



# COMPETITION & REGULATION TIMES

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## It's a KNOCK OUT!

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Stimulating the private sector to invest in government-led research is a ticklish business. Jyh-Bang Jou and Tan (Charlene) Lee<sup>1</sup> investigate.

**C**an a developing country successfully transform into a developed one? That hinges mainly on its capability to move resources from the agricultural sector to the manufacturing sector.

The developing country has several ways to achieve this goal of industrialisation. One proposed by the economist Paul Rosenstein-Rodan in 1943 was to generate a 'big push' by simultaneously industrialising many sectors. This is because each sector of the economy can generate income for its workers that stimulates a demand for goods in other sectors and thus makes industrialisation profitable. In 1989 three prominent economists, Kevin Murphy, Andrei Shleifer and Robert Vishny, argued<sup>2</sup> that South Korea followed exactly this policy.

However, most developing countries lack both the opportunity and

the budget for adopting increasing-returns technologies and subsidising multiple sectors of the economy at the same time. Consequently, these countries choose just one sector as a target industry. It is usually argued that inter-industry spillover and imperfect competition are the two main reasons that a government fosters and subsidises a single target industry.

### Punching above its weight

Our simplified model explores how government can stimulate investment in a particular industry. In particular, we assume that capital investment exhibits external benefits to the society. As a result, we might expect to see that the government is more keen on firms making investments than the firms are themselves.

We suggest a new policy that a government can implement in order to

promote investment in a target industry. This new policy is a combination of threatening to take over the investment project, and offering minimum investment tax credits. Consider a situation in which a government derives an innovative product from a public R&D laboratory, and would like to use an investment tax credit to encourage a private firm to commercialise this innovation. The government may believe that this commercialisation will produce external benefits and thereby eventually lead to the establishment of a viable industry. However, the government will undertake the investment project in question by itself if the project's operating environment becomes so bleak that the firm is unwilling to invest. In finance jargon, the government gives the firm a 'knock-out' option: the firm can invest, and use the patent; but if the investment project falls in value sufficiently, the firm will lose this option.

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### A parable in Taiwan

The establishment of the Taiwan Semiconductor Manufacturing Company (TSMC), which is currently the largest semiconductor foundry in the world, may be a real-world example of this. In 1984, Taiwan embarked on its Very Large Scale Integration (VLSI) Technology Development Project, under the auspices of the Industrial Technology Research Institute's Electronic Research Service Organization (ERSO). In 1985, incumbent Premier Yu sought to establish a new spin-off venture from ERSO that would take Taiwan into the VLSI era. The premier intended for this venture to be funded primarily through private sector support. But, because of the sluggishness of the Taiwanese economic environment, private firms lacked interest.

In June 1986 the government announced that the TSMC would be established and that, by governmental invitation, the Philips Corporation would possess 27.5% of TSMC's equity and would be its leading private-equity holder. However, the Taiwanese government (through its China Development Fund) was the largest investor in the TSMC, with 48.3% of the TSMC's equity. The remaining 24.2% of equity was held by several domestic private firms. The establishment of the TSMC thus resembles a case in which the Taiwanese government first offered an investment opportunity to private firms but subsequently exercised a knock-out option.

We can envision an extremely simplified model to discuss the issue at hand. Suppose that  $V$  is the value of an investment opportunity held by a government, and that  $H$  is the level of  $V$  that triggers the government into executing the investment project itself. In this scenario, a private firm invited by the government to invest in the project is entitled to receive a perpetual American call option with strike price  $K$  (that is, the right but not the obligation to buy something worth  $V$  for  $K$ ) as long as  $V$  remains greater than  $H$ .

## ... the firm has a perpetual right to decide whether to undertake the investment project.

In other words, the firm is not required to undertake the investment project during a finite period of time. Instead, the firm has a perpetual right to decide whether to undertake the investment project. The firm's investment decision is then characterised by a trigger policy: once  $V$  rises above a threshold level, the firm will undertake the investment project. However, if  $V$  falls below  $H$ , the value of the firm's option to invest becomes worthless because the government itself will implement the investment project. The existence of the knock-out option decreases the firm's opportunity costs, raising the firm's incentive to invest. Consequently the more dangerous the knock-out option is, the sooner will the private firm undertake the investment project.

Given that a firm ignores the beneficial effect of the investment project on society, left to its own devices, the firm will delay making investments. A traditional way to chivy the firm along would be to offer a tax credit to the firm if it undertakes the project. But tax credits are costly, and a knock-out option is free.

### Two ways to skin a cat

We consider how a government can combine a knock-out option and an investment tax credit to induce optimal behaviour. A higher knock-out level is associated with both a lower tax credit required to be offered by the government

and a lower critical level of the investment value that induces the firm to invest. Consequently, if the government wishes to accelerate investment, it can establish a knock-out level that is as close to the expenditures on the investment project as possible and simultaneously offer an infinitesimal rate of investment tax credits. This will encourage the firm to invest as soon as the project becomes profitable, rather than waiting to see if it can make more money.

In practice, the government may hesitate to employ this policy because of the risk of completely destroying the firm's incentive to invest if the government mistakenly overestimates the firm's investment costs. Consequently, the government should have full information about the production technology employed in the target industry that it intends to support. This policy resembles an earlier suggestion by Metcalf and Hassett,<sup>3</sup> which assumes that a firm undertakes an investment project but faces policy uncertainty regarding the investment tax credit. They show that if a government wishes to accelerate investment, then it should enact a tax credit immediately and threaten that it will be removed in the near future and never restored.

1 This article is based on: J-B Jou and T Lee (2013) 'How do Knock-out Options Affect Irreversible Investment Decisions and the Design of an Efficient Investment Tax Credit', which was awarded the ISCR Prize for Best Paper on Regulatory Finance at the NZ Finance Colloquium in 2013. It is available at [http://jbjou.blog.ntu.edu.tw/files/2013/10/Knock-out\\_7\\_March2013.doc.pdf](http://jbjou.blog.ntu.edu.tw/files/2013/10/Knock-out_7_March2013.doc.pdf)

2 KM Murphy, A Shleifer & RW Vishny (1989) 'Industrialization and the Big Push' *Journal of Political Economy* 97(5) pp1003-1026.

3 KA Hassett & GE Metcalf (1999) 'Investment with Uncertain Tax Policy: Does Random Tax Policy Discourage Investment?' *Economic Journal* 109 pp372-393.

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# ISCR conference a participant's perspective

In August this year Dougal Tylee participated in the 'Public-Private Partnerships: Building Infrastructure for the Future' conference in Wellington, which was hosted by the ISCR and sponsored by the NZ Transport Agency (NZTA). He outlines his thoughts from the conference.

## **Public-private partnerships (PPPs) can apply to hard and soft infra-structure**

There are differing definitions of PPPs. A narrower definition is 'long-term contracts for the delivery of a service, where the provision of the service requires the construction of a facility or asset, or the enhancement of an existing facility'. This contrasts to a broader definition of PPPs being 'any mutually beneficial commercial procurement relationship between public and private sector parties that involves a collaborative approach to achieving a public-sector outcome'. This broader definition means PPPs can apply both to hard (physical) infrastructure such as roads and to soft infrastructure such as health sector services.

## **The government's ownership role in PPPs can vary**

Typically in a PPP, the government becomes the owner of the assets after, say, a 25-year concession period. However, the government can also eventually sell out of a PPP. For example, the government's ultrafast broadband network (UFB) initiative could be described as a 'reverse PPP', where the government initially owns the PPP entity, takes risk and provides seed capital to private-sector partners to build the network, and then eventually sells out to private-sector partners.

## **PPPs provide some key benefits**

PPPs are useful mechanisms to allocate operational and financial risks (and returns) to parties who are best placed to manage and mitigate those risks. They also allow a transfer of private-sector skills and expertise to the public sector, including how to manage capital more efficiently. Importantly, PPPs also enable a long-term perspective to be taken on long-lived assets.

## **Only some types of projects are suitable for PPPs**

Projects best suited for PPPs are large-scale, complex and risky projects where there is opportunity for innovation. On this basis, PPPs are only likely to be used for a minority of infrastructure delivery in New Zealand.

PPPs should be viewed as just another type of procurement, and should be considered alongside other procurement approaches. The public sector should consider PPPs when the same or better outcomes can be achieved at the same or lower cost ('better value for money') compared with other procurement methods. PPPs will not work if outcomes can't be measured and/or private-sector partners can't be incentivised to deliver the outcomes.

## **New Zealand is at an early stage of development**

Compared with overseas, New Zealand is at an early stage of development in the use of PPPs. Overseas, PPPs have been in existence for around 15 to 20 years. For example, 'private finance initiatives' (PFIs), which are a way of creating PPPs, began to be used in the UK in 1992 and around 700 were completed by 2007. However, New Zealand's 'early' stage in PPP development is beneficial because we can learn from mistakes made with PPPs overseas.

For example, allocating demand risk to private-sector partners has meant the failure of a number of PPPs (such as the Sydney Harbour Tunnel project). New Zealand can learn from these mistakes.

## **Recent examples of New Zealand PPPs**

The Hobsonville Point schools (pictured), a partnership between the Ministry of Education and Learning Infrastructure Partners consortium, were completed in April 2012. The 25-year contract for this PPP is worth \$111m in net present value terms. Wiri, the South Auckland prison, was completed in September 2012 and is a partnership between Department of Corrections and SecureFuture consortium; the 25-year contract for this PPP is worth \$840m. Transmission Gully, a new 27km motorway north of Wellington, is currently being tendered by the NZTA. There is also significant opportunity to apply PPPs in the delivery of government services.

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Photo: ASC Architects



The pricing of television is taken as given in New Zealand. But internationally, regulators and competition authorities have begun to think about the effects that different pricing structures have on viewers and competition in television markets. Konrad Hurren outlines a pricing structure known as *bundling*, explains why firms use it, and ponders what it means for television viewers and content providers.

**E**conomic theory says that, in an everyday market interaction (say, buying a spoon), one might expect to pay anything up to the valuation one puts on the spoon and no more. To pay more would be irrational. After the transaction is complete the seller gets the price and the buyer gets the use of the spoon and whatever surplus comes with that.

Conventional economic wisdom also suggests that it is most efficient to sell goods and services in individual pieces (*à la carte*). Consumers usually expect to go to a market with the intention of buying a basket of goods. They 'shop around' to find which vendor is offering the lowest price for the individual items. Offering homogeneous goods *à la carte* allows this shopping around, which (even if there are only a small number of firms) results in competitive prices. Economists refer to this situation as a Bertrand equilibrium.

### The New Zealand television market

The television market is what is known as a two-sided market. Viewers, content producers, and advertisers are brought together by platforms to exchange programmes and advertisements for money and time. In the absence of the platforms the three groups could not engage in trade (or would find it prohibitively costly to do so).

New Zealand's television market is characterised by four platforms: SKY, Vodafone, TVNZ, and Mediaworks. SKY and Vodafone respectively offer 'pay' television over satellite and cable. TVNZ and Mediaworks offer 'free-to-air' television through Freeview. TVNZ is also in a joint venture with SKY to offer Igloo, a 'pay' television service where viewers can purchase content as and when

they feel inclined (a consumer subscribing to any of these four platforms will have access to TVNZ's and Mediaworks' free-to-air television content).

### Departing from the norm

Where the television market departs from standard economics wisdom is in the offering of channels in bundles and in the offering of free content. We'll look first at the offering of channels in bundles as opposed to *à la carte*.

In the television market, 'bundling' means selling multiple channels for a fixed subscription fee. For example, a subscriber to SKY gets the basic bundle and can purchase additional bundles such as movies and sport. This differs from the bundling that occurred in the telecommunications market in New Zealand before the 2006 amendment to the Telecommunications Act: it is (horizontal) bundling of content from various sources rather than vertical integration of infrastructure and content.

### Why do they do it?

The literature generally agrees that bundling is used in conventional markets as a way of reducing the variance in consumer demand. Reducing this variance reduces uncertainty, and it strengthens the incentives for suppliers to invest in the high fixed (and sunk) costs of providing both infrastructures and the content to distribute over those infrastructures.

Table 1 shows a simple bundling example where there are two consumers (A and B) who value television channels  $q$  (for example, documentaries) and  $p$  (children's television) *additively*: that is, their valuations of each channel ( $p$  and  $q$ ) added together equal their

valuation of the two channels bought together. For bundling to be profitable, A must value  $p$  more than B does and B must value  $q$  more than A does (in other words, there must be some heterogeneity in valuations). We can ignore costs because all fixed costs are sunk and the marginal cost of television distribution is negligible.

Bundling channels  $p$  and  $q$  allows the television provider to decrease the variance of the individual demands, thus capturing more surplus (profit). If the firm were to sell  $p$  and  $q$  separately at 70 and 50 (respectively) it would make a profit of 240 compared to its bundle profit of 300. Where the costs of distribution are negligible, the consumer-demand variance (and hence profitability) will be reduced even further if these profits can be applied to the acquisition of even more content which can be added to the bundle to appeal to an even broader group of heterogeneous consumers. This explains why, over time, pay television providers have added a very large number of channels to the bundles that make up their standard plan. Content that is very highly valued by a significant portion of the population (which means they're prepared to pay a premium for access to it) is not added to the basic bundle; it is separated out into pay-per-view (*à la carte*). We observe this happening, for example, with boxing matches. Likewise, stand-alone channels like SoHo and Rialto and add-on bundles like sport or movies can only be purchased along with the basic bundle, making a 'bundle of bundles'.

Another reason why firms engage in bundling is to foreclose a market from a potential entrant. Assume in the earlier example that another firm can offer only  $p$  and

**Table 1**

	Valuation of $p$	Valuation of $q$	Valuation of $p$ and $q$
Consumer A	100	50	150
Consumer B	70	80	150
Profit-maximising price	70	50	150

has the same cost structure as the incumbent firm, and that a viewer watching  $p$  will like  $q$  more because of being able to watch  $p$  ( $q$  and  $p$  are 'complements'). The incumbent firm can threaten to inform its subscribers that it will increase the per-channel costs of  $p$  and  $q$  if consumers do not buy the bundle. This threat is viewed as credible by the potential entrant, so it stays out of the market. Thus the threat need never be carried out.

A final reason why firms engage in bundling is economies of scope. If marginal distribution costs were non-negligible, television providers could bundle channels in order to decrease the total cost of provision, thus earning higher profits. Consumers also benefit, since firms would offer the bundle at a lower price than its components.

#### Who wins most?

Reconsidering the conventional market with the buying and selling of a spoon as an example illustrates something quite peculiar to two-sided markets. The spoon can be bundled with a fork and a knife as a set. Although there may be gains to consumers based on convenience (given that spoons, knives and forks are very good complements), it is likely that the general result of bundling will hold: the price will increase and consumer surplus will be lowered. However, in a two-sided market and particularly in television markets, bundling has more ambiguous results.

Bundling in the television market is primarily used to reduce heterogeneity in consumer valuations and thus capture more profit (second-degree price discrimination). But, interestingly, bundling in the television market has an ambiguous effect on consumer surplus. Two results are worth describing.

The first is that offering television channels à la carte results in less variety in channel content and a tendency to serve the lowest common denominator (this is because each channel must appeal to the most homogeneous group in order to maximise profit). We would observe more 'talent shows' and 'reality tv' and many fewer minority-interest programmes such as documentaries. Less variety in content decreases consumer surplus; so bundling would result in higher surplus.

A second interesting result is that if advertisements have a high-enough nuisance cost then à la carte pricing results in greater consumer surplus, even net of the loss of content-variety. This is because there are fewer advertisements in à la carte pricing. And there are fewer advertisements because firms must compete to offer the least amount of advertising, in order to incentivise viewers to subscribe to their channels under à la carte pricing.

Despite this ambiguity in results, it is generally accepted that bundling in the television market is an efficient solution because the total surplus is maximised.

#### Policy implications

In recent years, with the internet making different distribution models possible, bundling has become an important policy issue. In the UK, the government has attempted to unbundle and is finding that niche channels are closing.

New Zealand's Commerce Commission recently investigated<sup>1</sup> the potential anticompetitive nature of SKY Television's agreements with retail service providers (RSPs) for the redistribution of its content over the internet. The Commission warned SKY that some of its actions may have breached the Commerce Act 1986. Despite this warning, the Commission found that SKY's prohibition on RSPs' bundling SKY content with competing content from other sources did not have the effect (or likely effect) of substantially lessening competition. Such bundling would allow an RSP to 'free ride' on SKY's content in order to enter the market, potentially reducing incentives for firms in the future to invest in content. This could result in a reduction in competition. Consequently, SKY was found to be acting in a similar manner to a competitive firm when imposing the non-bundling obligation on RSPs.

<sup>1</sup> [www.comcom.govt.nz/business-competition/competition-enforcement-outcomes/commerce-act-enforcement-actions-register/detail/799](http://www.comcom.govt.nz/business-competition/competition-enforcement-outcomes/commerce-act-enforcement-actions-register/detail/799)

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## Economics Of Electricity Regulation

Tuesday 10 December – 9.00am-4.30pm  
Presented by: Professor James Bushnell

This one-day course provides an introduction to the economic principles underpinning regulation of the electricity industry. It covers the basic economics of monopoly industries, and explores the interrelationships between price regulation and investment incentives as they apply in both the transmission of and markets for the sale of electricity.

Individuals employed in the electricity sector, and those engaged in sector policy-making and regulation should attend, as well as those interested in learning about the principals of price regulation for application to other infrastructures such as telecommunications, gas and water.

James Bushnell is an associate professor of economics at the UC Davis.

Professor Bushnell is the 2013 S. T. Lee Fellow at the ISCR. His research focuses on industrial organisation and regulation, energy economics and policy, environmental economics, and game theorisation optimisation models. He is a research associate of the NBER, and has served on the California Independent System Operator's Market Surveillance Committee since 2002. In addition, he served on the California Power Exchange's Market Monitoring Committee and on the California Air Resources Board's Economic Assessment and Allocation Committee for its cap-and-trade programme.

A course outline is available from <http://ped.victoria.ac.nz/courses/380-economics-of-electricity-regulation>

For further information: email: [Profdev@vuw.ac.nz](mailto:Profdev@vuw.ac.nz) or phone: +64 4 463 6556



# Banking on too much of a good thing?

One of the difficult questions facing regulators in the financial sector is how much banking competition to allow. In most industries, increased competition increases social welfare. But banking regulators see the banking industry as different. They believe that excessive competition may put the banking system at risk, a belief that underlies the recent restrictions on mortgage lending introduced by the New Zealand Reserve Bank. Ronald Fischer explores the connections between banking competition and economic stability.

**E**xcessive competition may put the banking system at risk? This does not appear so obvious to economists. For example, the 2013 Global Financial Development Report highlights that 'competition in the banking sector promotes efficiency and financial inclusion, without necessarily undermining financial stability'.<sup>1</sup> Other economists believe there is theoretical and empirical support for the existence of a tradeoff between competition and stability in the banking system.<sup>2</sup>

As circumstantial support for the existence of this tradeoff, consider the case of Canada. It is supposed to have the safest banking system in the world. Five banks dominate the market, with 85% of total assets and profits of US\$ 26.59 billion in 2012 (1.5% of GDP). New Zealand is another country in which banks are very solid and very concentrated. In 2012, its five major banks made profits of US\$2.86 billion (1.9%

of GDP) and held more than 95% of all bank assets.<sup>3</sup> Note that New Zealand banks' credit ratings are in the A+ to AA-category, and some of them are included among 50 safest banks worldwide (2012 rankings). Similarly Chile, whose five major banks hold 73% of all banking assets, saw banks making profits of US\$ 3.35 billion in 2012 (1.2% of Chile's GDP).<sup>4</sup> The major Chilean banks are also very safe. The four highest Latin American bank ratings are Chilean and two of them are among 2012's 50 safest banks in the world. In these three countries, banks resisted the financial crisis of 2008 and had only minor downgrades in their credit ratings.

A relationship that has been explored by empirical researchers, but not often by theorists, is the link between banking competition and economic instability. They have found that economic depressions follow

a banking crisis when the regulatory system is inadequate. A case in point was Chile, where financial liberalisation (and the concomitant increased competition) led to a systemic crisis within the banking system in 1982 and a subsequent depression, with GDP growth rates of -14.3% in 1982 and -3.5% in 1983. That crisis led to the creation of a strong banking regulator, who restricted entry into the banking sector for more than a decade and created a strong banking sector with little competition.

## Show me the links

Many researchers have studied the possible existence of a link between competition and stability in the banking sector. Leaving aside the possibility of runs due to sunspots,<sup>5</sup> theoretical researchers have found contradictory results. By focusing on the demand for loans, the authors of one paper<sup>6</sup> reason that, when

markets are less competitive, interest rates rise and thus only firms that have risky projects find these rates attractive. Hence more competition would lead to safer lending and a smaller risk of banking instability. A complementary argument<sup>7</sup> notes that when there is intense competition, spreads are low (so lending is not very profitable) and the opportunity cost of reserves is low. Thus banks can afford large reserves, leading to greater safety for depositors. Other researchers<sup>8</sup> observe that banks choose the riskiness of their loan book. When rates are low, they attempt to increase their returns by lending to riskier projects. According to this line of reasoning, an increase in the intensity of competition would increase the systemic instability of the banking sector.

The empirical evidence is also ambiguous. For example, a paper<sup>9</sup> that examined the effects of the 1980s deregulation process in the US banking industry found that risk-taking increased, leading to more instability in the banking sector. A more recent examination of increased competition in Spain<sup>10</sup> obtained similar results. However, various studies that use cross-country data<sup>11</sup> find evidence that competition leads to more stable banking industries. A very recent cross-section study<sup>12</sup> tries to reconcile the conflicting evidence of single-country and cross-country studies. By including a measure of the quality of banking regulation, as well as variables corresponding to other financial-market characteristics of the countries, this study shows that it's possible to find a positive association between competition and banking-system instability.

### Wait ... there's more

In a recent paper,<sup>13</sup> I and my colleagues developed a theoretical model that links banking competition to instability in the banking sector and hence to the economy more generally. The model tries to reproduce the stylised facts of the industry and we assume the possibility of an initial shock to the real economy (an example would be the EMS syndrome currently affecting the shrimp industry in Thailand, or the ISA virus that almost destroyed the Chilean salmon industry in 2008-2009). The losses due to the initial shock imply that firms in the sector, although they may still be viable, cannot repay their working capital loans. Banks that lent to these firms may end up with less capital and reserves after repaying their short-term obligations. If the size of the initial shock is sufficiently large, the reduction

in capital and reserves leads to a reduction in the bank's loans, because they are constrained by capital adequacy restrictions. Since these capital adequacy restrictions allow a bank to lend a multiple of its capital and reserves, lending is reduced by a multiple of the initial defaults. Thus banks amplify the economic effect of the initial shock.

What is the effect of competition? Since competition reduces the interest rate spread and the cost of loans, there is more lending and economic activity initially. Banks become more highly leveraged (or geared): that is, their lending is closer to the capital adequacy limit. Thus the amplification effect of the initial shock will be larger. This explains the relationship between economic instability and the intensity of competition, and shows the existence of a tradeoff between the benefits of competition and increased economic instability. The paper models this intuitive argument using a two-period model and provides additional results.

First, the model allows for two types of equilibria in a banking system: a *prudent* equilibrium, in which the banks restrain their lending so that they can survive the shock; and an *imprudent* equilibrium, in which the controllers of banks bet that the shock will not occur. In the latter case, they choose to lend more than in the prudent equilibrium. Banks are very profitable when there is no shock, but fail if the shock occurs and need to be rescued by the public (a case of privatisation of profits and socialisation of losses). This type of equilibrium may appear when capital adequacy restrictions are loose, so banks can lend a high multiple of their capital and reserves.

Our model shows that as competition increases, the attractiveness of the imprudent equilibria increases. So the combination of competition, loose regulation and deposit insurance can be lethal for the banking system. Prudential regulation (for example, stringent capital adequacy regulations such as those Switzerland has imposed on its major banks) rule out the possibility of imprudent equilibria.

The model explains another feature of the banking sector: the role of regulatory forbearance. In a financial crisis (such as the Global Financial Crisis of 2008), the banking regulator will usually relax its capital adequacy restrictions in the hope of dampening the effect of the crisis on economic activity. Our model shows that so long as forbearance is unexpected, it can reduce or eliminate the impact of the financial crisis on economic

activity. However, it also shows that if banks anticipate regulatory forbearance in case of a shock then they will increase their pre-shock lending, which at least counteracts the effects of forbearance and potentially leads to increased instability.

Banking competition produces a tradeoff between the benefits of economic stability and increased economic efficiency. Choosing the optimal intensity of competition is a difficult task for a regulator. In general, a strong banking regulator will tend to be cautious and restrain banking competition by too much.

- 1 The World Bank (2013) *Global Financial Development Report* Chapter 3 (available at: <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTGLOBALFINREPORT/0,,contentMDK:23267294~pagePK:64168182~piPK:64168060~theSitePK:8816097,00.html>).
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- 6 JH Boyd & G De Nicoló (2005) 'The theory of bank risk taking and competition revisited' *Journal of Finance* 60(3) pp1329-1343.
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- 8 F Allen & D Gale (2004) 'Competition and financial stability' *Journal of Money, Credit and Banking* 36(3) pp453-479.
- 9 The 1980s US deregulation allowed banks to enter markets away from their home states, thus raising the intensity of competition in the industry. See: FR Edwards & FS Mishkin (1995) 'The decline of traditional banking: Implications for financial stability and regulatory policy' NBER (National Bureau of Economic Research) Working Paper 4993 August.
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- 13 R Fischer, N Inostroza & F Ramirez (2013) 'Banking competition and economic stability' CEA (Centre for Applied Economics) Working paper 297 June (available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2277246](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2277246)).

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# price perversities in primary health care

The processes for assessing acceptable increases in patient fees paid to New Zealand primary health care practices are inconsistent with the government's subsidy policy intentions. Bronwyn Howell explains why.

New Zealand's primary health care system is characterised by an agreement dating from the early 1940s, which allows general practitioners (GPs) to charge patient fees in order to recover any costs of providing services (consultations) not covered by government subsidies. The arrangement insulates GPs from financial risk if the subsidies do not increase in line with underlying cost increases. However, it means that the financial risks are passed on to patients as higher fees. And high fees are seen as a barrier to use of primary health care services by the 'sickest' individuals, as they are charged for each consultation provided.

Following a policy change in 2001, almost all government subsidies for care provided by general practitioners are paid under a capitation (per-head) system. Practices receive a fixed sum each period (somewhat crudely 'risk-rated' using age, gender, ethnicity, income and past-usage characteristics) for each individual registered at the practice, regardless of the number of consultations delivered. The balance of practice revenue comes from patient fees.

GPs are expected to charge fees commensurate with the subsidies received. To ensure that fees are lowest for those with the least ability to pay, some practices (termed 'very low cost') have agreed to offer very low fees in exchange for receiving very high subsidies. Around 90% of the revenues of 'very low cost' practices come from capitation subsidies; in other practices, as little as 50% of revenue is from capitation.

## Finding 'fair' fee formulae

To ensure patient fees are 'acceptable', a fee-increase approval system was introduced in 2006.<sup>1</sup> It uses an annually constructed historic-cost index to assess the 'acceptable' amount by which practice revenues may increase. The proposed increase in government funding (determined each year in the Government's Budget) is then used to calculate the increased subsidy revenues; and, to calculate the

'acceptable' fee increases, the subsidy increase is subtracted from the total 'acceptable' revenue increase. Fee increases within these bounds may proceed. The remainder are assessed by DHBs, who can refer exceptional increases to Fees Review Committees for detailed review.<sup>2</sup>

In principle, this appears to be a reasonable way of ensuring that increases in government subsidies flow through to lower patient fees and that fees will increase only as a consequence of historic cost increases. But, because of the capitation subsidy payment system, it hasn't turned out to be so simple. Practices receiving identical capitation payments and charging the same user fee per service can receive different revenues. They can also incur different costs in a given period if the number of consultations provided varies from the expected capitated average.

Table 1 shows examples of this. Where capitation is expected to be 50% of 'average' practice revenues, a fee of \$10 per consultation is charged; where capitation is expected to be 90% (a 'very low cost' practice), the fee is \$2. But a 20% variation from the expected number of consultations results in considerable variability in the fees required to break even.

All else held equal (including costs remaining identical between periods), if 'unlucky' Practice U was delivering 20 more consultations than average because of random 'bad luck', then there is no reason why it should alter its fees in the future. However, if there really was some underlying factor not captured in the capitation payments that indicated it would expect to again deliver 20 more consultations than average in the coming year, it would need to increase its fees by \$1.67 if capitated at 50% and \$3 if capitated at 90%. (As the fee approval process is based on future revenues, it does not allow the firm to recover past losses.)

## Persistent price-policy perversities

The fee approval process essentially requires each practice to choose one of two formulae by

which its proposed fee increases for the next period can be assessed. Option A assumes the practice will deliver the average expected number of consultations; Option B is based upon the number actually delivered in the last period. Clearly, Practice U would prefer to use Option B and increase fees regardless of whether it expects to deliver 100 or 120 consultations. However, 'lucky' Practice L will prefer Option A, even if it knows it will deliver only 80 consultations, as it will not want its profitability to be revealed and its 'acceptable' fees potentially reduced.

The implications are significant if the differences in the numbers of consultations delivered by different practices are persistent. The sicker-than-average patients of Practice U will face increasingly higher fees, compared with the healthier-than-average patients of Practice L. And the more the practice income is derived from capitation revenues, the greater the penalty. Patients in the most highly-capitated practices (who are the least able to afford fee increases) will face the highest absolute and proportionate fee increases if they happen to be registered at a practice facing higher-than-average demand because of its sicker-than-average patient base.

## Complicating 'cost' increases

The situation becomes more complex when the underlying costs increase. The key to understanding what's occurring is recognising that 'acceptable' fees are based on practice revenues and the historic cost index, not on actual practice costs. The higher the proportion of its income a practice receives from capitation, the lower its 'acceptable' fees are. Further, the practice is also more susceptible to the relationship between the subsidy increase and the historic-cost index. This is because any variance in the subsidy effectively alters the capitation rate for all practices.

Table 2 shows what occurs if the cost index indicates a 5% acceptable revenue increase. In Scenario One, the government capitation subsidies increase by 3% (government subsidies fail to keep pace with cost increases); Scenario Two shows an 8% capitation subsidy increase



(government subsidies exceed cost increases, which may happen if the government wishes to increase sector funding).

In Scenario One, the lower the capitation percentage, the greater the allowable absolute fee increases can be. 'Average' Practice A can raise its fees by 70c (a 7% increase) at 50% capitation and by 46c (a 23% increase) at 90% capitation. However, the greatest proportionate fee increases are borne by those patients attending the very-low-cost practices: they are most sensitive to the government's comparative lack of generosity.

This is reversed in Scenario Two, when the government's generosity is intended to be most beneficial to the least able to pay. Because of the trade-offs between subsidy (revenue) increases and capitation percentage, fees will increase by 20c (2%) at the 50% capitation practice but decrease by 44c (22%) at the 90% capitation practice.

### Subsidy shortfalls and strategic selection

Even more interesting are the fee implications for the option (A or B) that's selected.

When government subsidy increases fail to match cost increases, lower-capitated and relatively 'lucky' practices are better off if they select Option B, because the allowable higher revenue increase can be spread over fewer consultations than it can in the 'average' practice. However, higher-capitated 'unlucky' practices are better off with Option A. Their already-sicker-than-average patients face additional penalties from regulatory arbitrage.

But when government subsidy increases are more generous than cost increases, Option B lets higher-capitated 'unlucky' practices spread the higher subsidies over more consultations, leading to higher 'acceptable' fee increases. Consequently, fee reductions are smaller for the financially vulnerable patients of sicker-than-average very-low-cost practices than for patients of healthier-than-average very-low-cost practices, who will choose Option A as it likewise offers the higher number of consultations.

### Resolution?

This 'strategic selection' opportunity arises because the fee approval process is based upon projected revenues and the limitation of patient fee increases. It is not based upon variations in financial risks as a consequence of the actual number of practice consultations varying from the capitated average. The financial risk associated with capitation

**Table 1: Capitation and profit (base case)**

	'Lucky' (Practice L)		'Average' (Practice A)		'Unlucky' (Practice U)	
<b>Capitation</b>						
Expected	50%	90%	50%	90%	50%	90%
Actual	56%	92%	50%	50%	45%	88%
<b>Capitation revenue</b>	<b>\$1000</b>	<b>\$1800</b>	<b>\$1000</b>	<b>\$1800</b>	<b>\$1000</b>	<b>\$1800</b>
<b>Consultations</b>						
Number	80	80	100	100	120	120
Revenue	\$800	\$160	\$1000	\$200	\$1200	\$240
<b>Total revenue</b>	<b>\$1800</b>	<b>\$1960</b>	<b>\$2000</b>	<b>\$2000</b>	<b>\$2200</b>	<b>\$2040</b>
<b>Total cost*</b>	<b>\$1600</b>	<b>\$1600</b>	<b>\$2000</b>	<b>\$2000</b>	<b>\$2400</b>	<b>\$2400</b>
<b>Profit/(loss)</b>						
Total	\$200	\$360	-	-	(\$200)	(\$360)
Per consultation	\$2.50	\$4.50	-	-	(\$1.67)	(\$3.00)

Note: \*Total cost based on \$20 per consultation.

**Table 2: Capitation and profit ('acceptable' revenue increase = 5%)  
Scenario One (government subsidy increases by 3%)**

	'Lucky' (Practice L)		'Average' (Practice A)		'Unlucky' (Practice U)	
<b>Expected capitation</b>	50%	90%	50%	90%	50%	90%
<b>'Acceptable' revenue</b>						
Option A	\$2100	\$2100	\$2100	\$2100	\$2100	\$2100
Option B	\$1890	\$2058	\$2100	\$2100	\$2310	\$2142
<b>Capitation revenue increase</b>	<b>\$1030</b>	<b>\$1854</b>	<b>\$1030</b>	<b>\$1854</b>	<b>\$1030</b>	<b>\$1854</b>
<b>Fee recovery (Option A)</b>						
Total	\$1070	\$246	\$1070	\$246	\$1070	\$246
Per consultation	\$10.70	\$2.46	\$10.70	\$2.46	\$10.70	\$2.46
<b>Fee recovery (Option B)</b>						
Total	\$860	\$204	\$1070	\$246	\$1280	\$288
Per consultation	\$10.75	\$2.55	\$10.70	\$2.46	\$10.67	\$2.40

**Scenario Two (government subsidy increases by 8%)**

	'Lucky' (Practice L)		'Average' (Practice A)		'Unlucky' (Practice U)	
<b>Expected capitation</b>	50%	90%	50%	90%	50%	90%
<b>'Acceptable' revenue</b>						
Option A	\$2100	\$2100	\$2100	\$2100	\$2100	\$2100
Option B	\$1890	\$2058	\$2100	\$2100	\$2310	\$2142
<b>Capitation revenue increase</b>	<b>\$1080</b>	<b>\$1944</b>	<b>\$1080</b>	<b>\$1944</b>	<b>\$1080</b>	<b>\$1944</b>
<b>Fee recovery (Option A)</b>						
Total	\$1020	\$156	\$1020	\$156	\$1020	\$156
Per consultation	\$10.20	\$1.56	\$10.20	\$1.56	\$10.20	\$1.56
<b>Fee recovery (Option B)</b>						
Total	\$810	\$114	\$1020	\$156	\$1230	\$198
Per consultation	\$10.13	\$1.43	\$10.20	\$1.56	\$10.25	\$1.65

(an instrument for prospective payment) means that a dollar of capitation income is not equivalent to a dollar of fee revenue. Fee revenue is paid retrospectively, so the uncertainty about the number of consultations actually delivered is eliminated. Until the fee-increase approval processes take account of the extent to which past consultation numbers reflect future expected demands, and until government subsidy increases perfectly match cost increases, perverse pricing outcomes can be expected.

1 P Davies, S Hope & D Moore (2006) *Provision of an Annual Statement of Reasonable General Practice Fees Increase*. Sapere Ltd.

2 In the committee's first year 90 practices (approximately 10% of all practices) underwent detailed review; in 2012 there were 19 fee increases referred and 70% of these were approved. See: L Topham-Kindley (2013) 'Fees reviews down to a steady trickle' *NZ Doctor* 14 February ([www.nzdoctor.co.nz/in-print/2013/february-2013/13-february-2013/fees-reviews-down-to-a-steady-trickle.aspx](http://www.nzdoctor.co.nz/in-print/2013/february-2013/13-february-2013/fees-reviews-down-to-a-steady-trickle.aspx)).

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# A LATIN LENS on ENERGY MARKETS



Stanford University's Frank Wolak looks at the pros and cons of Latin-American-style cost-based dispatch and pricing on short-term energy and operating reserve markets.

**A** feature of the electricity supply industry's restructuring in Latin American countries (LACs) that has attracted little notice outside of the region is the use of cost-based dispatch and pricing in short-term energy and operating reserves markets. To operate the system and set short-term market prices, virtually all LACs use generation-unit-level variable cost estimates approved by the regulator instead of offer prices submitted by generation unit owners. Chile, the first country to reform in Latin America in 1982, employs a cost-based short-term energy and operating reserves market. Currently Brazil, Peru and Argentina (as well as a number of other countries in Central and South America) use a cost-based short-term market.

In Chile, this policy was adopted in order to focus the restructuring process on what is generally thought to be the major source of benefits: the formation of a competitive market for long-term energy supply contracts between generation unit owners and electricity retailers and large customers. That Chile has attracted

sufficient private investment to meet its rapidly growing demand for electricity over the past 30 years suggests that this approach to short-term electricity market design merits further investigation.

## **Under the microscope**

In any restructured electricity supply industry, a short-term market is necessary to manage imbalances between forward market obligations to supply or consume electricity and each participant's actual consumption or production. Most of the energy consumed is purchased through long-term contracts between generation unit owners and electricity retailers and large consumers. However, a short-term market is still necessary to manage imbalances between these forward market obligations and each participant's actual consumption or production of electricity. Moreover, to ensure that only small amounts of energy are purchased in the short-term market, electricity retailers in all LACs that have cost-based short-term markets are required by

the regulator to have 100% of their retail-load obligations covered by fixed-price long-term contracts.

These long-term contract obligations provide generation unit owners with the vast majority of their annual revenues, although the LACs with cost-based short-term markets also have capacity payment schemes where all generation units that the system operator determines are necessary to serve the annual demand for electricity receive a monthly payment for their unit's available capacity (a construct determined by the system operator based on the energy the unit is able to provide under low hydro conditions).

To operate a cost-based market, all suppliers are required to submit to the market operator and regulator the characteristics of their generation units: the heat rates (for fossil-fuel units), the variable operating and maintenance costs, and other demonstrable variable costs such as emissions-permit costs. Fossil-fuel suppliers are also required to submit information on their input fuel costs, typically the fuel-supply contract associated with the generation unit.

This information is used by the market operator to compute a variable cost for the generation unit: that is, the heat rate times the fuel price plus the variable operating and maintenance cost and other demonstrable volume-variable costs. The methodology used and the inputs provided by the supplier to compute this variable figure must be approved by the regulator before they can be used by the market operator. This regulator-certified generation-unit-level variable cost is then used by the market operator as the unit owner's offer price for energy to the short-term market.

Computing the variable cost of hydro-electric units in a cost-based market is complicated by the fact that these units have virtually zero variable costs of operation; but if they have storage capacity there is an opportunity cost associated with their use. Consequently, for run-of-the-river hydro-electric units, the fuel component of the unit's variable cost is entered as zero in the dispatch process when these units are able to operate. For hydro-electric units with significant storage capacity, the system operator typically solves a discrete dynamic programming problem using the variable costs of all the fossil-fuel units and forecasts of system demand over a long time horizon (typically at least 12 months) to compute the opportunity cost of water for each of these units. This opportunity cost of water is the fuel cost component of the variable cost of producing electricity for hydro-electric units with storage capacity. All LACs that use cost-based markets have a significant amount of hydro-electric capacity with variable costs determined in this manner. There are cost-based markets in LACs with more and less hydro-electric capacity than New Zealand and with more and less storage capacity than New Zealand.

The short-term market is dispatched and prices are set using these variable costs. All unit owners are paid the market-clearing price that results from this price-setting process. In a nodal pricing cost-based short-term market, each generation unit producing during the hour would be paid the nodal price at its location set using these regulated variable costs as each generation unit's offer price.

### Probing the pros

In a cost-based market, a large supplier no longer has the ability to raise the short-term prices paid to its generation units by submitting a willingness-to-supply curve with offer prices

that exceed the unit's variable cost of producing energy. A cost-based market also makes it more difficult for a supplier to exercise local market power when transmission constraints allow only its generation units to meet a local energy need. In a bid-based short-term market without a local market-power-mitigation mechanism, a supplier with the ability to exercise local market power can submit an extremely high offer price and still sell some energy in the short-term market.

This logic suggests that a cost-based short-term market may have a number of advantages in markets where a few suppliers own a significant fraction of the total installed generation capacity and there are not other market-power-mitigation mechanisms in place. First, it significantly limits opportunities for suppliers to exercise unilateral market power in the short-term market, because all offer prices are based on the regulator's estimate of the variable cost of production (including the opportunity cost of water for hydro-electric units with significant storage capacity). Second, assuming that the regulator publicly releases data on the operation of the short-term market, suppliers and prospective new entrants will have a much easier time forecasting short-term electricity prices in a cost-based market than they would in a bid-based market, because they will not have to forecast the ability of suppliers to exercise market power through their offer prices.

Hence, if the ability of generation unit owners to exercise unilateral market power is a major determinant of the mean and variance of prices in a short-term electricity market, a cost-based market eliminates the variation in spot electricity prices that occurs because of suppliers attempting to raise or lower these prices through their offer prices. A cost-based market should therefore reduce the cost of suppliers and load-serving entities signing forward contracts, because both parties to the contract will have less uncertainty about the time path of short-term prices over the duration of the contract. Both parties can compute forecasts of future short-term prices using the publicly available market outcome data along with the cost-based market dispatch algorithm.

### Counting the cons

Requiring suppliers to submit their regulated variable costs as their offer prices in a cost-based market does not completely eliminate

the incentive or ability of suppliers to exercise unilateral market power. These attempts to exercise unilateral market power simply take a different form. Specifically, suppliers can now be expected to attempt to raise their regulated costs of production or to declare outages from their units in order to withhold generation capacity and thereby raise short-term prices. Consequently, a necessary pre-condition for a cost-based market is that the regulator must have in place a mechanism for determining whether a supplier's reported production costs have been prudently incurred. In addition, the regulator must keep detailed records on unit outages and track these relative to historical and international benchmarks.

To set these regulated variable costs of production, the regulator must engage in more extensive data collection and analysis of market performance for input fuels and other inputs to the electricity production process. In addition, the regulator must enforce the fixed-price forward contract coverage requirement of retail demand described earlier.

### A useful transition tool

Besides its widespread use in LACs, a cost-based market mechanism was used in the Pennsylvania-New Jersey-Maryland Interconnection<sup>1</sup> (PJM) market in the United States during its initial year of operation as a nodal pricing market. By starting with a cost-based market and transitioning to a bid-based market, PJM limited the risk of significant unilateral market power being exercised during the early stages of the market. This illustrates a useful role of the cost-based model: it can serve as a transition arrangement between government control of the electricity market and a bid-based nodal pricing model such as New Zealand currently uses.

<sup>1</sup> A wholesale electricity market in the eastern US serving 60 million people in all or parts of 13 US states plus the District of Columbia.

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# Meditating On Market Mechanisms



In policy debates, 'the market' and 'the government' are pitted against each other almost inevitably as diametrically opposed means of mediating economic transactions. There must be only one 'winner', to whom all the spoils (or at least the credit for generating them) accrue. But, as Bronwyn Howell points out, there's another way of viewing this.

**I**n the economic debate, the market and the government are seldom construed as combatants in a 'winner-take-all' battle. Thanks to the 'transaction cost economics' view of Nobel Laureates Ronald Coase and his pupil Oliver Williamson, the market and the government (as proxies for decentralised and centralised control of transacting) are more commonly seen to sit at opposite ends of a continuum (see Figure 1). It is almost never the case that the most efficient organisation of economic activity in a sector is exclusively between independent actors in a decentralised market or entirely in accordance with a plan where all outcomes are predetermined centrally by autocratic fiat. Rather, the most efficient organisation is almost always within institutions positioned somewhere along the continuum between the market and the government.

## Grit in the machine

The key to determining whether that position is towards the market or government end of the continuum comes down to transaction costs – the expenses of trading with others above and beyond the price.

Coase identified that market transactions are not costless, and that this affects the organisation of economic activity. For example, when the cost of buying from other firms is low (such as when neighbouring firms transact frequently and can observe without cost the quality of goods exchanged) then a firm is more likely to buy supplies from others in the market than to make them itself. But when

these costs are high (such as when one firm owns an asset that is critical to the output of the other and can 'hold up' the purchaser by withholding supply) then it is less costly to have the relevant assets controlled within one firm. The output produced with the 'specific asset' is now governed internally rather than being transacted in a market.

Furthermore, Coase identified that positions on the continuum are not fixed. Changes in the costs of transacting (for example, when internet-mediated sales lower the cost of doing business) will inevitably lead to a reorganisation of transacting activities. This may be a shift along the continuum towards the market end as market-trading frictions are removed; but it may equally be a movement toward government, since the same technologies may facilitate centralised control (for example, centralised procurement or 'big data').

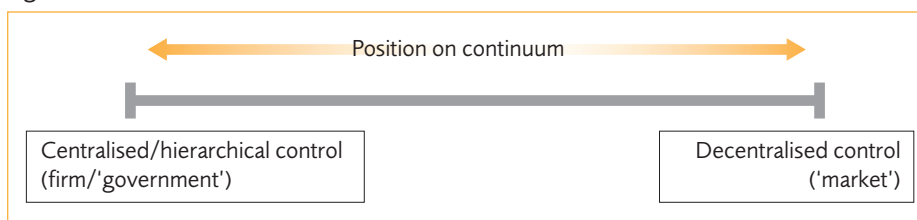
## The human factor

Williamson's contribution built upon Coase's. He observed that the costs of writing and executing complex contracts in a market will 'vary with the characteristics of the human decisionmakers who are involved with the transaction on the one hand, and the objective properties of the market on the other'. These human and environmental factors affect the transaction costs across markets *and* within firms (and governments). An important consideration is the interaction of information, uncertainty and the bounded rationality of

human actors. Williamson identified that transaction costs include the consequences of factors that humans know or can anticipate, and factors whose effects cannot be known or anticipated. The ways in which uncertainty ('risk') can affect the outcome of transactions can have profound effects upon the locus of activities along the continuum. Very different positions may emerge for what otherwise might appear to be near-identical activities, owing to subtle differences in the nature of the uncertainties faced in each case. And because information sets keep changing, the optimal position is not fixed.

Coase and Williamson's thinking identifies the complexities to be considered when contemplating the use of legislative and regulatory powers in arbitrarily positioning transactions in specific sectors at politically preferred places on the continuum (the 'privatisation' versus 'nationalisation' debates). Such political actions necessarily introduce an additional set of human decisionmaking characteristics into play. Political decisionmaking can be used to lower transaction costs (for example, regulations that shift transactions towards the 'hierarchical' end), but it is no less susceptible to uncertainty and bounded rationality than other human actions. In particular, greater centralisation tends to militate against the ability to lower transaction costs through a flexible realignment along the continuum; yet external shocks and changing information may suggest this would be the optimal response. Rigidity itself becomes a transaction cost to be considered when evaluating the costs and benefits of such an action.

Figure 1



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