Access – what where and how.

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1. Introduction.

It is approximately seven years since the *Report on National Competition Policy* (the Hilmer report)[2] brought infrastructure access to the centre of the Australian regulatory stage. Since then, access regimes have been introduced by the Federal government and all State governments. There are general access provisions under Part IIIA of the *Trade Practices Act 1974*, as well as specific regimes for telecommunications, rail, airports and other infrastructure industries. The administration of these news rules is vested in a variety of regulatory bodies that were unknown seven years ago - the Australian Competition and Consumer Commission (ACCC), the Office of the Regulator General (ORG), the Queensland Competition Authority to name but a few.

Infrastructure access has also dominated regulatory reform in energy and telecommunications and transport internationally. Many of the issues that are currently being faced in Australia are also being tackled in the US, the EU and Asia.

In this paper, I provide an overview of infrastructure access, and consider how the access problem might be solved in certain circumstances. Along the way, I provide a brief critique of some elements of the current Australian access laws in Part IIIA. Finally, I apply some of the ideas that I develop below to consider rail access.

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[2] Commonwealth of Australia, 1993.

2. Why is there a problem?

Access is only an issue when one or more firms each control upstream facilities that provide a good or service that is needed for further downstream production. Other firms, who seek to enter the downstream market, either have to purchase the relevant input from one of the firms, or integrate back into upstream production themselves.

This situation characterises almost any vertical production chain. But this does not normally lead to concern. If there are a reasonable number of non-integrated upstream firms, each of who can provide the relevant input, then competition will ensure that potential downstream firms can buy the input at a reasonable price. If the upstream firms are all integrated into downstream production and are competitive, then the vertical production chain as a whole will lead to an economically efficient outcome. Any inability of a potential downstream firm to purchase the upstream input is likely to reflect that such sales would be costly and inefficient, rather than an anti-competitive intent on the part of an integrated firm. If a potential downstream competitor was unable to purchase the upstream input, it could enter upstream production itself. Any attempt to prevent downstream competition by withholding the upstream input would simply invite competition over the entire production chain. Finally, even if there are only a small number of integrated firms, each of who refuse to sell the input, and further integrated entry is not possible, there is still only a problem if there are no other substitute downstream products that act as competitive constraints on the integrated firms.

For access to be a problem, the vertical production chain must be economically dysfunctional. There must be little or no competition in the provision of the upstream good or service. There must be little or no competition in the downstream market from alternative products that do not require the relevant input. And it must be extremely difficult or economically undesirable for any potential entrant to enter upstream production. In these circumstances, a potential downstream entrant may either be refused permission to buy the relevant input, or the input may be priced at a level that militates against effective competition.[3]

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[3] See Commonwealth of Australia, 1993, ch.11.

2.1 Why refuse to sell the input?

For simplicity, suppose that an integrated monopoly controls the relevant upstream production. Why would this firm ever seek to refuse sales of its upstream product to potential downstream entrants? While such sales would invite downstream competition, it is far from obvious that this is undesirable for the upstream firm. So long as it can set an appropriate (non-linear) access price, the integrated firm may be able to retain all monopoly profits from the vertical chain of production and seize all of these profits through input pricing.

To see this, suppose that one unit of the upstream input is required for one unit of the downstream output. Let the initial monopoly downstream price be denoted by P^m. Suppose that there are *n* potential entrants to downstream production. If these firms buy the upstream input at price p_a and compete in the downstream market with the integrated incumbent, then the downstream price will be $P(p_a, n)$. It is reasonable to assume that *P* is continuous in p_a, $\left(\partial P \big/ \partial p_a\right) > 0$ for any *n*, if p_a is set equal to the marginal cost of upstream production then $P \leq P^m$, and if p_a is set sufficiently high, then $P \geq P^m$. Given these assumptions, the integrated firm can always set an access price such that downstream competition results in exactly the integrated monopoly price.[4] The integrated firm can then seize any profits from the downstream competitors using a fixed fee (such as an annual 'access charge'). Overall, the integrated firm retains all monopoly profits despite allowing downstream competition.

If an integrated firm refuses to supply access to potential downstream competitors, then this probably reflects the failure of one or more of the assumptions given above. The monopolist might be unable to set the correct non-linear price, possibly because it is uncertain about the exact nature of potential downstream competition or because it is unable to credibly commit not to renegotiate non-linear access prices with some

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[4] This will often be *easier* than it sounds. Essentially, the upstream firm can control downstream production indirectly through a contract that sets the amount of the upstream product each downstream firm can purchase. This would simply be a contract where p_a is very low up to a certain quantity of the input, then infinitely high for larger input quantities.

downstream competitors.[5] Downstream production may not be equally efficient as integrated production. For example, if there are substitution possibilities between the monopoly input and some other input, then any attempt to manipulate the upstream price might lead to an inefficient mix of inputs and a diminution of total profits. Alternatively, there might be real economic costs of providing the upstream input.[6]

If an integrated monopolist refuses to supply an upstream input then this reflects that it is either economically inefficient to supply the input while maintaining monopoly output or there are limitations on contracts that prevent the upstream firm from maintaining monopoly output downstream.

A regulatory solution to this 'refusal to deal', simply requiring that the relevant input be sold, may lower social welfare. For example, if the integrated firm does not wish to sell access because this leads to inefficient production, then mandating that the input be sold may simply result in higher costs and lower social welfare. The integrated firm will set a price for access that maintains maximum profits and there will be 'competition' downstream. But to the degree that marginal production costs rise, final product consumers will tend to face a higher price, not a lower price.

Alternatively, if the integrated firm initially refused to supply access due to difficulties in maintaining the profit maximising price, then mandating access is likely to result in lower final product prices, raising social welfare.

2.2 Is there a problem if the input is being supplied?

If an upstream monopoly (whether integrated or not) does sell the input product to downstream firms, then it will want to price the input in a way that

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[5] McAfee and Schwartz (1994) and Rey and Tirole (1996) consider this issue for a non-integrated supplier of an upstream input.

[6] Of course, if potential downstream firms are more efficient than the integrated firm or are able to sell differentiated products that raise total profit above the integrated monopoly level, then the integrated firm will want to sell the upstream input. Allowing competition will raise the profits that it can seize through non-linear pricing.

(a) maintains overall monopoly production and profits downstream and

(b) enables the upstream firm to seize as much of the monopoly profits as possible.

In either case, sales of the essential input will not promote efficient downstream pricing, although they might create the appearance of downstream competition. The real problem in these circumstances is the lack of upstream competition. Such a problem is not, however, unique to input markets.

There are numerous markets in every economy where it might be felt that competition is below some desirable level. However, it is not necessarily desirable to immediately intervene in such markets through, say, price controls. Regulation has its own costs and if any lack of competition is transitory, then it is likely that these costs will outweigh any benefit. Further, regulation might exacerbate competitive problems. If an industry is subject to intrusive regulation, then this may prevent firms from making profits that will attract new entry. In many markets, it is better to allow competition to develop naturally.

This also holds for most input markets. If there is a current lack of competition then it is likely that this will diminish over time. While the rules of Part IV of the Trade Practices Act need to be rigorously enforced to make sure that increased competition is not artificially impeded, there is little to be gained from direct regulation.

In this sense, access to an essential input is only a cause for specific regulatory intervention if it is either highly unlikely that competition will develop in the upstream market in the longer term or if such competition is itself undesirable. In general, this means that the upstream production process involves a natural monopoly technology.

A natural monopoly technology exists if, at all relevant levels of output, it is more efficient (in terms of lower production costs) to have the output supplied by a single firm than by more than one producer.[7] In such circumstances, it is economically undesirable for there to be competitive supply in the sense that *given a level of output,*

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[7] See Panzar 1989 and Waterson 1987.

the costs of having two or more firms produce that output is higher than if only a single firm produced that output. The existence of a natural monopoly technology is an empirical question, although such technologies are most likely to arise where production involves fixed costs that are large when compared with marginal costs. Further, the existence of a natural monopoly technology depends on the extent of demand. As demand for a product grows, it may become economically desirable to divide the increased production between different producers.

If production involves a natural monopoly technology, then this does not mean that competition in production is impossible. Rather it means that this competition is inefficient in the sense that total output is not produced at minimum cost. Whether competition between two or more firms can arise for a product that involves a natural monopoly technology depends on the nature of interactions between the relevant firms. In particular, such competition, if it exists in the longer term, is likely to be muted.

Competition with a natural monopoly technology is an extreme version of a common economic phenomenon. If production involves fixed costs and there is imperfect competition then free entry by firms will not lead to cost efficient production in the sense that, *given the level of output* total cost could be reduced if there were fewer firms in the industry.[8] Such common inefficiency does not call for general regulatory intervention, because of the costs associated with regulation. Limiting entry might reduce costs for a given level of production but is more likely to simply lead to a reduction in output, a rise in prices and a loss of allocative efficiency that more than offsets any productive gain. Imposing price regulation on the industry is likely to lead to greater inefficiencies as firms inflate costs to try and convince regulators to raise prices. Similarly, if there is a natural monopoly technology in upstream production, any benefits that may arise from an access regime need to be weighed against the costs of regulation.

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[8] See Mankiw and Whinston 1986.

2.3 Summary

The discussion above highlights five key points

1. access is only an issue if the relevant upstream input is essential and the vertical chain of production is competitively dysfunctional;

2. access regulation (as opposed to other regulatory solutions) is only likely to be needed if upstream production involves a natural monopoly technology;

3. existing sales of the input by an upstream monopoly, whether integrated or not, do not mean that there is not an access problem;

4. light handed regulation that simply requires (negotiated) sale of the relevant upstream input may or may not raise social welfare; and

5. the costs of regulation need to be weighed against the potential benefits, particularly where there is current (albeit inefficient) upstream competition.

3. The legislative solution to the access problem.

The current access procedures in the *Trade Practices Act* attempt to both define the access problem and provide a regulatory process to overcome this problem. Part IIIA provides the general access regime and begins with the declaration of a service by a relevant government minister, following a recommendation by the National Competition Council (NCC). Section 44B states that "service means a service provided by a facility and includes :

(a) the use of an infrastructure facility such as a road or a railway line;

(b) handling or transporting things such as goods or people; …

but does not include

(f) the use of a production process; except to the extent that it is an integral but subsidiary part of the service."

Under s44G2 of the Act, the "Council cannot recommend that a service be declared unless it is satisfied …

(a) that access (or increased access) to the service would promote competition in at least one market (whether or not in Australia), other than the market for the service;

(b) it is uneconomic for anyone to develop another facility to provide the service; …"

If a service is declared then the facility owner and the access seeker(s) negotiate an access agreement. If negotiations are unsuccessful, then either an access seeker or the facility owner can apply to the Australian Competition and Consumer Commission (ACCC) to determine the terms and conditions of access.

The Act provides two alternatives to declaration under Part IIIA for access. First, if the ACCC accepts an access undertaking from a facility owner under s44ZZA of the Act, then the service cannot be declared (s44H3). An undertaking must include terms and conditions of access and can only be accepted by the ACCC prior to declaration (s44ZZB). Second, a service cannot be declared if it is already subject to an effective access regime (s44G2e) such as a State based access regime established in accordance with the Competition Principles Agreement.

The access rules in the Trade Practices Act, and particularly those highlighted above, have been subject to extensive discussion.[9] It is far from clear that they capture the true nature of essential facilities. Further, by focusing on negotiation rather than regulation, the access process established by the Act fails to recognise the potential for simple 'rent sharing' between the access provider and access seekers.[10] Finally, the undertaking route ignores the potential desirability of *not* allowing access. We consider each of these issues in turn.

3.1 Declaration and essential facilities

Before considering rules for declaring services produced by essential facilities, it is necessary to formally define such facilities. An essential facility involves two distinct

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[9] See for example King 1997, King and Maddock 1996a and 1999a, National Competition Council 1996.

[10] See King and Maddock 1996a and 1999b.

characteristics.[11] First it must involve a natural monopoly technology. This is formally defined above. Second, the product that the facility produces must be an input into the production of a specific final good or service where:

1. there is no alternative input or process that enables another firm to produce an equivalent final good or service at a comparable or lower cost.

2. there is no alternative substitute final good or service that can be manufactured and sold at a comparable price without using the input product.

The existence of a natural monopoly technology means that competition in upstream production does not minimise production costs. Further, where such competition exists in the long term, it is likely to be muted. However, this does not mean that there is a potential for monopoly pricing of the input unless there is neither effective competition from alternative inputs nor from alternative final products.

The tests under s44G2 of the Act only partially reflect these essential facility characteristics. The requirement that access promote competition in another market can be viewed as an attempt to capture only inputs and to focus on dysfunctional vertical production chains. However, the market interpretation used by the NCC when considering this test has not resulted in a focus on final goods and services but rather artificial 'functional' distinctions in a production chain.[12] This focus on competition at other intermediate steps of a vertical production chain hides the fact that access is only useful if it results in more efficient production and pricing of final products.

The requirement that it is uneconomic for anyone to develop another facility to provide the service may be thought of as a natural monopoly test.[13] However, if 'uneconomic' is interpreted as meaning that it is not profitable for a private investor to develop another facility, then the test clearly fails to isolate facilities with a natural monopoly technology. As noted above, it is possible for more than one facility to exist

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[11] See King and Maddock 1996a and 1996b

[12] See for example National Competition Council 1997.

[13] See National Competition Council 1996.

even with a natural monopoly technology. Further, if it is privately unprofitable to develop another facility then this simply means that the upstream market is 'saturated'. This can arise under perfect competition.[14]

The NCC has considered an alternative interpretation where 'uneconomic' means that it is socially undesirable to develop another facility. This would involve an explicit natural monopoly test, but it is far from clear that the current wording of the Act allows for this interpretation. Further, determining precisely what is and what is not a natural monopoly technology can be difficult.

A pragmatic approach to essential facility declaration would focus on the two defining characteristics of essential facilities and try to capture these characteristics in workable tests. It would also recognise the potential for over-regulation and the costs of legal conflict. As such the rules would tend to be under-inclusive rather than over-inclusive.

As an example, consider the following tests that could replace s44G2a and b.

> The Council cannot recommend that a service be declared unless it is satisfied that
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> (a) access (or increased access) to the service will substantially increase competition in the market for a final good or service;
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> (b) the service is an input into further production and there is no alternative service or production process available to the access seeker that reasonably can be used for the production of the relevant final good or service and
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> (c) efficient production of the service necessarily involves an infrastructure facility with high fixed costs and relatively low operating costs so that it is likely that the development of another such infrastructure facility by any person will raise the total cost of supplying the market for the relevant final good or service.

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[14] In fact, the standard textbook version of perfect competition defines long-run equilibrium as the situation where it is 'uneconomic' for any firm that is not currently in the industry to 'develop' its own facilities and enter the industry.

Rule (a) focuses on final markets for goods and services. The requirement that there is a substantial increase in competition guarantees that there are no relevant substitute final goods or services that can be produced without the declared service.

Rule (b) focuses on input services and guarantees that there are no reasonable alternative inputs. Importantly, this rule requires that there is no alternative service. Clearly, such an alternative would be available if there were two separate facilities that could provide the service. As such, rule (b) requires that there is only a single producer of the service. As noted above, it is possible for there to be an essential facility problem even with more than one input producer. However, it is necessary to weigh up the regulatory costs against the potential for competition. Two firms do not necessarily guarantee competition. But it is necessary to draw a line somewhere and, in my opinion, if there are two potential providers of the essential input, then the need for intrusive regulation through declaration is significantly diminished.

Rule (c) provides an explicit natural monopoly technology test. It focuses on facilities with high fixed costs as these are most likely to involve natural monopoly technology. The word 'likely' is included to avoid excessive debate about whether the facility does or does not involve a natural monopoly technology.

3.2 Pricing by negotiation or regulation.

Under the current access regime, declaration leads to negotiation. However, there is no reason to believe that access negotiations will lead to economically efficient pricing. Rather, access seekers and the access provider have incentives to try and formulate access prices that both maintain monopoly profits and share those profits between themselves.

The current regime is more 'light handed' than the original proposal presented by the Hilmer committee, which involved the NCC providing access pricing principles when a service is declared.[15] While the provision of such principles or any other rules that may effect a potential ACCC determination over an access dispute can affect the outcome of access negotiations, they do not prevent the parties agreeing on anti-

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[15] See Commonwealth of Australia 1993, 266-7.

competitive prices.[16] Because of this, any declaration needs to be accompanied by a regulatory process of setting access prices. At a minimum, either the NCC or ACCC need to formulate a set of access pricing principles. After declaration, access seekers and the access provider would then negotiate access prices subject to satisfying these principles. Any agreement between the negotiating parties would need to be ratified by the NCC or the ACCC before it came into force. We discuss issues of access pricing in more detail below.

The Part IIIA access regime, even with regulated post-declaration pricing, is unlikely to capture essential facilities where access is already being supplied but at a monopoly price. There is however no rule against monopoly pricing in Australia. Thus, if access is being provided at a monopoly price then this is just a specific example of a more general limitation of Australian competition laws.

3.3 *Undertakings and new investment*

The potential for declaration can significantly impede new investment in facilities that embody a natural monopoly technology.[17] To see this, suppose that there is a single firm that can build a new infrastructure facility that might be subject to declaration. For example, the facility might be a cable network in a country town that is to be used for pay-TV distribution. When the firm invests in this facility it faces an uncertain payoff. For example, suppose the network will cost $51m to install, but the firm is unsure of the size of demand in the town for pay-TV. If the pay-TV service is successful then the firm will be able to set a relatively high price and it will receive (in present value terms) $100m. If the pay-TV service is moderately successful then the firm will set a lower price and receive $60m. If the pay-TV service is unsuccessful then the firm receives only $20m. Suppose that the probabilities of each of these outcomes are 25%, 50% and 25% respectively. Then the expected return to the

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[16] See King and Maddock 1999b.

[17] Gans and Williams 1999 and Gans 1998 note that when different firms can build an 'essential' facility then the principles used to set access prices can either create a race to be the first to invest or a situation where both firms want to wait for the other firm to build the facility.

investor is $60m, less the $51m cost of the investment. So the firm expects to make $9m on average and (if risk neutral) will invest in the cable network.

Now, suppose that after building the network, the pay-TV distribution services provided by the network could be declared. A potential access seeker can wait until they have observed whether or not pay-TV is successful before they attempt to gain access. If declaration is successful, the network owner will have to sell access to at least one other pay-TV provider. If the network owner and access seeker successfully negotiate on access and this leads to no diminution in total profits then the network owner will still need to share these profits with the access seeker. Alternatively, if access negotiations fail and the ACCC establishes access prices, then these prices are likely to encourage competition and reduce total profits below the monopoly level. Either way, when the network is declared, the network owner will receive lower total profits.

Using the numbers above, suppose that it is only worthwhile for another pay-TV provider to seek declaration if demand is high in the town and, in the absence of declaration, the incumbent would receive $100m. Further, suppose that in this situation declaration occurs and, due to access, the return to the network owner is reduced to $60m. *Ex post* this leaves the network owner receiving $9m more than the cost of the network. But *ex ante*, the investment in the network is no longer viable. The network owner now expects to receive $60m if pay-TV is successful, $60m if pay-TV is only moderately successful and $20m if pay-TV is unsuccessful. Using the same probabilities as before, this gives an expected return of $50m, less than the capital investment of $51m. The expected return from the investment is now negative one million dollars. Hence, if the network owner believes that its network will be declared if pay-TV is successful, then they will not bother to invest in the network in the first place.

This example illustrates a general principle. Declaration and access are *ex post* decisions that affect the expected return from an investment. Further, access is most likely to be sought when the downstream returns from the investment are high. This means that *ex ante* the potential for declaration will ‘cream skim’ the returns from an investment and might make socially desirable investment privately unprofitable.

The principle, that access will deter investment when returns are uncertain, holds regardless of the access prices so long as access leads to some diminution in total profits to the access provider. It is hard to imagine non-trivial access prices where this would not occur. The efficient component pricing rule (ECPR) for access would enable the access provider to retain all of their profits and so would not reduce investment. But, in the absence of final market price regulation, this rule is essentially trivial. Some authors have attempted to extend the rule to avoid triviality. For example, M-ECPR uses the market prices of substitutable final products as a basis for determining access prices. However, if these final products are really relevant substitutes, then there is no essential facility problem and access is unnecessary. However, any lower access prices will reduce the returns from infrastructure investment and as such may make marginal but socially desirable investment, unviable.

Access pricing rules that allow a 'reasonable' return on investment do not avoid this problem. For example, suppose that if declaration is successful, access prices are set by the regulator to cover the cost of the investment, including a 'risk premium'. So long as there are some potential situations where the investment will be *ex post* unprofitable, the potential for access will distort the expected investment returns and may make the investment unprofitable. In the above example, the network owner did receive a 'reasonable' return on the investment even after access. However, *ex ante* this return did not offset the potential loss that could be incurred by the investor.

Even if the regulator could set the access price *before* any investment, the potential for access to distort investment would not be eliminated. To see this, suppose that the regulator can *ex ante* set the access price such that whenever access is sold the network owner is guaranteed to make enough return to cover their investment. Then this will still not overcome the problem if there is a potential for the service to 'fail'. In these situations there will be no access seeker and the investor will be forced to bear the entire burden of any loss. In the example above, the regulator could *ex ante* require that the investor receive $60m whenever access is provided, but as we have seen this will still make the project unviable as it does not protect the investor from the potential of a $31m loss if pay-TV is unsuccessful.

In summary, whenever the returns from a large infrastructure investment are uncertain, the potential for declaration and access (at non-trivial prices) will tend to deter socially desirable investment.

The access regime in the *Trade Practices Act* does not provide any way for new investors to protect themselves from declaration. At best, an investor can provide an undertaking to the ACCC that establishes ECPR as the rule for access. However, it is not clear that the ACCC would accept such an undertaking.

To avoid the disincentives for investment created by declaration, investors in new infrastructure facilities should be allowed to apply for an 'access holiday'. In other words, investors should be allowed to present the ACCC with an undertaking such that the terms and conditions for access are that the infrastructure owner will not provide access for a fixed period of time, such as twenty years. The ACCC should be able to accept such undertakings when there is a reasonably high degree of uncertainty surrounding the investment, such that (say with a probability of at least 20 percent) the investment might fail.

4. Access pricing

If a service is declared and a regulator is required to set access prices, what principles should be used to determine those prices? The problem of access pricing has led to considerable debate in the economics literature. This section provides an elementary introduction to the standard economic theory of access pricing. Where relevant, references to more comprehensive or advanced material are provided.

4.1. *Pricing and allocative efficiency.*

A simple economic principle underlies access pricing that promotes allocative efficiency. In the absence of any offsetting effects, the optimal price is set equal to the short-run marginal cost (SRMC) of production for the last unit sold.[18]

The SRMC of production is the extra cost associated with a one unit increase in output. For example, if a firm needs to increase its use of labour by one hour at a

[18] See Doyle and Maher (1992), Kahn (1988), Slater (1989) and King and Maddock (1996a).

wage of $50 per hour and needs to buy additional raw materials at a cost of $100 to produce an extra unit of output, then the SRMC of that extra unit is simply the total cost of the additional inputs, $150. If production occurs in a factory that is already rented by the firm on an annual contract then the SRMC would not include any part of that rent. The rent is a fixed cost for the firm in the short-run. The SRMC only includes those costs directly associated with the additional unit of output.

SRMC is based on economic costs rather than accounting costs. For example, consider that in addition to an extra hour of labour and the additional raw materials, a one unit increase in production requires the use of a machine which otherwise could be used to produce an alternative product. Then any (economic) profits that would have accrued from producing that alternative product represent an opportunity cost to the firm. Such opportunity costs need to be included in SRMC.[19] Similarly, if the firm increases its production and this leads to a social loss that is not borne by the firm, this loss should be considered part of SRMC. An example is the social cost of pollution.

If the relevant production facility is capacity constrained, so that no extra output can be produced in the short-run, then the SRMC is adjusted to allow for congestion. In this situation, efficient pricing involves rationing the infrastructure service on the basis of price.

SRMC pricing promotes allocative efficiency because it sends the correct economic signals to anyone wishing to obtain the relevant good or service. From an economic perspective, we would only want an extra unit to be produced and sold if the value to the person purchasing that unit is at least as great as the cost of providing that unit. If price were below SRMC there would be excessive demand for the product. If the producer were to meet this demand, then some consumers would purchase the good despite the marginal cost of production being greater than their personal value. Such consumption would be socially wasteful.

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[19] While the opportunity cost of *inputs* is part of SRMC, the opportunity cost of the *output* is not part of SRMC. For example, consider that access can be used by the facility owner in its own downstream production or can be sold to a downstream competitor. Then the foregone profits from own downstream production when a unit of access is sold to a competitor are an opportunity cost of that sale but are not a cost of producing access. This failure to distinguish between an opportunity cost of production and an opportunity cost from alternative disposal is incorporated in to the standard definition of the efficient components pricing rule. See for example, Baumol and Sidak , 1994, p.94.

It is also undesirable to set the price so that a potential purchaser who does value the output at more than the marginal cost of production is dissuaded from buying the product. Such a failure to purchase would lead to a social loss as the cost of providing the product is less than its value to the purchaser and yet the product has not been provided. The optimal regime involves price equal to SRMC.

While SRMC pricing maximises allocative efficiency, it presents two practical problems that impinge on productive efficiency and incentives for efficient investment. First, if the regulator requires access to be offered at short run marginal cost, then the facility owner may have little incentive to reduce this cost. Any effort taken by the owner that improves productive efficiency by lowering SRMC is transferred into lower access prices. While time lags between the realisation of cost savings and the adjustment of access prices by the regulator may provide the facility owner with some temporary return from improved productive efficiency, the owner is unlikely to face the optimal incentives to engage in cost minimising activities.[20]

Secondly, access services that are produced using large infrastructure facilities such as transmission grids, rail systems or networks of pipelines, often involve significant returns to scale. Average production costs tend to fall for these facilities as output rises until the facility becomes congested, and short run marginal costs are generally less than average production costs. SRMC pricing does not allow the facility owner to cover his costs unless the facility is so congested that the congestion rents under SRMC pricing are able to cover the owner's average costs. A facility owner who believes that he will be forced to price access at SRMC will either refuse to build a facility or will so restrict the capacity of the facility that the congestion rents will allow him to make at least an adequate return on his investment. Neither situation is likely to be economically optimal.

4.2. Additions and alternatives to SRMC pricing.

4.2.1. Non-linear pricing

While SRMC pricing requires that the marginal price for access is set equal to SRMC, it does not require that the infra marginal price is also set equal to SRMC. By allowing a facility owner to use non-linear pricing schemes it is possible for him to

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[20] This problem and potential regulatory solutions is examined in detail by Laffont and Tirole (1993).

generate a reasonable return on his investment without constraining capacity in an undesirable way.

A two-part tariff, which involves an upfront fee and a per unit price, is the simplest form of non-linear pricing scheme. By setting the per unit price equal to SRMC, a two-part tariff retains allocative efficiency.[21] At the same time, the upfront fee can be used to cover the costs of infrastructure development. Freebairn and Trace (1992) recommend a two-part tariff for pricing railway services to coal producers. "The first-part tariff ... would cover each mine's allocation of unattributable costs as well as the capital costs of dedicated infrastructure. ... The second-part tariff would be a per tonne of product charge based on marginal costs" (p.37).

While the per unit charge of a two-part tariff should be set at SRMC to minimise allocative efficiency, the up-front fee can be used to promote efficient investment incentives. See for example Gans and Williams (1999) and Gans (1998).

When setting the upfront part of a two-part tariff, it may be desirable to allow the access provider to discriminate between access purchasers. Setting a uniform upfront fee, say, at a simple average of facility development costs, may exclude some low value users from purchasing access even though these consumers have a marginal willingness to pay that exceeds SRMC. Allowing the access provider to set a lower upfront fee for these users, but a larger fee for higher value access seekers will promote efficient facility use.

Price discrimination will only be possible if resale between access seekers can be prevented. Also, both efficiency and equity considerations will require a limit to be placed on the profits the access provider can make from the upfront fees. Without such a constraint, the access provider will have an incentive to raise upfront fees. This will provide him with two benefits. Raising the fee will limit the degree of downstream competition by creating a barrier to entry for new firms. The high fee will also enable the access provider to reap most of the profits that are created by restricting downstream competition.

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[21] A limitation on the ability of non-linear prices, such as two-part tariffs, to maintain allocative efficiency arises when downstream firms that purchase access as an input for production cannot themselves pass non-linear prices on to final customers. See King (1997) for a discussion.

While two-part tariffs are the simplest form of non-linear prices, it is possible to design far more complex tariffs. Common examples include "block tariffs" and quantity discounts.[22]

4.2.2. Rate of return regulation

The use of non-linear tariffs can allow the infrastructure owner to gain a reasonable return on his investment. However, it may be difficult for the regulator to judge whether the prices set by a facility owner represent a reasonable return or abuse of market power. To the degree that the facility owner is able to reap monopoly profits through a non-linear access pricing scheme, and in so doing distort final product competition and prices, the regulator will want to control those profits. A traditional approach to this problem involves valuing the infrastructure owner's capital stock to form a 'rate base' and allowing him to set access prices that generate no more than a regulated return on this base. This regulation, which has been used extensively in the United States for more than a century, is called rate-of-return (ROR) regulation.

While ROR regulation is often linked with uniform pricing (above SRMC) this need not occur. Given the allowed return on his rate base, the facility owner should be encouraged to set prices that lead to optimal facility use.

However, ROR regulation presents other problems. Like other regulations that limit the facility owner's profits, ROR regulation reduces the incentives for the owner to minimise production costs. In fact, ROR regulation creates incentives for the access provider to deliberately choose an inefficient mix of productive inputs. If the access provider expands his capital inputs then this will increase his rate base and raise allowed profits. Consequently, ROR regulation tends to be associated with over capitalisation and over investment in infrastructure facilities.[23] While solving the problem of allowing the owner to receive a reasonable return on his investment, ROR regulation can exacerbate productive distortions.

4.2.3. Ramsey Pricing.

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[22] Mitchell and Vogelsang, 1991, especially chapter 5, provide a more detailed analysis of a variety of non-linear pricing schemes.

[23] This is sometimes referred to as the Averch-Johnson effect. It was first shown formally in Averch and Johnson (1962). For a discussion of rate-of-return regulation, see chapter 21 in D. Carlton and J. Perloff (1994).

In some situations, it might be impractical to use non-linear pricing for access. In such cases, it may be necessary to raise per-unit prices above SRMC to provide the facility owner with a reasonable return on his investment while at the same time seeking to minimise the allocative loss created by the access prices. The standard approach to this problem involves pricing to different customer groups according to the relative responsiveness of their demand. For example, if there are two distinct types of firms who purchase access, and only one type can (inefficiently) choose an alternative input, then it may be socially desirable to set a higher per-unit access price to those firms who have no alternative input.[24] Allocative distortions are created by changes in the quantity of a good that is used. So if one type of firm has more limited input substitution possibilities then raising their access price will lead to a relatively smaller distortion in the purchases of the access input.

4.2.4. Efficient components pricing rule

Efficient components pricing (ECPR) is a regulatory rule designed to promote productive efficiency among access seekers when there is a vertically integrated access provider. It involves a two-part regulatory process. First, final product prices are restrained by a price cap. Given this cap, the facility owner can sell access at a price that not only recoups his production costs, but also compensates him for any foregone profits from final product sales due to the additional competition from access seekers. ECPR has been strongly advocated by Baumol and Sidak for electricity and local telephone access in the US.[25]

The logic behind ECPR is both simple and, in the correct context, compelling. As an example, consider that the marginal cost of access is $3 per unit of the final good and the other marginal costs of providing a unit of the final good are $5. Let the price of the final good be constrained by a price cap at $10. A facility owner who is vertically integrated and operates as a final market monopolist would make variable profits of $2 per unit from final goods sales. Assume that if the facility owner provides a unit of access to a competitor in the final market then the access provider's sales in this market decline by one for each extra unit sold by the competition. If the facility

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[24] In the case of access, the optimal Ramsey prices will also depend on the relative 'elasticity' of final product demand and the nature of competition between downstream firms.

[25] See Baumol and Sidak (1994) and (1995). Hyde and Negrin (2000) provide a recent survey on ECPR.

owner provides one unit of access to a competitor who uses this access to provide one unit of the final good, then the opportunity cost of providing this access is the marginal cost $3 plus the foregone profits $2. Under ECPR the access charge should be set, not at SRMC which is $3 but at opportunity cost which is $5.

Why is such pricing desirable? Consider a downstream competitor who is not as efficient as the incumbent integrated facility owner. For example, the competitor's cost of producing the downstream product given a unit of access might be $5.50. It would then be economically undesirable for the competitor to enter the downstream market. Such entry would result in inefficient production. However, the inefficient competitor could enter if access was priced at SRMC. If the competitor paid $3 for a unit of access and paid an additional $5.50 to produce the final product given the unit of access, then his total cost per unit will be $8.50. This is $0.50 more than the cost for the incumbent firm but is less than the market price of $10. The inefficient competitor can enter and make $1.50 profit per unit. In contrast, if access prices were set by ECPR then the total cost of production for the inefficient competitor would be $10.50; $5 for a unit of access and $5.50 to turn this unit into final product. The competitor could not make a profit at a final market price of $10. Only if the competitors costs of turning access into final product were at least as low as those of the incumbent facility owner, would the competitor be able to profitably enter when access is priced according to ECPR.

ECPR can promote efficient entry and production in the final goods market.[26] However, this is not the same as efficient production of the access service. By focusing on efficient production by access seekers, ECPR simply duplicates a function of competition. If we are seeking to open final market production to competition by requiring the facility owner to provide access, then so long as all competitors (including the facility owner himself) can buy access at the same price then competition should drive inefficient downstream producers out of the market. If an access seeker is inefficient then an alternative producer should be able to enter the final market, buy access and force out the inefficient producer. If the access provider

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[26] The example given above is very simple. In any actual market, ECPR needs to be adjusted to retain its desirable features. For example, a unit of competitor's product need not crowd out exactly a unit of the incumbent's product. See Armstrong, Doyle and Vickers (1996). The example also assumes that the final price stays constant at $10, even if inefficient entry occurs. In contrast, if the access price was set at $3 and the threat of inefficient entry forced the incumbent facility owner to reduce his final product price to $8.49 in order to prevent entry, then the threat of (inefficient) entry would not lead to any actual inefficient production but would benefit consumers by lowering the final product price. See also Economides and White (1995).

himself is inefficient in downstream production then he will also be forced out of final market production and will have to retreat to simply providing access to his essential infrastructure services. Put simply, ECPR only does what we expect competition to do anyway.

ECPR is a useful adjunct to downstream competition only when regulators believe that downstream competition will be either muted or distorted. For example, if regulators restrict final market entry to a single licensed firm then there is unlikely to be effective final market competition. ECPR can be used in this situation to prevent the licensed firm entering markets where it is less efficient than the vertically integrated incumbent. However, a better solution to this problem may be to allow unrestricted entry downstream.

Alternatively, a vertically integrated incumbent may be able to abuse its control over access to distort downstream competition and either provide its own subsidiary with access at a more favourable price than it offers to competitors, or engage in cross subsidisation in order to manipulate its regulatory regime.[27] ECPR will limit these distortions. For example, it does not pay a vertically integrated producer to protect its own inefficient downstream subsidiary under ECPR as it is fully compensated for foregone profits. However, a better regulatory solution may involve tackling the distorted competition at its source by requiring the access producer to vertically divest its downstream subsidiary.[28]

A third situation where ECPR can aid efficient downstream entry is if regulated final product prices involve cross subsidies. For example, the vertically integrated incumbent producer may be required to cross subsidise rural consumers by charging a higher price to urban consumers. If the downstream market is opened to competition with access sold at SRMC, then new entrants will only sell to profitable market segments. New entrants will be able to undercut the incumbent in the urban market as they do not need to cross subsidise rural consumers. To protect the incumbent and maintain the cross subsidy, access can be priced by ECPR so that new competitors in the urban market compensate the incumbent for any foregone profits through the

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[27] T. Brennan (1987) "Why regulated firms should be kept out of unregulated markets; understanding the divestiture in *United States v AT&T*", *Antitrust Bulletin,* 32, 741-793.

[28] For a discussion of the arguments for and against vertical divestiture, see chapter 8 in S. King and R. Maddock (1996a). See also King (1999).

access price. However, a better regulatory solution may involve either removing the cross subsidies from the final product prices or removing the facility owner's burden to finance these subsidies.

ECPR is most useful when political constraints prevent the introduction of fair competition in the downstream market. However, in the absence of such concerns, ECPR is equivalent to a final market price cap regime, with unregulated uniform access prices. The incentives for productive efficiency in the provision of access under a final market price cap will be similar to those that arise when access prices are directly capped. As discussed above, to the degree that future price caps are set according to current profits, price cap regulation will provide distorted productive incentives, similar to ROR regulation. Also, if the price caps are set too high, then there will be a loss of allocative efficiency. ECPR does not address either of these issues.

If ECPR is used without final market price caps then the rule is the same as allowing unconstrained monopoly pricing of access. This has been recognised by the proponents of ECPR.[29] However, the problem is not the access pricing rule but rather that ECPR is really a two-stage process. It is only designed to work with final market price controls in place.

The access pricing rule under ECPR is not designed to promote either allocative efficiency, efficient access production or efficient investment decisions over time. Rather, these issues are handled by final market price constraints under ECPR. The access pricing rule is designed solely to promote efficient entry in the downstream market in circumstances when other distortions exist that would impede such entry and those distortions cannot be removed for either economic or political reasons.

4.2.5. Long run marginal cost pricing

Long run marginal cost (LRMC) is the cost of increasing output by one unit when both the variable costs of production and the costs of expanding the relevant facility are taken into account. Unlike SRMC, which ignores any input costs that cannot be adjusted in the short-term (for example, production capacity that is already rented on an annual contract), LRMC considers the cost of production when all inputs can be varied. Because it can allow for an optimal plant capacity, LRMC will be below

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[29] See Baumol and Sidak (1994) at p.108.

SRMC whenever existing production facilities are operating above their optimal capacity. However, if existing facilities are operating below optimal capacity, LRMC will exceed SRMC.

If demand for access grows steadily over time, then requiring a facility owner to price access at LRMC can induce efficient investment without any loss of allocative efficiency. Under LRMC pricing, capacity will adjust to the economically optimal level while simultaneously setting the access price equal to the congested adjusted SRMC.

Unfortunately, if demand for access is more complicated; involving for example periods of peak and off-peak use, a variety of different peak periods say over a daily cycle, or varying around a trend rate of growth; then simple LRMC pricing will promote neither allocative efficiency nor optimal investment. If there are multiple peak periods using the same access facilities, then economically optimal investment requires expanding the facility until the total value of an extra unit of capacity to all peak users is equal to LRMC. Pricing to promote efficient investment would require that the sum of all peak period prices equals long run marginal cost. Setting price at LRMC to all users would substantially overprice access and lead to under investment. If there are both peak and off-peak users, then LRMC pricing will lead to allocative inefficiency in off-peak periods. Peak period users will have too little incentive to substitute to off-peak and off-peak users will tend to purchase too little access. Finally, if there is a single (peak period) demand that is volatile, LRMC pricing will require non-price rationing when demand is unexpectedly high and will overprice access when demand is unexpectedly low.

LRMC pricing is most likely to be useful where there is a single, well-defined peak period for access demand. In such a circumstance efficient investment is encouraged by requiring the access provider to sell reserved capacity during the peak period at long run marginal cost and to expand capacity whenever demand in the peak period cannot be met at this price. SRMC pricing can be used in off-peak periods, and upfront tariffs can recover any costs associated with initial construction that are not covered by LRMC pricing.

These situations are likely to be rare in practice. In energy industries, peak use is often related to weather and cannot be predicted in advance. In water industries, new infrastructure involves lumpy investments so that LRMC is not well defined. In urban rail systems, there are usually multiple peaks in both the morning and the evening rush hours. While LRMC tariffs may provide a useful basis for access pricing in some industries, these cases will be the exception rather than the norm.

4.2.6. Access pricing and asymmetric information

Access pricing inevitably involves information asymmetry between the access provider, the access seekers and the relevant regulatory authorities. Regulators will be unable to perfectly value the assets used to provide access. Short run and long run cost information will not be easily available and the access providers who are most likely to know relevant cost figures will often have little incentive to correctly provide this information to regulators.

Sensible access pricing procedures recognise this information asymmetry. For example, price cap regulation is based on the premise that the regulator will not be able to perfectly monitor cost reducing activities by the access provider. By allowing the access provider to retain any benefits from such activities, price cap regulation compromises allocative efficiency in order to maintain a greater degree of productive efficiency.

Economic theory provides a wide range of tools designed to overcome regulatory problems with information.[30] The lessons from this literature are relatively simple. First, regulators need to recognise that they will often be at a disadvantage compared to access providers. There is little point requiring access providers to set capacity according to long run marginal cost when the only information the regulator has about those costs will be provided by the access provider themselves. Such a request simply invites the access provider to plead ignorance, manipulate accounting measures of cost, and pad out LRMC measures so that any reports will provide little indication of the true level of costs.

Secondly, efficient access pricing schemes will try to overcome asymmetric information and recognise information constraints which are unavoidable and minimise their effect. For example, benchmarking access against comparable facilities in Australia or overseas can provide a powerful tool to overcome information problems and improve incentives. Benchmark comparisons can be used to structure price caps or revenue caps for the access provider. Because these caps depend less on the access provider's own costs and more on the costs of related businesses, the facility owner has greater incentives to operate efficiently and less incentive to distort reported costs.

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[30] See D. Baron (1989) and Laffont and Tirole (1993).

Similarly, where a number of participants in the market place may have relevant cost information, then the regulator can use competition between these participants to reveal information. Franchise auctions are a simple example of a regulatory scheme designed to elicit information from multiple providers.[31] Alternatively, regulators can use information provided by access seekers to control access prices. A simple example is a capacity auction for a gas pipeline, an optical fibre cable or a railway line.

Thirdly, practical access prices will involve compromise. It is usually impractical to try and design an access pricing scheme that satisfies all the requirements of economic efficiency. A desirable access pricing regime will trade off distortions, weighing each by its potential long term detriment to welfare. Thus, a regulator may be quite satisfied with a scheme that leads to overpricing in the short term if this loss is more than outweighed by long term productivity improvements. Similarly, it may be desirable to allow an access provider significant profits through the upfront component of a nonlinear pricing scheme if this leads to improved investment incentives. An important trade off involves administrative simplicity and regulatory complexity. While such compromises are unlikely to satisfy access providers, access seekers or final product consumers, maintaining a balance of incentives, information requirements and simplicity is most likely to provide economic benefits.

5. Rail access pricing

To apply the principles of declaration and access pricing developed above, consider the issue of access to railway lines. Such lines were specifically mentioned as a 'natural monopoly' in the Hilmer report.[32] Rail has also been the main source of declaration decisions by the NCC.

There are at least three different types of railway lines that need to be considered for access – urban rail networks, general (long distance) freight and passenger rail and high-volume regional rail. We consider these in turn.

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31 See Demsetz (1968) and Crew and Zapan (1991).

32 Commonwealth of Australia 1993, p.240.

5.1. *Urban Rail Networks.*

Applying the tests presented in section 3.1, urban rail services are not essential services. In particular, urban rail networks fail the first test: that access (or increased access) to the service will substantially increase competition in the market for a final good or service. Urban rail transport is part of a highly competitive market for public transport services. In general, competition is so fierce that urban rail systems do not provide a standard commercial return to their government owners. Competition from other forms of public transport and from private cars means that access to an urban rail network will not substantially increase competition in the urban passenger transport market.

Urban rail systems are best thought of as 'convenient facilities' for the purpose of access.[33] Urban rail probably involves a natural monopoly technology. Given the level of demand for these services, they are most efficiently supplied using a single rail network. But urban rail operates in a broader, competitive market. Reform of urban rail might involve an access regime. For example, it might be desirable to allow competing private train operators to operate on an urban rail system and an access regime would facilitate this. At the same time, alternative methods of operation, such as the use of franchise contracts, may be preferred. Regardless of the method used to operate urban rail systems, however, they are not essential facilities.

5.2 *General freight and passenger rail*

Like urban rail, many companies that provide general freight and passenger rail services operate in a highly competitive market where road transport provides a viable and effective alternative. While access to general freight track services may allow some increase in competition, it is far from obvious that there will be a substantial increase in competition in general freight and passenger transport. General freight and passenger rail is best thought of as a 'convenient facility' for access rather than as essential facilities.

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[33] See King and Maddock 1996b and 1999c.

Again, this does not mean that there is not room for reform and improvement in general rail services. Poorly run publicly owned firms have often provided these services. There is often considerable room for improvement in the way that these services are supplied. Such improvement may involve an access regime so private firms can operate long distance rail services. It might be desirable to privatise the rail infrastructure. To the degree that such infrastructure involves few if any external costs or benefits, unregulated private ownership of the rail tracks would seem to create few economic or social concerns.[34] Where rail transport does involve external effects, for example in providing transport links for people who are unable to use alternative road transport, these issues might best be dealt with through specific subsidies to the relevant passengers. Overall, general freight and passenger rail is not an essential facility and should not be subject to a general access regime and constrained by standard access pricing rules.

5.3 *High volume regional rail.*

Some rail infrastructure involves the transport of specific bulk commodities such as coal, wheat and iron ore. In some of these cases, there is no competitive alternative To see whether these facilities satisfy the three essential facility tests presented in section 3.1, we consider each test in turn.

First, would access (or increased access) to the service substantially increase competition in the market for a final good or service? In part, this depends on the relevant bulk commodity and the final markets that involve this commodity. Many commodities, such as coal and iron ore are sold into world markets where Australia is effectively a price taker. While it is in the interest of Australian firms to produce these bulk commodities as efficiently as possible, it is not clear that allowing rail access will increase competition in any final market for a good or service. In this sense, high volume regional rail might also be a 'convenient facility'. Many bulk rail services could be reformed. Historically, State governments have used bulk rail transport to raise revenue. Pricing of this rail transport has not been efficient with prices considerably exceeding marginal cost. It might be better to privatise these railways,

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[34] King and Pitchford 1998 provide a framework for analysing privatisation decisions.

possibly selling them to a cooperative involving the firms that use the bulk transport services. Alternatively, it may be useful to create an access regime so that the rail users can operate or organise their own transport. However, once again, the rail infrastructure would not be an essential facility for the purpose of access.[35]

This said, there might be some circumstances where access will lead to a substantial increase in competition in a final good or service market. In these cases, we need to move on to the second test – whether the service is an input into further production and there is no alternative service or production process available to the access seeker that reasonably can be used for the production of the relevant final good or service. Again, this test depends on case-by-case analysis. For example, the rail transport of wheat is clearly an input into further production and it is unlikely that there is any alternative process that could be economically used to transport wheat, or any alternative product to wheat that could be practically used as an alternative in many final goods and services.

The test will often also depend on the specific circumstances of the facility. An example is provided by the Robe River's application to the NCC in 1998 for the declaration of a rail line owned by Hamersley Iron in Western Australia. This railway line is used exclusively to transport iron ore. But there were two railway lines that could be used by Robe River for the transport of their iron ore from the mine to the port – the Hamersley Iron railway and one owned by BHP. If the BHP railway was an effective alternative for Robe River, then their application to declare the Hamersley railway would fail this second test. There would be an alternative service available that would be used for production. Robe River could negotiate access services from either Hamersley Iron or BHP. As noted above, two providers does not guarantee competition. But, if it is in fact efficient to sell access to Robe River, and the two potential suppliers do not violate the anti-collusion requirements of the *Trade*

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[35] Productivity Commission 2000, p.162 notes that increased competition from access reforms on coal railways in regional Queensland and New South Wales has led to significant benefits.

Practice Act, then we would expect that Robe River would successfully negotiate rail access off one of the two providers without the need for regulatory intervention.[36]

The third test – whether efficient production of the service necessarily involves an infrastructure facility with high fixed costs and relatively low operating costs so that it is likely that the development of another such infrastructure facility by any person will raise the total cost of supplying the market for the relevant final good or service – will often be satisfied for bulk rail transport.

5.4. *Rail access pricing*

If regulated access is used for rail services, how should it be priced? In many situations, including long distance freight and passenger rail transport and regional high-volume rail transport, the most sensible solution will involve auctioning access. Using auctions to both price and allocate rail access is canvassed in Productivity Commission 2000.

Auctions involve little specific information for the regulator and do not require the regulator to use 'rate-of-return' regulatory procedures. Auctions can be carried out in a mechanical fashion, and while a well-designed auction is not immune from collusion, it is less susceptible to collusion than many other allocation and pricing procedures. An auction process uses the information that is possessed by access seekers and forces these participants to reveal this information. For track sections where there is significant demand, an auction forces participants to reveal this demand and allows prices to reflect demand. Where there is little demand for a rail section, then this is also revealed by the auction. The track owner can them decide whether the section is economically viable over the longer term. Overall, the use of auctions to allocate and price access, satisfies the key principles of good regulatory decision making developed in section 4.2.6.

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[36] The case for a negotiated settlement is even stronger in this situation, as Robe River had indicated that they would build their own railway if they were unable to gain access. Hence, even if Hamersley Iron and BHP both had concerns about final market competition, denying access to Robe River would not prevent this competition.

The auction process requires some regulatory intervention. In particular, the regulator will need to design and oversee the auction process, and establish the parameters for the auction. For example, the regulator will need to determine the period of time between auctions. Are participants purchasing access for one year, five years or ten years? The regulator will need to set a reserve price for the auction of track sections. This reserve price should be set at short-run marginal cost including the costs of maintenance of the track. But the reservation price should not include any return on the value of the asset. If demand for a track section means that price exceeds short run marginal cost but does not cover the cost of refurbishing and replacing the track in the longer term, then the owner can close down that section of track in the longer term.

The design of the auction process will clearly be critical to the successful allocation of track access. The auction will involve multiple rounds of bidding, as in standard auctions of wireless spectrum. The auction needs to allow participants to 'build up' complete journeys from rail sections. This means that the regulator needs to determine the relevant individual rail sections to be auctioned, both geographically and by time of day, day of the week and possibly, time of the year. It also means that the multiple rounds of the auction need to determine current highest bids by considering both the bids placed over complete journeys and bids over smaller track sections. In essence, an auction algorithm will, at any round of the auction, determine the maximum value (in terms of the consistent current bids) of all the track sections of the railway in aggregate. Such an algorithm can easily be designed for a computer.[37]

The regulator might also want to allow a secondary market in track sections to develop to allow for beneficial reallocations between auctions.

The use of auctions to allocate rail access has met with some opposition. For example, it has been suggested that such an auction will be difficult to design.[38] While designing the auction will not be a simple task, it is far from obvious that the task is more onerous than attempting to apply rate-of-return regulation to rail lines. In fact,

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[37] Professor Charles Plott from CalTech illustrated the use of such a computer algorithm for rail track access in North America in a seminar at the University of Melbourne in 1999.

[38] Productivity Commission 2000 p.181. See also Affleck 1999.

the information required by the regulator to design a successful auction is far less than under standard regulation. Further, even if it is difficult to design an auction, the potential gains compared to traditional regulation, in terms of efficient allocation of access and pricing, are likely to more than compensate for the initial effort.

It has been claimed that auctions would disrupt existing long-term business relationships.[39] This will only be true where the value of the rail access to another firm is greater than the value to the current rail user *even taking account of existing business relationships*. In other words, auctions only disturb existing business relationships if these relationships do not involve the most efficient use of the track. In such circumstances, it is economically desirable to 'disrupt' these relationships. Uncertainty over the future ability to use a certain route might also reduce the incentives for train operators to make route specific investments. To the extent that this is an issue, it suggests that auctions should occur at longer intervals.

It has been noted that auctions may lead to very low prices for some track segments.[40] This is undoubtably the case. And in such situations it might be desirable to close the track down in the longer term. The regulator needs to establish procedures that allow low value track to be removed from the access regime in the longer term if auction prices do not cover the on-going long term operating costs.[41] Where a track is removed from the auction process in the longer term it need not be closed down. Rather, the owner of the track could still sell access to the track by individual negotiation with access purchasers. However, the price information revealed by the auction would show that demand for the track was not high enough to warrant formal regulatory intervention. The regulator might establish rules to allow such a track to be re-included in the auction at a later date, for example if the owner requested inclusion

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[39] Productivity Commission 2000 p.182.

[40] ibid

[41] Formally, a track may be removed from the auction process if the total revenues accruing to the track over, say, one year, do not exceed the avoidable costs of operating that track over the same period.

or if there was a significant change in circumstances that would lead to a significant increase in demand.

A successful auction that included long distance freight and passenger transport would require coordination across State boundaries. Because of this, an auction could not be done on a state-by-state basis, but would need to be carried out on a national basis.

If an auction was not used to price and allocate rail access, then standard regulatory access pricing would be needed. Such pricing should be based on short run marginal cost with, say, a per rail segment annual fixed charge to cover fixed costs. If there are multiple access seekers for any rail segments, then the regulator would need to develop rules to allocate access.

5.5. *New rail developments*

There are a number of new rail developments that have been proposed involving both freight and passenger transport. Examples include the Alice Springs to Darwin railway and the Sydney to Canberra fast rail project. These projects involve substantial degrees of uncertainty. It is likely that the projects are either only marginally commercially viable or require government funding to make them feasible. Following the discussion in section 3.3, it would be sensible for these projects to be exempt from any access regime.

It could be argued that, for these major projects, regulated infrastructure access is desirable *ex post*. Even ignoring the potential for an access regime to deter investment, the economic arguments to include new rail infrastructure in an access regime appear weak. Bottleneck infrastructure causes a problem when it involves an essential facility. But a new railway that does not presently exist cannot, by definition, be an essential input for any existing downstream producer. These producers have been operating without any rail services and to the degree that rail investment creates new competition to supply inputs, the relevant downstream firms can only be made better off.

New producers, for whom the railway is a bottleneck facility may develop after the railway is built. But again this is usually not a problem requiring regulatory

intervention. Because new producers develop their facilities after the railway, there is unlikely to be an essential facility issue. The new producers will negotiate with the railway to gain long-term transport contracts before they commence any investment. The new producers will be in a strong position to bargain with the track owner – after all, the track owner has sunk their investment while the rail service purchaser has not yet made their investment.

6. Conclusion

This paper has considered a variety of issues in essential facility access including the structure of regulations and pricing. Overall, there seems to be significant room for improvement in Australian access regimes. The general regime in Part IIIA of the *Trade Practices Act* does not properly capture essential facilities. Alternative tests are proposed above. Access pricing has often followed rate-of-return regulation in Australia but this will often be inefficient. When considering rail transport, access may be part of general reform, but often it is not essential facility access.

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