss triangle is incurred. If the regulatory price is set too high, some deadweight loss less than or equal to the monopoly deadweight loss triangle is incurred. If the price is set too low, the deadweight loss is the triangle, PRS. In general, PRS is substantially larger than the welfare loss of monopoly, and cannot be less than it.²⁷ If half



the time regulation results in efficiency losses between zero and the monopoly loss, and half the time results in losses that are more than double the monopoly loss,²⁸ then the net effect of regulation is not just asymmetric, it is worse than none at all.²⁹

²⁷ PRS equals the monopoly loss only in the extreme case when demand goes to zero for any price above the monopoly price. If demand remains positive beyond that point, then PRS exceeds the monopoly loss.

²⁸ For linear demand, PRS is four times the monopoly loss. If, as is likely, demand tends to flatten as quantity purchased increases (the absolute value of its slope falls), then PRS is even larger.



This regulatory asymmetry remains if the regulated firm has fixed or sunk costs.³⁰ In either case, average cost lies above marginal cost.³¹ With a fixed but not sunk cost (Figure 2), the asymmetry of the welfare losses associated with prices that vary around average costs is again clear. Shut down occurs if price is set at any level that does not recover fixed plus marginal cost. The reason for this is that fixed costs are fungible. If the firm does not recover its opportunity cost, then it will apply those resources to a different use. As a result, symmetric errors around average cost generate asymmetric welfare losses similar to that of the case without fixed costs (any price below P' results in welfare losses of P'RS').³²

²⁹ In fact, regulation is more costly than monopoly for PRS even smaller than twice the monopoly loss, since there is a positive probability of a welfare loss due to the regulated price exceeding marginal cost.

³⁰ Strictly, fixed costs include sunk costs, but for ease of use, throughout this note fixed costs refer to costs that do not vary with output *and* are not sunk.

³¹ By definition, since when marginal cost is linear, average costs equal fixed and sunk costs divided by output, plus marginal cost.

³² Measuring from the second best, that is, cost-covering, level of output. The welfare loss as compared with the first best situation—PRS less PP'S'T, the saved fixed cost of production—is less relevant as it is questionable as to whether the first best outcome can ever be obtained. Taking this second best approach means that the cost of no regulation is the triangle S'T'V plus the rectangle S'TUT' (that portion of the fixed cost not covered by the higher demand experience at price P', or identically, P'WXT').





Figure 2—Constant marginal cost with fixed (but not sunk) costs

If the regulator seeks to set price at average cost when production involves sunk costs (not illustrated), there are two different effects:

- in the short run, underpricing over a narrow range can enhance efficiency but, for reasonable distributions of regulatory error, leads to overall expected welfare losses; and
- a long run effect that reduces efficiency.³³

To keep matters simple, it is assumed all investments that are sunk, are sunk for the same length of time. As a result, one can focus on two periods: the short run when some costs are sunk, and the long run when none are. In reality, investments are sunk for different time periods. Thus, the long run welfare losses identified here in reality occur whenever the firm comes to reinvest in a sunk asset for which cost recovery was denied. Such a period



Further, the long run welfare loss typically dominates any short run gain.

What makes the case with sunk costs different from the previous case, is that the short run shut-down effect does not occur if regulatory underpricing is small enough. In particular, the firm does not shut down in the short run when the regulated price is below average cost, but still allows the firm to recover its fixed (but not sunk) and variable costs. In this circumstance, short run allocative efficiency is increased, though by a relatively small amount.³⁴ For any larger error, shut down is triggered and the short run allocative efficiency loss is large (being equal to the sunk costs wasted plus the welfare triangle analogous to P'RS' in Figure 2). As a result, if the probability distribution of regulated prices is symmetric around average cost and does not fall off sharply in the region where fixed and variable costs are not recovered, expected welfare losses of price underestimates will exceed those of price overestimates.

When short run welfare gains are achieved, a more serious loss occurs in the long run. Regulation that results in short run gains implies that recovery of some or all of the sunk costs is denied. As a result, in the long run production ceases and the larger loss of the welfare triangle analogous to P'RS' in Figure 2, *plus* sunk costs, is incurred.³⁵ This effect will swamp any short run gains, and there may be none so long as the discounting factor of society is not very large.

If average costs are upward sloping in the range where they intersect demand,³⁶ and there are no fixed or sunk costs, then optimal prices more than recover costs (see Figure 3). In this case, the allocative efficiency losses of getting the regulated price too high or too low are, over a narrow range, nearly symmetric (see triangles SUV and SWX).³⁷

typically will be considerably shorter than the long run (a period so long that **all** sunk assets come up for reinvestment).

- ³⁴ In Figure 2, if all fixed costs were sunk, then the maximum short run gain from underpricing would be equal to the triangle TSS'. If some fixed costs were not sunk, then the welfare gain would be smaller than this.
- ³⁵ While sunk costs are avoided in the long run case because no new investment is made, the initially incurred sunk costs must be counted at some point. If they are not counted in considering the short run allocative gains when price is above the shut-down price, but below the full cost-covering price, then they must be counted here.
- ³⁶ Average costs cannot slope upwards throughout their range as this would imply that entry would occur until an infinite number of firms each producing an infinitesimally small amount operated in the industry, that is, a situation not requiring regulation if it is at all plausible.
- ³⁷ They are exactly symmetric in the case of linear demand and marginal cost, when the probability distribution of regulatory errors is also symmetric and prices are in the range of P plus or minus the smaller of (1) the difference between the monopoly price and P, and (2) the difference between P and the minimum cost-recovering price.



If some positive probability can be attached to the regulator either setting prices greater than the monopoly price or below the minimum cost-recovering price, then the expected welfare loss for underestimation of cost exceeds that for overestimation. This is because any price set above the monopoly price will result in the monopoly price being implemented (assuming the regulator does not object to a lower price than what it recommended) so the welfare loss is capped by the illustrated upper shaded triangle, and any price below the minimum cost-recovering price results in a welfare loss given by the area RST.





The case of rising marginal cost with a fixed cost results in a very similar diagram to that of Figure 3. The fixed cost raises average cost, so shut down is triggered by a smaller regulatory error. The asymmetry of course remains. Allowing for sunk costs creates an additional welfare asymmetry in the long run, but one that is triggered at an even higher short run price. Thus, even if fixed and variable costs are covered, an error that fails to cover total costs leads to long run shut down. There is no corresponding gain that can off-set this.

The final case is that where average cost slopes downwards (not illustrated). Here the asymmetry is at its sharpest. Any price that does not cover variable costs leads to immediate shut down and large welfare losses. As with the constant marginal cost case, if sunk costs are added to the mix, some cost underestimates lead to static allocative welfare improvements. However, sufficiently large cost underestimates lead to shut down and hence large welfare losses. If any reasonable probability can be attached to a cost estimate lying below the shut down point, then an asymmetry exists even in the short run case. More importantly, even when static allocative gains are made in the short run, shut down occurs in the long run. As



before, the efficiency cost of this is considerably higher than any short run welfare gain and would outweigh these for reasonable discount rates.

4 Access holidays

In a submission to the Commission's *Review of the National Access Regime*, NECG provided further comments on the proposal to award access holidays to certain types of risky investment.³⁸ NECG supports the Commission's proposals in this area, but emphasises that exempting new infrastructure from access regulation for some initial period does not, by itself, constitute the most effective way to reduce regulatory risk. In particular, any access holiday would need to be accompanied by explicit *ex ante* commitment from regulators with regard to the level at which they will set prices when the holiday expires.

The material contained in that submission attempted to evaluate the costs and benefits of the access holiday proposal. It pointed out that there is some potential for access holiday arrangements to distort investment across different types of assets, to raise prices relative to the first-best outcome and to bring forward the timing of investment in a way that may not be socially beneficial. However, these costs are likely to be small relative to the benefits in terms of improved incentives to invest that an access holiday would create, and it is noted that the Commission has itself previously acknowledged that the costs associated with dynamic inefficiency are likely to outweigh any loss of allocative efficiency.

NECG therefore, once again, encourages the development of a 'menu' approach to awarding access holidays and refers the Commission to the three types of arrangement set out in our submission, which appear to be best suited to achieving the objectives discussed in the Commission's Position Paper.

NECG, "Productivity Commission: Review of National Access Regime. Comments on Submission by Professor Johnstone and Access Holidays" 25 July 2001.