# REGULATION vs INVESTMENT

## STRIKING AN APPROPRIATE BALANCE

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# BIOGRAPHICAL NOTE

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**This paper reflects the personal views of the author and not necessarily the views of any of his current or previous clients or employers.**

# ABSTRACT

This paper analyses the impact of telecommunications regulation on the long-term incentives for telecommunications infrastructure investment. This paper argues that some jurisdictions have not yet struck an appropriate balance, particularly in circumstances where substantial investment in next generation networks may now be required.

First, the paper explores the key factors influencing the level of telecommunications infrastructure investment, specifically the risk-adjusted return on capital for private sector investors. The paper examines the types of risks faced by telecommunications infrastructure investors and the extent to which regulation can increase risk and thereby reduce investment returns.

Second, the paper uses the Australian regulatory regime as a case study. In Australia, regulation has persisted, even increased in some cases, as competition has increased. Such regulation has arguably deterred long-term infrastructure investment by enabling market entrants to obtain access to existing infrastructure at a materially lower cost than if they rolled out infrastructure themselves. While this has promoted short-term market entry, it has created a market dependence on continued access regulation: arguably at the expense of the development of long-term infrastructure-based competition.

Third, the paper identifies examples internationally and in other industries where appropriate incentives have been created to encourage large-scale infrastructure investment. The paper identifies the key features that have influenced the success of such incentives and distils lessons that can be learned for telecommunications regulators. The paper argues that the long-term benefits of such incentives outweigh any detriments. The paper also explores whether it may be appropriate for investors to be rewarded with higher returns as a means of promoting investments that have positive spillover externalities for wider society.

Finally, the paper focuses on the use of techniques, such as public-private partnerships (PPPs), to reduce the level of risk to private investors. PPP's have generally followed a principle of risk redistribution so that participating entities bear those risks that they are best placed to manage. Accordingly, regulatory risks have been frequently borne by Government. The paper identifies whether this approach provides insights that should guide the development of telecommunications policy more generally.

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> *"While unbundling can serve to bring competition to markets faster than it might otherwise develop, we are very aware that excessive network bundling requirements tend to undermine the incentives of both incumbent LECs and new entrants to invest in new facilities and deploy new technology." (FCC, 2003)* [1]

## 1. Determinants of telecoms infrastructure investment

This paper will analyse the impact of telecommunications regulation on the long-term incentives for telecommunications infrastructure investment. The paper will argue that some jurisdictions have not yet struck an appropriate balance, particularly in circumstances where substantial investment in next generation networks is now required.

### 1.1 A vision for the year 2015 – ubiquitous broadband Internet access

The Internet is one of the most significant innovations of the 20th century and is profoundly shaping modern society in the 21st century. It is a readily accessible cross-border resource for aggregate human knowledge that far surpasses any individual library. It is an important source of entertainment, rivalling television as computers become multimedia powerhouses. It provides a means for anyone to immediately communicate large volumes of digitised information to anyone else, at any time, anywhere on the planet – transcending geopolitical borders.[2]

Furthermore, the Internet growth story continues. The Internet is evolving as an important medium for commerce, reducing search costs and promoting market efficiency. It is becoming integral to the utility that can be extracted from modern computing technology. Its importance continues to be enhanced by a growing

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1 Federal Communications Commission Report and Order and Order on Remand and Further Notice of Proposed Rulemaking (*Triennial Review Order), FCC#03-36,* 21 August 2003, 18 FCC Rcd 16978, para 3, available on the Internet at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-36A1.pdf

2 See Martyn Taylor "Issues on Broadband: Transactional, Regulatory, and Intellectual Property" (2005) 6 *Business Law International* 76.

range of technological innovations and new software applications. Ultimately, the Internet will supplant traditional voice telephony while providing a platform for large-scale, on-demand, interactive video communications.

Governments around the world are increasingly recognising the value of Internet access, including via positive externalities that spillover into economic growth. Many Governments are now taking active steps to promote the increased availability of Internet access at a reasonable cost. A common policy vision among advanced industrialised nations is ubiquitous broadband Internet access. [3]

*Why broadband ?* By facilitating high-speed Internet access, broadband services provide the key mechanism for a consumer to access the benefits of the Internet. As more consumers adopt broadband access with ever higher bandwidths, so network effects will arise that will support a new generation of more powerful Internet applications and services. These may range, for example, from high resolution Internet video streams of television quality, through to powerful on-line application software that could rival current Windows applications. Advanced broadband will accelerate the digital convergence of communications, telephony, television, video, music, entertainment, e-commerce and computer software within a high-speed, interactive, on-line environment.

*What is the principal constraint to the realisation of this vision ?* As of today, the principal constraint to the supply of high-speed broadband access into the home in most countries is legacy wireline "last mile" customer access network (**CAN**) infrastructure. With the exception of new housing developments, such infrastructure in most nations typically comprises:

- in most instances, a twisted copper pair, often many decades old and prone to quality issues; and

- less commonly, a separate coaxial cable, normally as part of a hybrid fibre coaxial (**HFC**) network initially rolled out to provide cable television services.

At present, broadband Internet access is provided over both forms of infrastructure via xDSL and DOCSIS technologies, respectively.[4] However, such technologies have inherent limitations derived from the quality of the underlying infrastructure. While wireless services may ultimately provide a means to overcome such limitations, wireless still continues to lag behind wireline in bandwidth and service quality. Given such issues, increased focus is now turning to the upgrading of legacy wireline infrastructure.

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[3] See, for example, the discussion regarding various international governmental policy initiatives in "Ubiquitous Broadband: Taking Universal Connectivity from Pipe Dream to Reality", AT Kearney, at http://www.atkearney.com/shared_res/pdf/Ub_Broadband_S.pdf

[4] xDSL refers to the range of Digital Subscriber Line technologies used to condition copper lines. DOCSIS refers to the Data Over Cable Service Interface Specification used to provide Internet access over HFC cable via cable modem technology.

Our vision for the year 2015 is therefore a vision underpinned by the large-scale rollout of so-called "next generation networks" (**NGN**) that replace legacy wireline infrastructure. While such networks may have a wireless aspect, they are more likely to involve wireline infrastructure utilising high bandwidth fibre optic cable within the CAN.

In Australia, as around the world, the current focus is on the rollout of Fibre to the Node (**FTTN**).[5] Fibre is substituted for copper in the part of the CAN closest to a local exchange, normally down to an intermediate node. Copper remains in place between that node and the particular households that the node serves. Ericsson has indicated it would be possible to currently deliver connection speeds of up to 100Mbit/s without replacing copper between the node and the home.[6] Such speeds could be delivered using VDSL2 technologies to activate the residual copper.[7]

## 1.2 Realising the vision – the economics of infrastructure investment

However, it is trite that very little of value in life is free. Telecommunications networks are no exception and their rollout is costly. The rollout of NGN infrastructure in the "last mile" is particularly costly. Our vision for 2015 is therefore subject to the twin realities of network economics and corporate finance.

*What are the economic characteristics of last mile NGN infrastructure ?* The rollout of NGN infrastructure involves substantial labour costs as well as capital costs. The investment is essentially irreversible: once deployed, fibre cannot easily be redeployed. NGN infrastructure therefore involves a very significant sunk cost. As the firm's ability to redeploy capital is limited, its potential losses from a poor investment decision are commensurately greater.[8]

The investment also involves economies of scope and scale and network effects that mean it is most efficient to rollout the network rapidly on a holistic rather than piecemeal basis. As a consequence the investment is "lumpy" and the bulk of the costs are borne up-front in a short period of time rather than spread over the life of the network. In contrast, the infrastructure assets themselves may last for a very substantial time period and the investment is normally recovered over that asset life, creating a significant mismatch between the timing of outgoing (cost) cash flows and incoming (revenue) cash flows. The financing costs for network infrastructure normally comprises a substantial proportion of its overall costs and must address this mismatch.

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5 See http://en.wikipedia.org/wiki/Fiber_to_the_node for a more detailed explanation.

6 See "Ericcson demonstrates live 100Mbps broadband on VDSL2 and GPON", Ericcson media release, 26 April 2007, at http://www.ericsson.com/au/ericsson/press/2007/20070426_broadband_vdsl2.shtml

7 Ericsson has also publicly commented in Australia that it is developing a new dynamic spectrum management technology that would increase maximum theoretical speeds to 250Mbit/s for FTTN networks within two to three years.

8 See, for example, the discussion in Graeme Guthrie "Regulating Infrastructure: The Impact on Risk and Investment" (2006) 44:4 *Journal of Economic Literature* 925.

When these economic characteristics are considered in light of the magnitude of the costs involved (which in Australia are estimated to be in the order of USD14 billion for an FTTN rollout – or roughly USD680 per head of population), the investment decision is obviously not one to be made lightly.[9]

*So when will a firm invest ?* Insights into this issue are provided by corporate finance theory. Generally, a firm should only invest in telecommunications infrastructure if it can achieve revenue cash flows over the life of the project that exceed its cost cash flows, adjusting for financing and opportunity costs. Under a standard NPV analysis, this is assessed by discounting the incremental net ungeared after-tax cash flows at a Weighted Average Cost of Capital (**WACC**) appropriate for the project. The cash flows are probability-weighted to adjust for project-specific risks.

Any investments that achieve an average return greater than the WACC are value accretive for the firm and are represented by a positive NPV. Conversely, any investments that result in an average return below the WACC are value destructive and are represented by a negative NPV. Most corporates choose between multiple investment projects based on their NPV ranking, subject to corporate budgetary constraints.

Under modern "real option" theory, the calculation of the NPV also includes the cost of options destroyed by the act of investing, as well as the value of all options created. The value of such options is time-dependent and can be calculated by such techniques as the Black-Scholes theorem. In this manner, the timing of an NGN project will affect its value by creating and removing alternative investment possibilities, particularly in a world of reducing costs, uncertain demand and rapid technological innovation.

*How is the project-specific WACC determined ?* The WACC is the financing cost of the project, calculated as the weighted average of the cost of debt and the cost of equity. The precise weighting is determined by the capital structure desired for the project: debt increases leverage while providing a benefit via tax deductible interest payments. The cost of debt is relatively stable and will depend on the credit rating of the borrower. The cost of equity is usually determined by the Capital Asset Pricing Model (**CAPM**) as the risk-free interest rate, plus a beta-adjusted market risk premium. The level of market risk for a project is represented by the beta coefficient which, in effect, indicates the potential volatility of the project returns in response to undiversifiable market (economy-wide) events.[10]

Bearing this decision-making framework in mind, risks therefore affect investment decision-making in two principal ways:[11]

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9 See, for example, Lilia Guan "Is more money needed for FTTN?", CRN Australia, 24 May 2008, available at http://www.crn.com.au/News/76701,opinion-is-more-money-needed-for-fttn.aspx

10 See World Bank *Regulatory Structure and Risk and Infrastructure Firms: An International Comparison* World Bank Policy Research Working Paper No. 1698, December 1996, p4.

11 See, for example, the discussion in Donald Lessard "Incorporating Country Risk in the Valuation of Offshore Projects" (1996) 9:3 *Journal of Applied Corporate Finance* 52.

- **Symmetric risks:** Risks with similar upside and downside impacts (e.g., changes in interest rates) will increase the overall volatility of net cash flows for the project, typically in the form of undiversifiable market risk. Such risks increase the beta coefficient so that the cost of equity increases, leading to a reduced NPV. The project must therefore earn a higher rate of return before it proceeds relative to competing projects.

- **Asymmetric risks:** Risks with detriments that substantially exceed benefits (e.g., price regulation) will directly reduce the expected net cash flows of the project and hence similarly reduce NPV. While such risks are typically project-specific and therefore diversifiable for equity investors (via portfolio theory), the expected return on equity for the NGN project will be commensurately lower. Again, the project would need to earn a higher rate of return before it proceeds relative to competing projects.

However, the level of return obtainable from telecommunications infrastructure is limited by market conditions. This return is determined by the price and volume of services supplied. Price is constrained by such factors as consumers' willingness to pay, price competition from substitutable services (e.g., wireless broadband), and regulatory constraints. Volume is a function of price under a market demand curve.

An NGN investment will not therefore proceed unless and until a firm has reasonable certainty (in light of forecast long-term market conditions and project-specific risks) that it will earn a return that exceeds its cost of its capital over the long-term, including a market risk-adjusted return on that capital.

*What are the key risks for investors in NGN infrastructure ?* Of the taxonomy of risks faced by investors, the following are most relevant to NGN infrastructure:[12]

| **Risk** | **Description** | **Symmetry** |
|---|---|---|
| Funding risk | Interest rates may increase with a resulting impact on financing costs. | Symmetric risk |
| Market risk | The NGN may not attract sufficient patronage from consumers, including if the technology becomes obsolete or competition is intense. | Mixed symmetry |
| Design risk | The NGN may not be optimally engineered or may contain material design flaws that affect its ability to deliver a quality service on a timely basis. | Asymmetric risk |

[12] See R Tinsley *Practical Introduction to Project Finance* (Euromoney, London, 2003), the relevant part of which is also available on the Internet at http://www.iaf.au.com/full.htm

| Risk | Description | Symmetry |
|---|---|---|
| Construction risk | Revenue cannot be realised until infrastructure rollout has occurred, hence delays impose costs. | Asymmetric risk |
| Operating risk | Realisation of project cash flows depends on the reliability of the technology, control of operating costs and managerial experience. | Asymmetric risk |
| Force majeure risk | The NGN is exposed to unforeseen events in the nature of *force majeure*. | Asymmetric risk |
| Regulatory risk | The project cash flows remain at risk of government regulatory intervention over the project life. | Asymmetric risk |

Of these risks, the two normally regarded as most significant for large-scale investments in telecommunications infrastructure are:[13]

- market risk, due to competitive overbuild, insufficient consumer demand and technological obsolescence; and

- regulatory risk, due to the high political visibility of telecommunications pricing and significant legacy sectoral regulation.

The magnitude of these risks explains why the structured (project) financing of telecommunications networks still remains relatively uncommon around the world today. In essence, investment in NGN infrastructure involves very substantial risks greater than those faced with other kinds of large scale infrastructure projects.

## 1.3 Conclusions on the determinants of telecoms infrastructure investment

In summary, the critical role of the Internet in the 21st century is driving demand for broadband Internet access services. Governments are also implementing policy initiatives to promote demand. However, legacy CAN infrastructure has its technological limitations. If we are to achieve a vision of ubiquitous broadband Internet access, substantial investment in NGN infrastructure will be required.

NGN investments are sunk and have a long asset lifetime, increasing their risk. Such investments will only proceed if a firm can confidently earn a return on its investment that exceeds its cost of capital over the project life. This required rate of return will depend on the risk profile of the project. The two most important risks for NGN infrastructure are market risks and regulatory risks.

The precise impact of regulatory risk on investment decision-making is analysed in further detail in chapter 2 below.

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[13] See, for example, the discussion in Richard Tinsley *Advanced Project Financing : Structuring Risks* (Euromoney, London, 2000).

# 2. The impact of regulation on investment

## 2.1 Excessive regulation as a deterrent to infrastructure investment

There are a variety of circumstances beyond generic competition law in which policy-makers have intervened in markets in the wider public interest. Telecommunications sectoral regulation is one example.

In circumstances of market failure, policy-makers reason that such regulatory intervention has the potential to offset market imperfections and restore market equilibrium conditions to their optimal result.[14] However, given the impossibility of accurately identifying the optimal regulatory intervention, the preferred policy instrument is usually determined by a cost-benefit ranking.[15] Such an approach usually involves policy-makers addressing perceived market failures by the most direct means to reduce unintended spillover effects on other markets and maximise efficiency improvements.

In this context, the potential welfare costs of inaccurate sectoral regulation are clear. Such costs arise where regulators attempt to correct market failures via a particular form of regulation, but either fail to optimally do so, create unintended market failures in other markets, and/or impose significant spillover costs. In this manner, regulatory intervention may be sub-optimal and can cause more harm than it intends to correct. The "Theory of Second Best" suggests that the scope for sub-optimal intervention is very considerable, given that any intervention in one market will typically affect the equilibrium conditions in a wide array of other markets.[16]

Well-intended regulation can similarly have unintended adverse effects. Regulatory intervention can harm investment incentives. The analysis in the previous chapter indicates that such a situation may occur if regulatory intervention increases the level of risk faced by investors without providing scope for offsetting higher returns.

*What regulation could be applied to NGN infrastructure ?* Given that telecommunications regulatory concepts tend to be technology neutral, the most likely regulation to be applied to an NGN would be a variant of existing regulation. Such regulation could involve, for example, any combination of mandated interconnection, local loop and sub-loop unbundling, cost-based access regulation, mandated leasing of conditioned access tails (e.g., bitstream services), spectrum sharing of conditioned local loop, and/or mandated resale of end-to-end services.

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14 Noting, however, the inherent risk that government intervention to correct market imperfections in one market may in fact exacerbate market imperfections in other markets: a dilemma for policy-makers.

15 See R Markovits "Second-Best Theory and the Standard Analysis of Monopoly Rent Seeking: A Generalisable Critique, a Sociological Account, and Some Illustrative Stories" (1993) 78 *Iowa Law Review* 327.

16 See M Taylor *International Competition Law* (Cambridge University Press, London, 2006), p14

To illustrate the effects of such regulation on investment, it is useful to consider mandated network unbundling and cost-based access regulation. Unbundling of the local loop at cost-oriented rates has long been regarded as best practice in global telecommunications regulation.[17] The World Trade Organisation (**WTO**) General Agreement on Trade in Services (**GATS**), for example, specifically contemplates cost-oriented unbundling in its influential Telecommunications Regulatory Reference Paper.[18]

Unbundling has been justified as promoting allocative efficiency by increasing the level of competition to which incumbent network owners are subject. Specifically, unbundling facilitates access by competitors to the CAN infrastructure of vertically-integrated network providers. Access seekers are given flexibility to bypass some infrastructure elements while obtaining exclusive use rights to remaining elements at cost-based prices. Such unbundling is intended to lower barriers to market entry while enabling competitors to aggregate sufficient customers to support the economics of a wider network rollout. In this manner, unbundling has been viewed as a "stepping stone" towards full-scale competitive infrastructure rollout.[19]

Unbundling has also been justified as addressing so-called "bottleneck" infrastructure that is uneconomic to replicate. However, while the CAN does exhibit natural monopoly characteristics (i.e., declining costs with scale), it also remains subject to technological obsolescence and competitive bypass. Indeed, there are now at least six recognised infrastructure platforms for delivering broadband Internet access into the home, namely the CAN itself, HFC cable, conditioned electricity lines, mobile networks, wireless local loop, and satellite. All of these technologies can deliver effective inter-modal competition and therefore constrain access pricing.

*Has such unbundling achieved its objective?* While unbundling has stimulated short-term competition in most nations, it can harm long-term investment incentives if it persists as more than a short-term measure. The international trend is therefore to roll back unbundling obligations as competition develops.

This trend towards such regulatory "forbearance" is summarised in the following comment by the United States Federal Communications Commission (**FCC**) in 2003:[20]

> "While unbundling can serve to bring competition to markets faster than it might otherwise develop, we are very aware that excessive network bundling

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17 See, for example, the comments regarding international best practice in *Mexico – Measures Affecting Telecommunications Services*, WT/DS204/R, Report of the WTO Panel, 2 April 2004.

18 *Reference Paper on Basic Telecommunications* as incorporated by various nations into their respective Schedules of Specific Commitments forming part of the Fourth Protocol to the *General Agreement on Trade in Services* (adopted 30 April 1996, entry into force 5 February 1999).

19 See Harald Gruber "European sector regulation and investment incentives for broadband networks", March 2007, available at http://web.si.umich.edu/tprc/papers/2007/662/TPRC%20Gruber.pdf

20 See FCC, above n 1.

> requirements tend to undermine the incentives of both incumbent LECs and new entrants to invest in new facilities and deploy new technology."

In 2006, the FCC subsequently moved to eliminate mass-market switching in the context of network unbundling with the following reasoning:[21]

> "[We] conclude that the disincentives to investment posed by the availability of unbundled switching, in combination with the unbundled local loops and shared transport, justify a nationwide bar on such unbundling".

This rationale for such forbearance is well explained in the literature:

- Professor Gregory Sidak commented in a 2006 journal article that the FCC implementation of unbundling lead to "tens of billions of dollars of investment flowing into business models that were neither particularly innovative nor sustainable in the absence of regulatory distortions in their favour. That distortion of investment represented a staggering destruction of wealth."[22]

- Professors Philip Gayle and Dennis Weisman concluded in a 2007 article that "the numerous CLECs in the U.S. proceeded to lose billions of dollars when the FCC's introduction of UNE-P along with artificially low prices for network elements resulted in what was *ultra-free-entry*" and "policies that reward imitation rather than imitation will attract those market entrants adept at innovation, predominantly arbitragers, while driving away genuine innovators".[23]

In summary, while sectoral regulation of telecommunications is justified as correcting market failures arising from imperfect competition, care must be taken to ensure that such regulation is only introduced if it results in net efficiency gains. Furthermore, while regulation may initially be beneficial, it may become detrimental if it persists in circumstances where it is no longer required.

Importantly, the crux of the issues that have been encountered with local loop unbundling concern the price at which access is provided to unbundled network elements. These access pricing issues are central to the impact of regulation on investment and are considered in further detail below.

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21 Federal Communications Commission Order on Remand, *FCC#04-290*, 4 February 2005 2003, 18 FCC Rcd 16978, page 110, available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-290A1.pdf

22 See Gregory Sidak "A Consumer-Welfare Approach to Network Neutrality Regulation of the Internet" (2006) 2 *Journal of Competition Law & Economics* 4, p55.

23 See Philip Gayle & Dennis Weisman "Efficiency Trade-Offs in the Design of Competition Policy for the Telecommunications Industry" (2007) 6:3 *Review of Network Economics* 321.

## 2.2 Criticisms of cost-based incentive pricing : TELRIC and TSLRIC models

The precise impact of unbundling on investment tends to be a function of the price at which access is provided to the unbundled infrastructure. The selection of that price can be perceived as a balancing exercise between promoting allocative and dynamic efficiency:

- If the access price is set too low, a firm will have a reduced incentive to invest in new infrastructure : hence *dynamic* efficiency will be impeded.

- If the access price is set too high, a firm will face less competition and have greater market power to set prices at levels that maximise its profits : hence *allocative* efficiency will be impeded.

Most nations have sought to balance allocative and dynamic efficiency by adopting so-called "incentive regulation". Such regulation is designed to mimic competitive markets by constraining prices at a level consistent with that which would otherwise be imposed by competition.

The United States has historically used a form of incentive regulation known as "Total Element Long Run Incremental Cost" (**TELRIC**). Australia currently uses essentially the same concept, but calls it "Total Service Long Run Incremental Cost" (**TSLRIC**).[24] Both pricing models determine prices that are based on the incremental costs faced by a hypothetical efficient cost-minimising firm with an optimally configured network that uses the best available current technology. The key constraint on the design of that hypothetical network is that the locations of key parts of the network are assumed to be the same as the regulated firm's existing network.[25]

In this manner, the pricing of access is determined not by the network provider's need to achieve a return on its historic capital costs, but rather by a forward-looking model in which the only costs recoverable are those that would be incurred by a hypothetical efficient firm. The policy rationale behind this approach is that a network provider in a competitive market would be constrained in its price recovery by the price of its most efficient competitor (whom is assumed to have rolled out the most efficient possible network and aggressively undercut the incumbent's pricing).

In theory, if the TELRIC approach were applied accurately, any investment in network infrastructure would generally realise an NPV close to zero. This is because the firm would not earn above the project WACC. Professor Robert Pindyck explained this in a statutory declaration in the following terms:[26]

> "The TELRIC pricing methodology relies on the simple Net Present Value (NPV) investment rule. The NPV rule states that a firm should invest in a project if the

[24] In this paper, a reference to TELRIC is also intended to mean a reference to TSLRIC.

[25] This is known colloquially as "scorched node" as opposed to "scorched earth".

[26] See "Declaration of Robert Pindyck Before the Federal Communications Commission", WC Docket No. 03-173, 12 December 2003.

> sum of the discounted cash flows (the NPV) from the project is positive. TELRIC is designed to produce prices that price an ILEC with a competitive return, i.e., with no profits in excess of those that would arise in a competitive market. In other words, under TELRIC the expected NPV of the included costs at any given discount rate is zero. The theory behind the TELRIC methodology is that, if the NPV was greater than zero, additional firms would enter until excess profits were driven to zero".

It is therefore not surprising that investments in new infrastructure are deterred. By investing in a project subject to TELRIC pricing, the firm is exposed to little upside to create shareholder value. Rather, the firm is exposed to significant downside that could destroy shareholder value. In such circumstances, a firm would be better to invest its money in alternative positive NPV projects that do create shareholder value.[27]

Beyond this immediate NPV = 0 issue, there are also a range of other difficulties with the application of TELRIC pricing in a telecommunications context that create significant asymmetric downside risk and therefore further reduce the NPV:

- **Rapid technological innovation and regular cost reviews:** A key characteristic of modern telecommunications technology is that its price is continuing to decline over time for a given level of network functionality. If TELRIC pricing is constantly reassessed at regular intervals, such declining prices will mean that a firm will never recover the initial cost of its investment. The firm can only recover its costs to the level of the cost of the best available technology at the time of the review.

  Generally, the shorter the TELRIC review period and the faster the rate of technological innovation, the greater the risk to the firm that it will not recover its actual costs. Professors David Mandy and William Sharkey identified in 2003 that the magnitude of this potential cost under-recovery was very considerable:[28]

  > "When TELRIC prices are recomputed at intervals shorter than asset lives, the firm will generally not earn the target rate of return. In these cases, a correction factor must be applied to the TELRIC price path in order for revenues to exactly recover investment cost, including the target rate of return. When asset prices are falling 11% per year, the TELRIC correction factor is approximately 50%".

- **Regulator always has the benefit of perfect hindsight:** In making its investment decision, the firm will have imperfect information regarding future demand. A margin of error will likely be included in the network

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27 See Jerry Hausmann "The Effect of Sunk Costs on Telecommunications Regulation", Columbia University Conference Paper, 20 October 1998.

28 See David Mandy & William Sharkey "Dynamic Pricing and Investment from Static Proxy Models" (2003) 4:2 *Review of Network Economics* 403, p437.

design to avoid the risk of under-dimensioning in light of uncertain demand forecasts.

In contrast, the regulator will have the benefit of perfect hindsight. At the time it makes its regulatory decisions, it will know actual traffic patterns and will be able to ascertain the optimal network to meet those patterns. This difference in information means that the firm will likely be held to a standard of network design that it cannot practically achieve, resulting in some of its costs being disallowed.

- **Competitors share in rewards but not risks:** In making an investment in new infrastructure, the firm is exposed to the market risk that its demand forecasts are incorrect. If the network is a failure, it alone will bear the cost of that failure. However, if the investment is a success, the firm will be subject to access requests from competitors wishing to share in that success at cost-based access prices. In this manner, the firm is facing a project return profile with an unlimited downside risk but a limited upside benefit. Such a truncated return profile will negatively skew the NPV calculation and is not conducive to promoting investment.[29]

  Furthermore, the disincentive to invest is even more acute when considered from the perspective of "real option" theory.[30] The firm must make a long-term substantial irreversible investment, so is committed to its investment for the life of the network. The firm therefore foregoes the value of an option to wait for lower cost technology and is exposed to the downside risk that forecast demand does not materialise. In contrast, the access seeker retains flexibility and has a valuable option to enter or exit the industry at will – or to roll-out its own infrastructure with a cheaper technology should the demand forecasts be proven correct.

- **Free-riding and disincentives for competitors to invest:** Not only will TELRIC pricing create a disincentive for the firm to invest (for the reasons identified above), but the pricing will also create a significant disincentive for *access seekers* to invest. In this manner, everyone in the industry will have a similar incentive not to undertake the relevant investment.

  In particular, access seekers will rank the NPV of the various investment options when making their investment decisions. A rational access seeker will always prefer to undertake a strategy which delivers the highest NPV. The access seeker will not wish to incur the significant capital cost and long-term risk involved in rolling out its own infrastructure, if that access seeker can obtain immediate access to the network elements it needs at a TELRIC price consistent with that of the best technology available. The access seeker

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29 See David Flacher, Hugues Jennequin & Jean-Herve Lorenzi "Innovation, Investment and Regulation: What are the Options for Regulation in the Near Future?" (2006) 64:4 *Communications & Strategies* 105.

30 See Robert Pindyck "Mandatory Unbundling and Irreversible Investment in Telecom Networks" (2007) 6:3 *Review of Network Economics* 274.

will generally be better-off free-riding on the investment by the network owner rather than rolling out its own competing infrastructure.[31]

- **Regulatory error:** In addition to the issues identified above, it is also the case that regulators are not perfect and may exhibit a natural bias in favour of the market entrant or may be prone to error. Professor Henry Ergas summarised these issues in the Australian context of "bottom-up" cost estimation in the following manner:[32]

> "The hypothetical, difficult to verify, nature of the resulting "bottom up" estimates exposes the firm to added regulatory risk, as the regulator's discretion with respect to costs increases the scope for regulatory opportunism. Adding to the risk that [this] creates is the risk of error in the calculation of the various elements of the TSLRIC [/TELRIC] model.
>
> This risk of error reflects the sheer number of interacting assumptions on which any such hypothetical cost model must rely. As errors can be made in each of these, the firm may be exposed to having its income reduced (so as to reflect "optimisation" by the regulator of its costs) by an amount that is only an approximation – and may be a very poor approximation – of the *actual* gap between its costs and the costs that would be incurred by an efficient firm.
>
> Combined, periodic re-optimisation, limited verifiability and measurement complexity (and associated measurement error) inevitably expose the regulated firm to greater income risk than it would bear under a less discretionary approach to cost estimation. The access provider may experience:
>
> - Asset stranding from "*actual*" gaps between the *expected* optimised asset value in each period (that expected value being the basis for the depreciation charge) and the properly measured optimised asset value in that period;
> - Asset stranding from *measurement error* – that is, from incorrect estimation of the difference between the expected optimised asset value in a period and the actual asset value in that period; and
> - Asset stranding from *regulatory opportunism* – that is, from the regulator using the discretion inherent in limited verifiability to reduce the firm's income stream by arbitrarily writing off some part of its assets; as well as
> - *Interactions* between all of these."

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31 See Guthrie, above n 8.

32 See Henry Ergas "Telecommunications Access Pricing: The Australian Experience", unpublished paper, 24 January 2008, an electronic copy of the paper is available from the following Internet link: http://www.greenwhiskers.com.au/publishgw/reports_papers_telecomm/Telecommunications_access_pricing.shtml, pp 6-7.

Given these concerns, it is not surprising that Professors Robert Crandall & Gregory Sidak commented in a June 2007 review of the literature on mandatory unbundling that "*the net effect of mandatory unbundling on dynamic efficiency (investment by both entrants and incumbents) is therefore unequivocally negative*".[33]

## 2.3 Conclusions on the impact of regulation on investment incentives

In summary, international best practice in telecommunications regulation has historically favoured a high degree of network unbundling with the associated application of cost-based access regulation. While such regulation has promoted market entry and services-based competition, it has impeded infrastructure investment and longer-term facilities-based competition. The optimal regulatory approach should be to wind-back sectoral regulation as competition develops so as to preserve long-term network investment incentives.

The example of local loop unbundling demonstrates that care is required in the application of telecommunications price regulation to ensure that an optimal balance is achieved between allocative efficiency and dynamic efficiency. While TELRIC pricing was intended to achieve this balance, it is now clear that it has significantly impeded dynamic efficiency:

- First, TELRIC generally approximates an NPV = 0 scenario, hence the firm would usually prefer alternate NPV positive projects that are value accretive.
- Second, if TELRIC is recomputed at intervals shorter than the asset life (which may be decades for networks), rapid technological innovation will prevent a firm recovering its initial costs.
- Third, the regulator will have the benefit of perfect hindsight so there is no margin for inevitable forecasting errors.
- Fourth, the investment risk profile is inherently asymmetric : the firm must bear all the downside risk, but must share the upside benefit.
- Fifth, competitors can free-ride on the firm's infrastructure at a lower cost than they can roll-out their own competitive infrastructure, so have a disincentive to invest.
- Finally, complex TELRIC modelling remains generally prone to regulatory error and the exercise of regulatory discretion against the network owner.

In light of these factors, it is not surprising that TELRIC pricing has deterred investment.

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[33] See Robert Crandall & Gregory Sidak "Is Mandatory Unbundling the Key to Increasing Broadband Penetration in Mexico? A Survey of International Evidence", electronic copy available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=996065

# 3. An Australian case study in excessive regulation

## 3.1 Failure to roll-back regulation as competition has evolved

As a geographically vast country with a highly dispersed population, located at a great distance from its trading partners, Australia depends heavily on the quality, efficiency and innovativeness of its telecommunications system. As the Australian Productivity Commission commented in a 2001 review of telecommunications regulation:[34]

> "A key policy concern is that Australia has appropriate investment in telecommunications facilities — reflecting the increasing importance of broadband and other telecommunications services to the future growth of the Australian economy and our standard of living. Accordingly, it is important to ensure that the access regime does not overly weaken the incentives for access providers to invest in core infrastructure."

However, partly reflecting the issues raised in the previous chapter, attracting sufficient funds for investment in fixed telecommunications infrastructure has been a significant challenge in Australia. In a 2004 report, the Australian Communications and Media Authority (**ACMA**) commented in relation to the deployment of new wireline telecommunications technologies:[35]

> "The greatest barrier to deployment of these services is likely to be the cost and scarcity of investment funding for such projects, particularly wireline and optical fibre cable infrastructure requiring significant capital works, and scarce radiofrequency spectrum resources."

Ironically, this comment by the ACMA was made at a time when credit markets were flush with funds and Australia was experiencing a dramatic investment boom. The author believes that the issue was not so much a scarcity of investment funding, but rather that investors were allocating their financing to projects that provided a better return. In effect, the level of regulation imposed on wireline infrastructure in Australia has acted as a significant deterrent to investment.

*What type of regulation is applied to wireline infrastructure in Australia ?* Australia was one of the earlier countries to liberalise its telecommunications sector, commencing this process in 1991. By 1997, significant progress had been made and Australia enacted a second stage of legislative reforms. Relevantly, Australia decided against the concept of a "reference interconnect offer" (**RIO**) as now adopted in many jurisdictions. Rather, a sectoral telecommunications access regime known as "Part

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34 See Productivity Commission *Telecommunications Competition Regulation Productivity Commission Inquiry Report,* Canberra, 21 December 2001, an electronic copy of the report is available at the following link: http://www.pc.gov.au/inquiry/telecommunications/docs/finalreport

35 See Australian Communications Authority *Telecommunications Performance Report 2003-04*, Canberra, 2004, p21.

XIC" was enacted into Australia's generic federal competition statute known as the *Trade Practices Act 1974 (Cth)*.

Part XIC enables Australia's federal competition regulator, the Australian Competition and Consumer Commission (**ACCC**), to "declare" various wholesale telecommunications infrastructure and carriage services after a formal public inquiry on the basis that the declaration is in the "long-term interests of end-users" (**LTIE**).[36] Following declaration, various "standard access obligations' (**SAOs**) apply that, in essence, require the service to be supplied on request to access seekers on a non-discriminatory basis.[37] There are currently around 12 declared services in Australia and they include unbundled network elements.[38]

An important consequence of declaration under Part XIC is that, if the access seeker and access provider cannot agree on any aspect of the supply of a declared service, either party may notify the ACCC and seek arbitration.[39] Most access arbitrations are lodged by access seekers and relate to the price at which the declared service is supplied. As at June 2008, there were just under 30 access arbitrations before the ACCC, of which three-quarters were lodged against Telstra Corporation as the incumbent.

The ACCC has published non-binding general pricing principles as well as non-binding pricing principles for each declared service. The ACCC applies these pricing principles when making arbitral determinations. The favoured pricing methodology since 1997 has been TSLRIC pricing (i.e., TELRIC), but with some deviations for specific services.

The crux of the concern in Australia is not so much with the imposition of unbundling and access regulation under Part XIC, but rather with the application of TSLRIC pricing by the ACCC to the declared services. As a consequence, there has been a notable distortion of investment away from regulated services and infrastructure towards unregulated services and infrastructure in Australia.

Telstra Corporation articulated those concerns in an April 2005 submission to the Australian Senate in the following terms:[40]

> "Telstra is concerned that Australian policy-makers and regulators have been overly preoccupied with promoting short-term competition without focussing on the need

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36 Section 152AL(3), *Trade Practices Act 1974 (Cth)*.

37 *Ibid*, section 152AR.

38 The Part XIC declared services currently include, for example, PSTN originating and terminating access, mobile terminating access, unbundled local loop services, spectrum sharing services, various transmission routes, wholesale line rental, and local call resale.

39 Section 152CM, *Trade Practices Act 1974 (Cth)*.

40 See "*Inquiry into the Performance of the Australian Telecommunications Regulatory Regime*" Submission by Telstra Corporation Limited to the Senate Environment, Communications and the Arts Committee, 8 April 2005. An electronic copy of Telstra's submission is available at the following Internet URL: http://www.aph.gov.au/senate/Committee/ecita_ctte/completed_inquiries/2004-07/trr/submissions/sub25.pdf

> to promote long-term investment. As a result, there are now significant regulatory disincentives to investment in the Australian telecommunications industry."
>
> "In Telstra's view, such a distorting effect is partly inherent in the costing methodology adopted by the ACCC, and most notably its emphasis on optimisation within a Total Service Long Run Incremental Cost ("**TSLRIC**") framework. Telstra does not believe that the TSLRIC standard is appropriate for setting access prices. If the access regime is designed to maximise the long-term interests of end users, then competitors must be provided with a price signal that will encourage efficient investment both by entrants and the incumbent. The cost of access to the incumbent network should not be priced too low."
>
> "The costs this imposes in terms of foregone competition are obvious. It is also important to note that this creates a self-perpetuating burden of regulation: regulatory distortions prevent new facilities from being committed to the market; the fact that there are not such facilities is then used by the ACCC as being grounds for continuing to regulate."

The last insight from Telstra's submission is particularly important. Not only is the regulatory regime creating a disincentive for investment; but the fact that such investment has not occurred has historically been used by the Government and regulators as justification to perpetuate and continually strengthen the regulatory regime. This further regulation has yet further exacerbated the risk of investing in new infrastructure, thereby feeding a vicious cycle.

In this manner, Australia has been caught in a upwards spiral of increasing sectoral telecommunications regulation which, only now, seems to be dissipating (although not without current calls for the formal structural separation of Telstra). This spiral of increasing regulation has occurred even though the level of competition in Australian telecommunications markets has dramatically increased since 1997 to the extent that most of Australia's telecommunications markets are now workably competitive. According to international best practice and economic theory, the level of sectoral regulation should actually have been rolled back as competition developed.

Telstra tactfully noted these issues in its submission in the following terms:[41]

> "The scale and scope of regulation currently present in Australia is now excessive by international standards relative to the level of competition in Australian telecommunications markets. International best practice supports a level of regulation closely tailored to the level of competition and directed at instances of manifest market failure. As competition develops, regulation should be reduced commensurately. Australia has not properly adjusted its regulation to reflect the development of competition so now over-regulates its telecommunications sector by world standards".

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41 Ibid, n 40.

### 3.2 Refinements to the regulatory regime to promote greater investment

For *existing* infrastructure, there is little risk to regulators that such infrastructure will be removed if excessively low access prices are imposed. The cost of such infrastructure is sunk. For existing infrastructure, low access prices will largely transfer value from the infrastructure owner's shareholders to the shareholders of access seekers. Any impact on investment is limited to ongoing maintenance of the network.

However, the situation is very different for *new* infrastructure. If excessively low access prices are imposed, the infrastructure owner has the ability to avoid incurring the sunk cost by not undertaking the investment. In this manner, low access prices will likely result in the infrastructure not being built. Low access pricing therefore has a direct and disproportionate impact on the rollout of new infrastructure.

The potential adverse impact of Part XIC on investment was recognised in Australia as early as 2001, only four years after its enactment. In a comprehensive review of the telecommunications regulatory regime in 2001, the Australian Productivity Commission commented as follows:[42]

> "Mandated access still presents formidable regulatory risks to investors. Telecommunications technology and markets are rapidly moving and very risky... For a carrier making a new investment, the risk of future declaration - with regulated access prices - may lead to the delay or termination of the planned investment. This is because access regimes may truncate the returns from risky investments."

The Productivity Commission made a series of recommendations to promote investment, principally the adoption of an "access holiday" regime.

Australia subsequently adopted an access holiday regime partly in reaction to the perceived failure of an existing mechanism in Part XIC known as "access undertakings". The concept behind an access undertaking was that an access provider (normally Telstra) would make a binding offer, negotiated in advance with the ACCC, to supply services at a pre-determined price. Such access undertakings were to be an important element of Part XIC for increasing investment certainty. In introducing the 1997 legislation, the Minister observed that:[43]

> "The Government will also be encouraging the larger access providers to submit an access undertaking for ACCC acceptance. This would both improve the certainty surrounding the terms and conditions on which those persons must comply with the access obligations and provide increased certainty for access seekers."

The subsequent failure of the access undertaking regime arose partly because Telstra and the ACCC did not normally negotiate the undertakings before Telstra

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42 See Productivity Commission, above n 34

43 See the Explanatory Memorandum to the *Telecommunications Bill 1997 (Cth).*

lodged them out of probity concerns. In this manner, the ACCC was faced with little choice but to reject an access undertaking if it encountered an issue of concern. Furthermore, because the ACCC took substantial time periods to review the undertakings before rejecting them, they were often outdated by the time the ACCC had made its decision. The time periods for review of undertakings were also exacerbated by rights of appeal. Telstra commented in its 2005 submission:[44]

> "Telstra believes that the ACCC administered Part XIC in a way that made it particularly unattractive for access providers to offer access undertakings. The ACCC's process for reviewing access undertakings proved to be extremely lengthy, involving continuing pressure for the release of substantial amounts of confidential information. The ACCC also rejected almost every access undertaking it considered."

Of the many undertakings lodged by various parties only three have been accepted. As Professor Henry Ergas comments "*one that merely copied the indicative prices issued by the ACCC immediately prior to the undertaking being lodged, while another had very short duration (and was accepted on the basis of this fact).*"[45] The only other undertaking that was accepted by the ACCC was an access undertaking given by Telstra Multimedia in the context of analogue cable television. Unlike other undertakings, it had been negotiated with the ACCC in advance in the context of a major commercial transaction. However, that undertaking was agreed outside the Part XIC framework.

On 10 December 2002, Parliament enacted the *Telecommunications Competition Act 2002 (Cth)* to address the perceived difficulties with Part XIC. The amendments relevantly included the "access holiday" procedure recommended by the Productivity Commission, now known in Australia as an "anticipatory individual exemption".[46] A carrier could apply to the ACCC for an exemption if it would promote LTIE, subject to any conditions imposed by the ACCC.

However, the exemption regime met immediate difficulties the first time it was used. As Telstra recounted in its submission in 2005:[47]

> "Telstra and Foxtel applied for an exemption order from the ACCC in relation to the digitisation of the Telstra's HFC cable television network. An exemption order was granted by the ACCC on the basis of an extensive access undertaking. Significant time was spent negotiating that undertaking with the ACCC, including in the context of addressing concerns arising from market inquiries. Digitisation proceeded on the basis of this exemption order at considerable cost. However, the ACCC's decision to grant an exemption was subsequently overturned on appeal, well down the track after digitisation had occurred - exposing the parties to considerable regulatory risk."

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44 See Telstra, above n 40.

45 See Ergas, above n 32.

46 Section 152ATA, *Trade Practices Act 1974 (Cth).*

47 See Telstra, above n 40.

After lodging the application for an exemption, Telstra and Foxtel had proceeded with the rollout of digital cable television before an appeal in relation to the grant of the exemption had been determined. Furthermore, Telstra and Foxtel had made a range of statements in the public domain regarding their intention to rollout digital television without qualifying these by the need for an anticipatory individual exemption. The Australian Competition Tribunal therefore determined that the investment would have proceeded regardless of the exemption, hence the exemption was not necessary for the investment to proceed. The Tribunal overturned the ACCC's grant of the exemption.[48]

Ironically, the Productivity Commission had used the Telstra and Foxtel digitisation as a key example of the need for the "access holiday" mechanism in the first place:[49]

> "News, as one of three FOXTEL shareholders, is currently considering whether to make an investment in digital subscription television broadcast carriage services, by cable (digital pay TV services). The discussion amongst the FOXTEL shareholders has proceeded on the assumption that the investment will be made in an environment in which access may need to be provided to digital pay TV carriage services. However, the uncertainty which is inherent in the processes makes it difficult, at best, and impossible, at worst, for News to predict the terms and conditions of access and the financial and business consequences thereof. Consequently, the likelihood of further investments decreases."

Not surprisingly, no further applications were made to the ACCC for anticipatory exemptions. Following the Tribunal decision, they would only be effective if an access provider delayed its investment until the exemption had been granted and any appeals of that decision were resolved. This could take in excess of two years. Ironically, the mechanism intended by the Australian Government to facilitate investment had the unfortunate converse impact of further impeding it.

### 3.3 The proposed Fibre to the Node network

Issues with the application of Part XIC came to a head between Telstra and the Government during 2006 and 2007 in the context of the rollout of Telstra's proposed FTTN network.

Given the perceived difficulties with Part XIC, Telstra indicated it was not intending to seek an anticipatory individual exemption from the ACCC. Rather, Telstra sought to enter into negotiations directly with the Government. In a December 2005 media release, Telstra commented:[50]

> "Telstra will begin building its new IP broadband network as soon as next year if its shareholders' investment is protected from regulations that would otherwise allow competitors to piggyback on the multi- billion dollar project."

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48 *Re Seven Network Limited (No 4)* [2004] ACompT 11 (23 December 2004).

49 See Productivity Commission, above n 34.

50 See "Telstra seeks investment certainty for new IP network", Telstra media release, 1 December 2005, http://www.telstra.com.au/abouttelstra/media/announcements_article.cfm?ObjectID=36016

> "At an investor briefing in Sydney, Mr Burgess said Telstra would be seeking legislative reforms before proceeding with the network upgrade. He said existing laws designed to give companies certainty before going ahead with major new investments were inadequate because the processes were slow and cumbersome, with decisions subject to challenges that would delay plans by at least two years."

According to media speculation, negotiations between Telstra and the Government over the rollout of an FTTN network occurred throughout much of 2006. Telstra's stated intent was that the Government would enact legislation that disapplied Part XIC to Telstra's investment : effectively providing an access exemption by way of specific legislation. These negotiations were conducted behind closed doors.

After many months of negotiations, it became clear that the Government and Telstra were unable to reach agreement. In August 2006, Telstra announced it would not continue with its proposal to roll out FTTN infrastructure as it had been unable to reach agreement with the ACCC on pricing and access issues.[51] In a share offer prospectus released later in 2006, Telstra included the following comment:[52]

> "Telstra seeks a competitive rate of return when it invests its capital. If Telstra cannot be confident that ACCC regulation of prices for competitor access to a new network will allow a competitive rate of return, Telstra will not invest in the network. This year, Telstra planned to start building a $3 billion FTTN network. However, Telstra disagreed with the ACCC on the price its competitors should pay for access to the network and, as a result, Telstra decided not to build the network."

Meanwhile, a consortium comprised of Telstra's competitors (known as "G9") announced a rival proposal to build its own FTTN network.[53] The G9 proposal required the Government to enact legislation that involved a prohibition against Telstra overbuild and required the forced cutover of Telstra copper to the new network at ACCC determined cost-based rates.

During 2007, the FTTN network became a significant issue in Australia's federal election. The Minister for Communications (Hon Helen Coonan) announced that a tender process would be established. Few parties subsequently expressed serious interest, leaving G9 and Telstra as the only potential bidders. Some notable investors cited excessive regulation as a deterrent towards investment.

The Liberal Government under Australian Prime Minister John Howard lost Australia's 2007 Federal Election and a Labour Government under Australian Prime Minister Kevin Rudd came to power on 3 December 2007. The new Minister for Communications (Hon Stephen Conroy) terminated the previous FTTN tender procedure and substituted a new procedure.

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51 See, for example, a letter by Telstra to the Australian Stock Exchange titled "Transcript from Telstra Fibre to the Node Briefing", dated 7 August 2006, an electronic copy is available from Telstra's website at http://www.telstra.com.au/abouttelstra/investor/docs/tls442_fibretothenodetranscript.pdf

52 See "Telstra 3 Share Offer Prospectus", 9 October 2006, a copy of which is available at http://www.t3shareoffer.com.au/docs/Telstra3ShareOfferProspectus.pdf

53 See Chris Jenkins, "Telstra rivals prepare to build fibre network", The Australian, 7 December 2006, at http://www.theaustralian.news.com.au/story/0,20867,20883863-643,00.html

On 11 April 2008, the Government announced the release of a Request for Proposals to roll out an Australian NGN that would cover 98% of Australia's population with a minimum bandwidth of 12Mbit/s into the home.[54] The Government indicated it would make a funding contribution of up to USD4.4 billion to establish the NGN.[55] The total cost of the NGN has been estimated at up to USD14 billion.

The tender process is confidential, so precise details are not known. However, there are speculated to be up to 8 potential bidders that have lodged bonds with the Government. Bidders are required to include a detailed description of new or altered legislative provisions that they are seeking, suggesting the Government will enact legislation to support the favoured NGN investment proposal. Some of these proposals may request that the NGN is exempted from the application of Part XIC.

## 3.4 Insights from the Australian case study

In Australia, regulation has persisted, even increased in some cases, as competition has increased. Such regulation has deterred investment by the incumbent. Such regulation has also deterred long-term infrastructure investment by market entrants by enabling them to obtain access to existing infrastructure at a materially lower cost than if they rolled out infrastructure themselves. While this has promoted short-term market entry, it has created a market dependence on continued access regulation: arguably at the expense of the development of long-term infrastructure-based competition.

Australia recognised the problems that Part XIC created for investment at an early stage and sought to create an access holiday regime. However, investment is sensitive to uncertainty and time delays and the new regime suffered both problems. As a consequence, Telstra sought to bypass Part XIC by negotiating directly with the Government. However, the apparent continued emphasis by the ACCC on TSLRIC pricing appears to have been a deal breaker for Telstra. Ultimately the issue became highly politicised. Infrastructure rollout will likely now occur in the form of a public-private partnership supported by partial Government funding.

Given this outcome, the existing Australian regulatory regime has undeniably failed to achieve one of its stated objectives of "achieving economically efficient investment in infrastructure".[56]

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54 See Hon Stephen Conroy "Government invites National Broadband Network proposals", Ministerial media release, 11 April 2008,a copy of the media release is available at the following Internet link: http://www.minister.dbcde.gov.au/media/media_releases/2008/government_invites_national_broadband_network_proposals

55 See Department of Broadband, Communications and the Digital Economy "Request for Proposals to Roll-out and Operate a National Broadband Network for Australia", Request for Proposals Number DCON/08/18, 11 April 2008.

56 Section 152AB(2)(e), *Trade Practices Act 1974 (Cth).*

# 4. Techniques to promote infrastructure investment

There are a range of examples internationally and in other industries where appropriate incentives have been created to encourage large-scale infrastructure investment by reducing the level of regulatory risk. Of the various mechanisms adopted, the most common are:

- the sharing of regulatory risk between the public and private sector via binding governmental commitments (enforced by compensation), as frequently occurs in public-private partnerships; and

- access holidays, typically providing certainty that a network owner will earn a positive NPV sufficient to justify the infrastructure rollout.

Both of these techniques are considered in further detail below.

Project financing structures also utilise techniques such as third party insurance as a means of mitigating regulatory risk for financiers. Such insurance is usually known as "political risk insurance" and is normally directed at the most extreme forms of regulatory risk, such as expropriation of assets and currency inconvertibility.

## 4.1 The public-private partnership model

As identified earlier in this paper, large-scale infrastructure projects involve significant risks. A wide range of stakeholders are involved in such projects whether by contributing debt or equity, or by contributing goods or services. An underlying principle guiding the negotiation of the contracts between these parties is that the project risks should be allocated to those parties best placed to control or manage them.[57] In this manner, the level of risk should be reduced and the NPV of the project should increase.

A relatively recent legal innovation in many countries has been the formal development of integrated "public private partnerships" (**PPPs**) to reduce the financial burden on the public sector while increasing the efficiency of service delivery. The OECD defines technology PPPs as "*any innovation-based relationship whereby public and private actors jointly contribute financial, research, human and infrastructure resources, either directly or in kind*".[58] PPPs often benefit from concessions given by government, including tax concessions, lump-sum subsidies, low-interest loans, long-term contracts, and favourable regulatory arrangements.[59]

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57 For example, engineering and design risk is allocated by contract to specialist engineers.

58 See OECD "Public-Private Partnerships in Science and Technology" in STI Review No.23, Special Issue on Public/Private Partnerships in Science and Technology, 1999, OECD, Paris.

59 The United Nations and World Bank are actively promoting a number of network rollout PPPs with a focus on developing nations. However, it is also true that many OECD governments, including the United States, are actively subsidising broadband roll-outs to their own rural areas.

A PPP is best described as a set of contractual arrangements between public and private sector entities to deliver cost effective and high quality services to the public over an extended time period.[60] A PPP is flexible and its structure varies according to the type of service delivered. PPPs typically arise in relation to projects that neither the private nor the public sector can efficiently undertake on their own. Each party contributes its skills and expertise and shares in the risks and rewards.

A key feature of PPPs is an overriding principle of risk redistribution: participating entities should bear those risks that they are best placed to control or manage, assuming that the relevant risk cannot be avoided. Under this principle, a party will bear a risk where it is within that party's control and/or which it can most efficiently manage relative to other parties (including by passing the risk to third parties). In effect, the party bearing the risk will therefore be the party that can best control and/or manage that risk at the least overall cost. The allocation of risk between the public and private sector is typically documented in a contract known as a "concession agreement".

Relevantly, the government normally bears a substantial proportion of the regulatory risk associated with large PPP projects. This is primarily because:

- regulatory risks arise as a result of governmental action, hence the government will normally have the political and legal power to prevent adverse regulatory events occurring; and

- if adverse regulatory events do occur, the government can most efficiently bear such risks by pooling and spreading the associated cost of compensation across tax payers (such spreading of risk appropriate if the government has determined that regulation is required in the public interest).

In a federal constitutional structure, such as Australia, it is not always the case that the federal government will have the power to prevent regulation being imposed by a State government, hence there are limits to the extent to which State-derived regulatory risk is appropriately borne by the federal government. However, the enactment and application of federal telecommunications regulation is clearly a matter that is properly within the control of federal government.

A key aspect of regulatory risk derives from the potential for a change in government, particularly if a different political party comes into power and implements a change in law and policy. The government may unilaterally change the regulatory framework in a manner which reduces the project NPV. While a government cannot normally bind its successors not to enact certain legislation, it is normally possible for a government to enter into a contract providing compensation (including by successor governments) if certain regulatory events occur. The government therefore normally assumes any regulatory risk via a compensation or

60 See, for example, the explanation at http://en.wikipedia.org/wiki/Public-private_partnership

indemnification arrangement, although the precise scope of that arrangement is subject to commercial negotiation.

*What insights do PPPs provide for NGN projects ?* A key characteristic of NGN projects is their high degree of exposure to regulatory risk. As evidenced by the Australian experience with FTTN, such risks can be sufficiently great as to render the NGN project uneconomic. By reducing the regulatory risk, the NPV of the NGN project will increase and it will be more likely to proceed relative to competing projects.

The key insight from PPPs is that it is possible to reduce regulatory risk via a binding contract between the public and private sector. In effect, the private sector will agree to rollout an NGN network in the wider public interest to a certain quality and with certain socially desirable characteristics. In consideration, the government will agree not to impose certain forms of regulation on that network (e.g., price controls) and will back up this agreement via compensation payable if the regulation is imposed.

As identified by Professors Joshua Gans and Stephen King (the latter now being a well respected Commissioner at the ACCC), the key issue being addressed by this arrangement is one of an *ex ante* regulatory commitment. They comment:[61]

> "How does a regulator commit not to effectively expropriate an investment by setting a low allowed price or rate-of-return after the infrastructure expenditure is sunk? This research has highlighted the importance of legal constraints on regulators, the design of appropriate regulatory institutions and the potential for a regulatory "contract" to form between infrastructure owners and regulators."

In essence, a NGN will be more likely to proceed if the private sector can obtain a meaningful binding contractual commitment (enforced via compensation) from the government that it will not be subjected to value-destructive regulation that will result in a negative NPV.

## 4.2 Access holidays in Australia

A specific form of binding commitment given by the government to the private sector to promote investment is an "access holiday". An access holiday is a defined period of time within which new infrastructure investment is exempted from some or all access regulation. Typically, the access holiday mechanism is enacted into law as a statutory exemption to an existing legislated access regime.

The benefits of an access holiday were covered in detail in the 2003 article by Professors Gans and King noted above. This article has subsequently proved highly influential in the international literature on access holidays. Professors Gans and King commented in the following terms:[62]

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61 See Joshua Gans & Stephen King "Access Holidays for Network Infrastructure Investment" (2003) 10:2 *Agenda* 163, p163.

62 Ibid, n 61.

> "We believe that the case for adopting an access holiday is [strong]. The need for an access holiday to spur investment arises from the *ex ante* inability of regulators to commit to access prices that adequately reward investors for all relevant risks.... If regulators are expected to set low access prices *ex post* but, at the same time, there is a commitment that any new essential facility will not be subject to infrastructure access for a significant period of time, then this will raise investor incentives. It is this *ex ante* commitment to delay access *ex post* that is the basis of an access holiday"
>
> "In this sense, access holidays play a role similar to a patent in innovative activity. Patents encourage innovations by conferring on the inventor temporary monopoly profits. Similarly, access holidays encourage infrastructure investment by allowing investors to temporarily exploit any market power associated with their facility. Both patents and access holidays are second-best solutions in that they impose a temporary monopoly cost. Both an optimal patent and access holiday needs to be designed to trade-off this temporary loss with increased incentives to invest".

The Gans and King analogy of a patent can be taken further than they may have realised. One of the policy rationales for granting exclusive rights in relation to patents is that the associated innovation may have spillover positive externality benefits for wider society. In this manner, the inventor of the patent is, in effect, also being allocated (via the inventor's monopoly right) a proportion of the wider utility benefit that accrues to wider society. The same can also be said in relation to access holidays for new telecommunications networks. Such networks have similar positive spillover externalities for wider society, explaining why Governments are so keen on promoting them. It is therefore entirely appropriate that network owners receive an additional reward in order to stimulate such investment.

The question also arises as to the precise nature of an "optimal access holiday". In this regard, the concept of an "access holiday" has been considered at length in Australia in the context of investment in natural gas pipelines. The debate in relation to pipelines provides insights into the likely solution for telecoms networks.

In August 2004, the Australian Productivity Commission released a final report on its review of Australia's national third party access regime for gas pipelines. The Commission specifically identified that access pricing for gas pipelines in Australia was impeding investment and innovation. The Commission reasoned that the existing regime was excessively focussed on cost-based price regulation and therefore caused a truncation of returns that deterred investment:[63]

> "The implication [from its analysis] is that the weighted average cost of capital (WACC) for the base case is inappropriate after truncation… The main finding from the analysis of regulatory truncation is that it has a potential to distort returns to pipeline investment."

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[63] See Productivity Commission *Review of the Gas Access Regime - Productivity Commission Inquiry Report*, Report 08/2004, Canberra, 10 August 2004, an electronic copy is available at the following Internet link: http://www.pc.gov.au/inquiry/gas/docs/finalreport

Relevantly, the Commission grappled with the issue whether an access holiday should be granted in relation to infrastructure that conferred market power. Ultimately, the Commission recommended that a 15 year "access holiday" regime should be introduced into Australia for new infrastructure without market power. However, the Commission recommended against an access holiday in relation to new infrastructure with market power. The Commission instead proposed a higher regulatory threshold for the latter infrastructure so that fewer new pipelines would become subject to price regulation. The Productivity Commission commented:[64]

> "The key attraction of providing, *ex ante* and without case-by-case assessment, regulation free periods (for say 15 years) for *all* new (greenfield) pipelines is that it would directly and fully address the chilling effect the regulatory regime has on investment. The basic problem with this approach is there would be a risk that a pipeline would then be in a position to exert market power that inhibits upstream and downstream competition."

> "Leaving [pipelines with market power] regulation-free for a given period forgoes the efficiency benefits that have been assessed to be achievable through regulation. It is a second best solution that might allow prices to be inefficiently high for some period, so as to offset the truncation of upside returns once the pipeline is regulated. Furthermore, such an approach raises equity concerns, given that consumers today would potentially subsidise investments to provide for cheaper consumption by future consumers after the expiration of the regulation free period."

However, the Productivity Commission's recommendation still meant that any new pipeline with market power would face price regulation, so investment in such pipelines would be deterred. Under the Gans and King proposal identified above, the ability of the investor to obtain some market power is the essence of its incentive to invest in the infrastructure and earn a value-accretive positive NPV. The Australian Ministerial Council on Energy's Committee of Officials therefore initially disagreed with the Productivity Commission and proposed a partial access holiday for pipelines with market power in which price regulation would be exempted but non-price regulation would remain.[65]

Following widespread opposition to this proposal by pipeline users, a political compromise was ultimately adopted:

- all new pipelines *without* market power were permitted to apply for a 15 year holiday from all access regulation;

- new *international* pipelines *with* market power were permitted to apply for a 15 year holiday from price regulation, but would remain subject to non-price regulation; and

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64 Ibid, n 63.

65 See Ministerial Council on Energy Public Consultation on Response to the Productivity Commission Review of the Gas Access Regime, November 2005, an electronic copy is available at the following link: http://www.mce.gov.au/index.cfm?event=object.showContent&objectID=736B0BFD-C079-9A12-BA33993E14F305F7

- new *domestic* pipelines *with* market power would have no right to an access holiday, but are instead subject to price regulation triggered by a higher regulatory threshold (hence resulting in higher access prices).

This compromise was subsequently enacted into Australian law.[66] Interestingly, this compromise does not necessarily address the investment issues identified by the Productivity Commission in respect of domestic pipelines with market power. The Gans and King solution would suggest that such pipelines should be guaranteed some kind of positive NPV return sufficient to create an incentive for investment and reward the investor.

### 4.3 Conclusions on creating appropriate incentives for investment

Several potential policy recommendations for NGN infrastructure can therefore be drawn from the analysis set out in this chapter:

- First, it is potentially beneficial for the government to grant an access holiday to encourage investment in new telecommunications infrastructure that will not confer substantial market power on the network owner.[67] This may be the case, for example, if the NGN would not be the only means of delivering broadband Internet access into the home due to inter-modal competition.

- Second, if the new telecommunications infrastructure would confer substantial market power on the network owner, it is still potentially beneficial to provide a more limited access holiday arrangement. Under this arrangement, the network owner would not be subjected to TELRIC pricing (and its associated problems as identified earlier in this paper) but would instead earn a regulated return that generated a value-accretive positive NPV sufficient to incentivise the investment. In this manner, any regulated access pricing should be increased well above the TELRIC levels that have traditionally been applied to legacy infrastructure.

- Third, particular jurisdictions may be susceptible to changes in policy (including Australia) so that "access holiday" rights could be repealed by a subsequent government. In such circumstances, it may be appropriate for network owners to also consider entering into an agreement with government in which compensation is paid by the government if an access holiday is prematurely removed. However, any such entitlement to compensation would likely be conditional on the network achieving certain quality standards, possibly under some kind of PPP arrangement.

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66 Part 3A of the *Gas Pipelines Access (South Australia) Act 1997*, noting this legislation applies nationally via adopting legislation in other Australian States.

67 The term "substantial" market power is used as investment in a new pipeline would normally only proceed if it has some ability to earn a positive NPV. The ability to earn a positive NPV implies it must necessarily have some degree of market power.

# 5. Conclusions and recommendations

This paper has analysed the impact of telecommunications regulation on the long-term incentives for telecommunications infrastructure investment. As identified in this paper, some jurisdictions (notably Australia) have not yet struck an appropriate balance, particularly in circumstances where substantial investment in next generation networks may now be required.

The first chapter of this paper identified the critical role of the Internet in the 21st century and the manner in which it is driving demand for broadband services. Government is also implementing policy initiatives to promote such demand. However, legacy CAN infrastructure has its technological limitations and therefore substantial investment in NGN infrastructure will be required.

Investment in NGN infrastructure is inherently risky because the cost of such infrastructure is sunk and it has a long asset lifetime. Under finance theory, an investment will only proceed if the firm can make a return on its investment that exceeds its cost of capital over the project life. The rate of return will depend on the risk profile of a project and, in the case of an NGN project, the critical risks will be market risks and regulatory risks.

The second chapter of this paper analysed the nature of the regulatory risks faced by NGN projects and the precise impact of those regulatory risks on investment incentives. While network unbundling and cost-based regulation has promoted competition in the context of legacy infrastructure, it has impeded infrastructure investment and the development of long-term facilities-based competition. The optimal regulatory approach should be to wind back sectoral regulation as competition develops so as to preserve long-term investment incentives.

The application of cost-based TELRIC and TSLRIC pricing has been particularly problematic from an investment perspective. While such incentive-based pricing was intended to balance allocative and dynamic efficiency considerations, it has clearly had a disproportionate adverse effect on dynamic efficiency. Generally, such pricing has capped the upside of telecommunications investment while exacerbating the downside risks. Furthermore, competitors can free-ride on the investor's infrastructure at a cheaper NPV than rolling out their own infrastructure. It is not therefore surprising that such cost-based pricing has deterred investment.

The third chapter of this paper identified some insights from a case study of Australian telecommunications regulation. Generally, regulation has persisted in Australia, even increased, as competition has developed. Such regulation has had the adverse effect on investment identified in the earlier chapters.

Australia sought to correct the adverse incentive effects of its regulation at an early stage by introducing an access holiday regime. However, for various reasons, this attempt was unsuccessful. As a consequence, the Australian Government has

ultimately intervened by providing partial government funding and proposing a public-private partnership arrangement.

The last chapter of this paper identified the public private partnership model and access holidays as two principal techniques to promote infrastructure investment, but with a focus on access holidays. Generally, the solution to the investment problem is to generate sufficient and certain returns for investors that they are guaranteed a value-accretive positive NPV over the long lifetime of their investment.

In circumstances where the investment confers a degree of market power, it will be necessary to achieve a balance between encouraging investment and preventing excessively high prices. This paper demonstrates that the appropriate pricing methodology to be applied in that scenario is not an incentive-based TELRIC or TSLRIC price. Rather, the appropriate pricing methodology should provide a return to the investor in the nature of a patent, allowing the investor to earn sufficiently above their WACC that the investment becomes highly desirable. Such higher returns to investors are justifiable given that telecommunications networks have positive spillover externalities for wider society.

In summary, many nations need to adopt a more appropriate regulatory balance that appropriately rewards investment and innovation in NGN telecommunications network infrastructure. If a better balance is achieved, we will likely achieve a vision for the year 2015 of ubiquitous broadband Internet access.