



FINAL REPORT

## **Innovation and Competition**

### **Licensing of Mobile Services in Hong Kong**

PREPARED FOR  
HUTCHISON TELEPHONE COMPANY LIMITED  
AND HUTCHISON 3G (HK) LIMITED

19 JUNE 2004

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## Executive summary

This report examines OFTA's proposal to issue an additional 3G licence in Hong Kong, and assesses the rationales for taking such action based on economic theory.

There are two apparent rationales for the proposal:

- That more competition, through the presence of an additional competitor, will lead to more innovation;
- That if one (new) player is forced to innovate, the other (existing) competitors will be forced to follow by similarly innovating.

Based on an examination of economic theory regarding the relationship between competition and innovation, we conclude that the first rationale is unlikely to hold and that incentives to innovate would more likely be damaged than enhanced.

Based on an assessment of the necessary steps for the second rationale to hold, we conclude that there are serious doubts that it would be fulfilled; and in any event less prescriptive and interventionist means of promoting innovation should be considered.

## 1 Introduction

Hong Kong's telecommunications regulator OFTA has proposed a number of changes to the mobiles licensing structure in Hong Kong. These include:

- the recovery of Hutchison's CDMA spectrum, to be re-auctioned to a "data focused" fifth 3G operator to encourage more data services. The new licence would be subject to additional conditions requiring it to meet certain targets that represent an "active level of mobile data usage" such as a percentage of its network capacity dedicated to mobile data, a percentage of its user revenues to be derived from data, or an average volume of data usage by users; and
- a "first right of refusal" for existing 2G operators – except CDMA and TDMA operators – to bid on extensions to existing licenses to 2G spectrum.

OFTA believes that while Hong Kong has a highly competitive mobile market, with a penetration rate among the highest in the world, the take-up of mobile data and related applications is disproportionately low; and that such services, if developed, would increase revenues and spawn new industries in content and applications which would enhance Hong Kong's status as the mobile services hub in Asia<sup>1</sup>. Moreover, it clearly believes that the specific actions it proposes will support these goals.

In particular, OFTA seems to argue that facilitating entry by an additional mobile service provider, licensed to offer 3G services using the frequencies currently occupied by Hutchison's CDMA service, would, at least to some extent, solve the perceived problem with the development of mobile data offerings and the take-up of 3G services.

In this context, NECG has been asked to examine, on the basis of economic theory, whether the desired innovation outcomes are likely to result from OFTA's proposals. The objective of this report is to examine relationships between competition and the incentives to innovate and invest in new 3G services.

The rest of the report is structured as follows:

- In Section 2, we review OFTA's rationale for its additional 3G licence proposal;
- In Section 3, we examine some of the economic theories and empirical evidence outlining the relationship between competition and innovation, and the circumstances in which innovation is likely to occur; we find that the most convincing view is the

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<sup>1</sup> Licensing of Mobile Services on Expiry of Existing Licences for Second Generation Mobile Services: Analysis of Comments Received, Preliminary Conclusions and Further Consultation, 19 March 2004 (Second Consultation Paper), paragraphs 10 and 39-41.

description of the competition-innovation relationship as an inverted U curve where the relationship is positive up to a point where this effect vanishes and the reverse is true.

- In Section 4, we ask whether, applying the inverted U theory, Hong Kong's lack of mobile data innovation is the result of too much or too little competition, and explore some reasons why it appears likely to be the former.
- In Section 5, we examine the contention that one innovating player will result in the other existing players matching that innovation strategy.
- Section 6 summarises our conclusions.

## 2 OFTA's rationale

In this section, we examine OFTA's rationale for introducing a fifth 3G operator in Hong Kong.

The main argument put forward by OFTA in relation to the introduction of a fifth 3G licence is best summarised in Paragraphs 38 to 41 of its Second Consultation Paper, which read as follows<sup>2</sup>:

38 If Block A is made available for licensing, the TA sees opportunity for the introduction of various advanced and innovative mobile data services supported by the cdma2000 standard, which is currently not adopted by mobile operators in Hong Kong. Consumers in Hong Kong will be able to enjoy services similar to those that have become successful and popular in places like Japan and South Korea, but are not available from existing operators in Hong Kong. This will increase the choice of advanced mobile services for consumers.

39 The TA is mindful of the concern that the introduction of a new licensee may intensify competition, especially in the 3G services market. The TA wishes to make it clear that if Block A is to be made available for issuing a new licence, the objective would be to enable the introduction of advanced and innovative mobile services to benefit consumers, spawn new industries and enhance Hong Kong's status as a mobile services hub in Asia.

40 The new mobile licence to be issued will therefore carry more stringent licence conditions, especially on quality and variety of services. Parties interested in applying for the new licence would recognize that in order to make a viable business case, product differentiation via innovative data, content and application services would be crucial. The TA envisages that introduction of the new licence may change consumers' usage pattern of and enhance demand for mobile data services. This would give impetus to competitors to invest further in services as well as research and development to improve their service quality and variety rather than by cutting prices in the conventional voice services. In the end, the revenue potential of the market would be expanded to the benefit of all players.

41 Taking the factors in paragraphs 38 to 40 into account, the TA intends to make available Block A for licensing, with stringent conditions on quality and variety of services to pave the way for new and expanded services to be formulated. This will achieve the objective of promoting innovation, spawning new industries and enhancing Hong Kong's status as a mobile services hub in Asia.

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<sup>2</sup> Ibid Para 38 to 41

OFTA's rationale for believing that the additional 3G licence will deliver innovation therefore appears to be either (or some combination of) the following contentions:

1. That more competition, through the presence of an additional competitor, will lead to more innovation;
2. That if one (new) player is forced to innovate, the other (existing) competitors will be forced to follow by similarly innovating.

As a matter of economic theory, neither contention necessarily holds. Both of these are examined in more detail below.

### 3 The relationship between competition and innovation

This section examines OFTA's first contention: that more competition means more innovation. While the basic principle has some support in economic theory, it is not as unqualified as OFTA seems to believe, nor is it the accepted economic theory explaining how innovation works in markets. In this section, we review three broad approaches to the relationship between competition and product innovation: one which indicates a positive relationship (consistent with OFTA's view), one which indicates a negative relationship, and one which suggests a bell-curve or inverted U relationship, which synthesises the first two approaches and provides, in our view, a more robust and realistic view of innovation dynamics as the number of competitors increases.

#### 3.1 More competition, more innovation: supporting theory

##### Escaping competition

Broadly, this view is supported by the theory that firms innovate *to escape competition*.<sup>3</sup> This theory is based on the following general principle: firms will innovate if the profits from the new innovation exceed their current profits by more than the cost of the innovation. In other words, the decision to innovate depends not just on the quantum of gains from innovation (post-innovation rents) but also the difference between this and status quo (pre-innovation rents), offset by the costs of the innovation.

It follows that if the number of firms is low, and the incumbent firms enjoy high pre-innovation rents, then it will be more difficult to find the incentive to innovate and invest, because the innovation will need to “work harder” in order to out-perform the status quo. This is especially so if the new innovation is likely to threaten or cannibalise the pre-innovation rents in some way – since it is the incremental gain that is important.

On the other hand, if pre-innovation rents are low as a result of intense competition, then an innovation that offers even slightly higher rents is likely to be pursued, so long as it can cover its own costs.

Thus, following this theory, increasing the level of competition to which incumbents are exposed would lead to more innovation as it may reduce firms' pre-innovation rents by more than it reduces their post-innovation rents. In other words, competition may increase

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<sup>3</sup> The classic reference is Arrow K, 1962, “Economic welfare and the allocation of resources for inventions”, in: R. Nelson (ed.), *The Rate and Direction on Inventive Activity*, Princeton University Press, Princeton, pp. 609–626.

the incremental profits from innovating – not necessarily because it increases the post-innovation rents per se, but because it reduces the pre-innovation rents - thereby encouraging more investment in innovation aimed at *escaping competition*. An example of reduced pre-innovation rent is the impact of lower-cost voice over IP (VOIP) services on incumbent PSTN operators. Such an innovation enables new VOIP providers (innovators) to challenge PSTN providers to innovate – not because there are necessarily higher rents from VOIP, but because innovators can reduce the rents available to PSTN operators.

OFTA appears to assume that the ‘escaping competition’ effect will be the only driver of the decision to innovate and invest in 3G services. In other words, it believes that a fifth 3G operator would alter the incentives of 3G licence holder and leave them no choice but to innovate in order to recoup their investments.

However, there is a risk this presumed equivalence between the dynamic of innovation and incentive to escape price competition takes an overly simplistic view of the real world workings of markets and competitor incentives. The incentive to innovate must also be seen in the light of the “size of the prize”. Unless it is large, the escaping competition argument may not be very strong because (1) the innovative leader’s reward is not large given the fixed costs of innovation; and (2) the laggard’s reward for catching up with the innovative leader is small. This leads to the necessity to consider alternative theories which explain the relationship between innovation and the intensity of competition.

### 3.2 More competition, less innovation: supporting theories

#### The Schumpeterian effect

Some elements of *industrial organisation* theory<sup>4</sup> and the more recent literature on *endogenous growth*<sup>5</sup> predict that innovation should *decline* with competition, as more competition reduces the rents that reward entry by new successful innovators. This is the so-called *Schumpeterian effect*.<sup>6</sup> In other words, market structure conditions the expectations of how much rent can be appropriated (that is, the “appropriability” of rents) and therefore how much reward can be expected<sup>7</sup>. To have the incentive to undertake new

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<sup>4</sup> See for example, Vives X, 2004, “Innovation and Competitive Pressure”, CEPR 4369.

<sup>5</sup> Aghion P and Howitt P, 1992, “A Model of Growth through Creative Destruction”, *Econometrica*, 60-2:323-351.

<sup>6</sup> Named after Joseph Schumpeter. See Schumpeter, J. 1942, *Capitalism, Socialism, and Democracy*. Harper and Row, New York.

<sup>7</sup> Classic models of innovation analyse a patent race: as the number of symmetric competitors increases, the likelihood of a given firm winning a patent race (and obtaining the rents) decreases. Dasgupta, P. and Stiglitz, J.E., 1980, ‘Uncertainty, industrial structure and the speed of R&D’, *Bell Journal of Economics*, 11:1–28.

product development, a firm must be able to appropriate returns from the product innovation to make the investment worthwhile<sup>8</sup>. As the number of innovators increases, the expected return that an innovator can expect to appropriate will fall. As appropriability falls, so does the incentive to innovate.

Importantly, if there are too many firms in the industry, competition will force the price of their current product(s) down. Moreover, any firm that successfully innovates will be able to sell the new (higher-quality) product (for example, 3G mobile data services) only if it is also priced low enough to remain attractive in comparison to the lower quality one (that is, the current 2G and 2.5G mobile services). However, if the price of the new product does not even cover the cost of innovation (or the cost of 3G network upgrades), there will be no firm in such an industry that has incentive to innovate.

The implication of this view is that an increase in the number of operators would destroy rather than enhance the incentives to innovate, a possibility that has been recognised by OFTA, although not in the current consultation process. For example, OFTA explicitly warned against the danger of a one-sided view, in the following paragraphs:

Assessments of the introduction and impact of competition tend to focus more on the analysis of price, product and service innovation, and consumer take-up in the liberalised industry. This focus reflects the direct benefits that end-users derive from a competitive market. However, an understanding of operator investment behaviour is also important as it has implications as to whether the introduction of competition will actually mean more choice for end-users and the extent to which operators will be innovative with their development and deployment of new services and products in the long run.<sup>9</sup>

Competition in the Hong Kong telecommunications market is intense, but in the heat of competition, telecommunications operators should not neglect the importance of quality of service. [...] To pursue only the lowest price while neglecting aftersale service, investment with the result of degraded quality of service and lack of advanced or innovative service would be a very short-sighted strategy, bringing no long-term benefits to the Hong Kong economy and consumers.<sup>10</sup>

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<sup>8</sup> For example, Hausman and Mackie-Mason show that price discrimination by patent holders is not necessarily a socially undesirable exploitation of monopoly power. See Hausman J A and Mackie-Mason J K, 1988. Price Discrimination and Patent Policy, *RAND Journal of Economics*, 19-2:253-265.

<sup>9</sup> See OFTA, “Report on the Effectiveness of Competition in Hong Kong’s Telecommunications Market: An International Comparison”, June 2003, Available at <http://www.ofta.gov.hk/report-paper-guide/report/rp20030620.pdf>, at page 25.

<sup>10</sup> See OFTA, M H Au, “To Maintain an Open and Fair Environment for Competition so as to Enhance Hong Kong’s Competitive Edge in the Telecommunications Industry”, 16 September 2003, speech at the Seminar on “Development of the Telecommunications Industry”. Available at [http://www.ofta.gov.hk/speech-presentation/dg\\_20030916.pdf](http://www.ofta.gov.hk/speech-presentation/dg_20030916.pdf), at pages 1 ff

OFTA has also previously commented on appropriability of rents as follows:

Prices may be competitive in Hong Kong, but this needs (sic) not be a deterrent for investment. The basic objective of doing business is to earn a return commensurate with risk. Monopoly rent is not required to induce investment.<sup>11</sup>

OFTA is correct to foreshadow that investments need to generate rewards that are commensurate with risks. It is also correct to note the monopoly rents are not required for investment to occur. However, OFTA appears to have confused the two concepts.

Monopoly rents are not at issue here. OFTA's own report on the effectiveness of competition noted a "high level of competition" in mobiles, with the lowest population-to-operator ratio and the lowest mobile sector concentration ratio of all countries examined<sup>12</sup>. It concluded that competition in Hong Kong has been very effective, with the highest mobile penetration rates and rapid price declines<sup>13</sup>. Monopoly rents, therefore, are not a present danger.

The appropriability of quasi-rents from innovation is very different to the creation of monopoly rents. It is not a danger to be avoided; it is a necessary condition for innovation to occur. By reducing the appropriability of rents (through creating a new operator) OFTA destroys the incentive to innovate – quite the opposite of what it intends.

Generally, competitive firms will undertake investments in innovation to the point where the marginal return of such investment equals the marginal cost of innovation. In this case, they would not earn monopoly rents, defined as ability to earn economic profits by restricting output.<sup>14</sup> Enabling firms to appropriate rents is important to the level of innovation. With more appropriability, more investment projects satisfy the cut-off criterion, leading to more spending on innovation.

This is especially so in circumstances of high risk or uncertainty. Here, the rewards for successful innovation must be higher in order to induce the investment, because at the same time, the heightened risk environment means that more failures will occur. Again, those rents are not monopoly rents but simply the return to risk-taking.

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<sup>11</sup> See OFTA, M H Au, "Telecommunications Market in Hong Kong: Cultivating an Environment Conducive to Investment", available at

[http://www.ofta.gov.hk/speech-presentation/ddg\\_20021130.pdf](http://www.ofta.gov.hk/speech-presentation/ddg_20021130.pdf), page 4.

<sup>12</sup> *OFTA Report on the Effectiveness of Competition in Hong Kong's Telecommunications Market: An International Comparison*, June 2003, Spectrum Strategy Consultants. Pages 10 – 12.

<sup>13</sup> *Ibid*, page 27.

<sup>14</sup> If there are economies of scope and/scale or if firms differ have different cost structures, they may secure some (Bertrand or Ricardian) rents but these rents do not arise as a result of a monopolist's restriction of output. For example, if a firm has a comparative advantage in innovation, it may earn a superior return, without monopolisation.

### Firm size and deep pockets

A further theory which indirectly supports “more competition, less innovation” (in contrast to OFTA’s view of “more competition more innovation”) can broadly be described as the *firm size theory*<sup>15</sup>. Broadly, this suggests that innovation is correlated with firm size because:

- innovative projects typically involve large fixed costs, and these can only be covered if sales are sufficiently large;
- there are scale and scope economies in the production of innovations;
- large diversified firms are in a better position to exploit unforeseen innovations
- large firms can undertake many projects at any one time and hence spread the risks of R&D; and
- large firms have better access to external finance.

The *deep pocket* theory goes hand in hand with this. The ability to provide internal funding obviates the need for external capital-raising to fund R&D and other innovation activities. Due to risks and information asymmetries, obtaining such external funding can be difficult and expensive. The result is that deep-pocket firms – generally larger firms – find it easier to innovate.

Some empirical evidence, for example in the telecommunications industry, has substantiated these theories. In a recent study<sup>16</sup> that examined the decisions of all incumbent local exchange companies in the United States to deploy advanced telecommunications services within each of their serving areas, it was found that large providers are more likely to innovate.

### 3.3 Resolving the views: the inverted U theory

Other theories have cast further doubt on whether either of these ‘linear’ views of the relationship between competition and innovation can suffice.

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<sup>15</sup> See Kamien M I and Schwartz N L, 1982, *Market Structure and Innovation*, Cambridge University Press; and Cohen W, 1995, “Empirical Studies of Innovative Activity”, in P. Stoneman (ed.), *Handbook of the Economics of Innovation and Technological Change*, Blackwell for surveys of the literature.

<sup>16</sup> Gabel D and Floyd E, 2003, “An Econometric Analysis of the Factors that Influence the Deployment of Advanced Telecommunications Services”, presented at TPRC, Alexandria, Va., September 20-21, 2003.

### Market share

For example, one study<sup>17</sup> arrived at an interesting combination of the views above: first, they found a positive correlation between product market competition and product innovation, thus supporting the “more competition, more innovation” view. But they went on to find that firms with a higher market share tend to innovate more. They concluded not only that firms with high market share tend to produce more innovations than smaller firms, but that these innovations were of a higher quality.

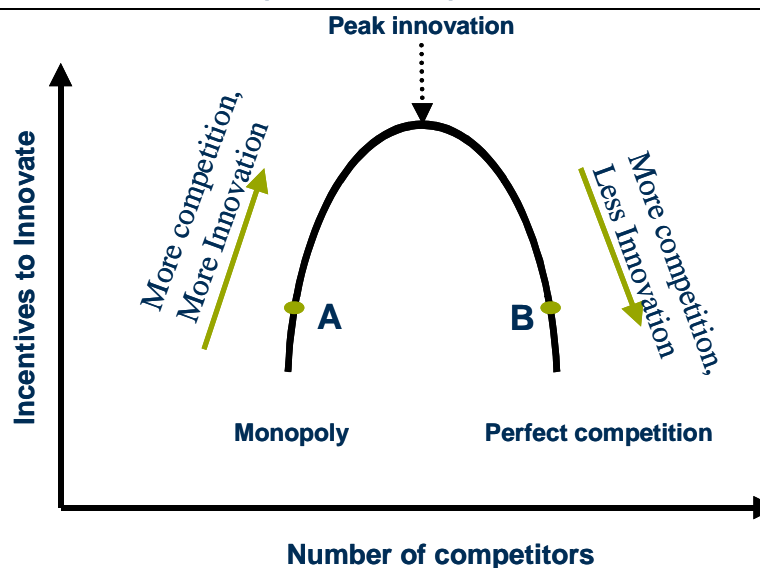
### Inverted U theory

The conflict between these two approaches is resolved by a further theory known as the *inverted U* or *bell-curve* theory<sup>18</sup>. This theory holds that the relationship between competition and innovation is positive up to a point where this effect vanishes and the reverse is true, creating a bell shaped or inverted U curve to describe the competition-innovation relationship. In other words, the *escape competition* effect tends to dominate for low levels of competition, whereas the *Schumpeterian effect* tends to dominate at higher levels of competition. As illustrated in the graph below, the optimal number of firms is determined by the point beyond which firms would not appropriate the benefits of their innovation because of excessive competition.

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<sup>17</sup> Blundell R., R. Griffith and J. Van Reenen (1999), “Market Share, Market Value and Innovation in a Panel of British Manufacturing Firms”, *The Review of Economic Studies*, 66 (3): 529-554.

<sup>18</sup> See for example Loury G C, 1979, “Market structure and innovation”, *Quarterly Journal of Economics*, 93:395-410 and Scherer, F M, 1967, “Market structure and the employment of scientists and engineers”, *American Economic Review* 57:524-531..

Chart 1 **Inverted U relationship between competition and innovation**

This view of the world is supported by strong empirical evidence. For example, Scott<sup>19</sup> examined the relation between R&D intensity and concentration index across all the US Federal Trade Commission lines of business and corroborated the findings, a result also confirmed by Levin, Cohen and Mowery<sup>20</sup>. Most recently, Aghion et al. confronted the inverted-U prediction with data on UK firms' patenting activity at the US patenting office, which was found to accord well with observed behaviour.<sup>21</sup> Overall, these studies confirm the existence of an 'innovation-optimising' concentration level, which is intermediate between pure monopoly and perfect competition.

Importantly, this inverted U relationship indicates that two very different conclusions could be drawn from the same observation. A low take-up of 3G services in a given market and an apparent lack of incentive to innovate may correspond to a situation in which there is not enough competition (point A) or to a situation in which there is too much competition (point B). The mere evidence that there is a low penetration of mobile data services is not enough to conclude the appropriate remedy (even assuming a remedy

<sup>19</sup> Scott, J. 1984, "Firm Versus Industry Variability In R&D Intensity", in Z. Griliches (Ed) *R & D, Patents And Productivity*, University of Chicago Press. Scott uses a cross-section statistical study of over 400 large firms with over 3000 observations on their activities in various industries.

<sup>20</sup> Levin, R., W. Cohen and D. Mowery. 1985. "R&D Appropriability, Opportunity And Market Structure: New Evidence On Some Schumpeterian Hypotheses." *American Economics Review Proceedings*, 75: 20–24.

<sup>21</sup> Philippe Aghion, Nicholas Bloom, Richard Blundell, Rachel Griffith, and Peter Howitt, 2002, "Competition and Innovation: An Inverted U Relationship", *NBER Working Paper No. W9269*

is actually needed). An additional entrant may foster the incentive to innovate (if that market was at point A) or hurt them further (if that market was at point B).

Hence, while OFTA's contention is that an additional licence would invariably assist in generating more innovative wireless data services (under theories outlined in the first view), this is unlikely because:

- it is unlikely to be the only impact on incentives to innovate since the Schumpeterian effect is likely to be more evident as the number of firms increases and appropriability decreases; and
- in any event it is less likely to occur where there are already high levels of competition (that is, past some point, competition is already intense and hence an additional competitor does not add any further incentive to innovate).

## 4 Too much or too little competition in Hong Kong

Given the range of theories above, it must be asked: is the lack of mobile data innovation in Hong Kong a result of too little competition, or too much? In the language of inverted U theory, is Hong Kong on the left or the right of the innovation peak?

The answer to this question will then lead to the assessment of the likely effect of a hypothetical fifth 3G operators on innovation. If the current situation corresponds to a point on the left of the optimal number of firms, then a 5<sup>th</sup> operator would foster innovation. If it corresponds to a point on the right, then auctioning a 5<sup>th</sup> licence would have the opposite effect: innovation would be harmed.

The question of the optimal number of firms in a market is a long-standing one. In the world of mobile telecommunications, all regulatory authorities and/or governments had had to assess the different elements of this choice during the spectrum allocation process<sup>22</sup> (including OFTA in setting out its licensing arrangements for mobile services).

Now, while the question of the optimal number of mobile licences is complex, there are several indicators that suggest there is already too much competition relative to the innovation-optimising point.

### Market already highly competitive

First, virtually all the stakeholders (including OFTA) agree that the mobile market is already fiercely competitive. With eleven networks, operated by six firms, the Hong Kong market is one of the most competitive and fragmented in the world. For example, in its Report on the Effectiveness of Competition in Hong Kong's Telecommunications Market, OFTA reports the following concentration indices<sup>23</sup>:

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<sup>22</sup> Some variables of choice may not have been limited to efficiency considerations. Political interest and public finance objectives may have been included in the assessment.

<sup>23</sup> OFTA, 2003, *Report on the Effectiveness of Competition in Hong Kong's Telecommunications Market: An International Comparison*, June 2003 available at <http://www.ofa.gov.hk/report-paper-guide/report/rp20030620.pdf>

Table 1: **Selected Mobile sector concentration ratio**

Country	HHI
Japan	0.449
South Korea	0.407
Sweden	0.376
Singapore	0.376
Australia	0.349
United Kingdom	0.250
Hong Kong	0.193

Source: OFTA Report on the Effectiveness of Competition, Spectrum Analysis, op cit

A simple comparison of the number of operators in Hong Kong shows that it already has more operators than most comparable countries – including countries which are much larger and which enjoy higher levels of innovation than Hong Kong.

Six operators (four of whom hold 3G licences) in Hong Kong is the highest of all countries used by OFTA as appropriate comparators<sup>24</sup>:

Table 2: **Number of mobile operators**

Country	Number of operators
Japan	3
South Korea	3
Sweden	4
Singapore	3
Australia	4
United Kingdom	5
Hong Kong	6

In addition to the market structure, the performance of the mobile market is consistent with the outcomes that would be expected in a competitive market. For example, the mobile penetration rate is above 95% and prices for traditional mobile voice telephony are considered low.<sup>25</sup> Therefore, if there is a lack of innovation, it seems difficult to argue that this is because of a lack of competition under any of the theoretical frameworks outlined in section 3.

Interestingly, OFTA seems to put forward the Japanese and Korean experiences in support of its proposed actions. As explained below, Japan and Korea have fewer mobile network

<sup>24</sup> Ibid.

<sup>25</sup> See OFTA Report on the Effectiveness of Competition, Spectrum Analysis, op cit.

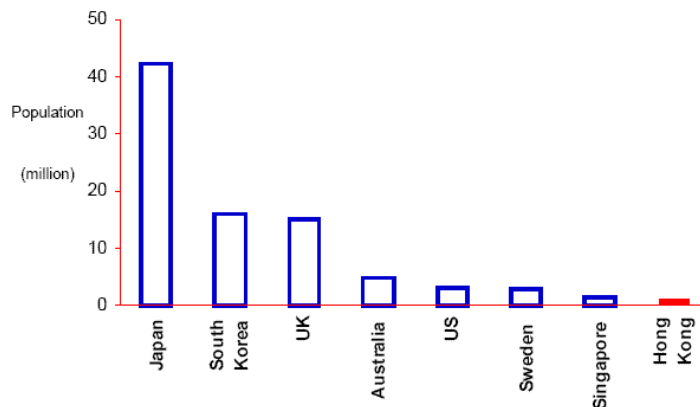
operators than Hong Kong and hence, if anything, their relative success tend to prove that Hong Kong is already on the right-hand side of the inverted U curve.

**Hong Kong is a small market, with each network operator servicing a only small average customer base**

Second, Hong Kong has a much smaller population than most of these countries. Japan and South Korea are much larger; Australia is significantly larger. Even these countries sustain fewer operators than are already present in Hong Kong.

The large number of operators in Hong Kong, compounded with its small population, means that operators can serve only small average number of customers. In fact, it is the lowest of all the countries included in OFTA’s report.

Chart 2: Average population base per mobile network operator



Data source: Exhibit 9, page 10, OFTA Report on the Effectiveness of Competition, Spectrum Analysis, op cit

Hong Kong operators therefore do not seem to benefit from economies of scale via a large customer base, which limit their ability to spread the fixed costs of innovation over a large number of customers, or to reap large aggregated benefits of higher ARPUs.

In these circumstances, all other things being equal, the difference between the post-innovations rents and the costs of innovation (eg: the 3G upgrade) may be small. This is because the size of the Hong Kong market would not allow for the realisation of economies of scale, that, say, Japanese and Korean mobile operator can enjoy. More importantly, since these post-innovation rents, net of investment costs, are at the source of

the (Schumpeterian) incentives to innovate, it follows that the optimal number of firms would be smaller in Hong Kong than in larger markets<sup>26</sup>.

### Hong Kong has no large market leader

Third, not only the market is highly competitive, but also the largest firm has a small market share<sup>27</sup>, relative to countries where mobile data innovations have taken place.

For example, Japan and South Korea, considered by OFTA as examples of countries with successful innovations in data mobile services, both have high concentration indices; in addition, they each have in their market a large leader, as illustrated in the next tables.

Table 3: **Japan's providers of mobile data services**

Mobile Operators	Market Shares
J-Phone	17%
DoCoMo	57%
KDDI	26%

Source: PA Consulting Japan/Korea Report, March 2004

Table 4: **South Korea's providers of mobile data services**

Mobile Operators	Market Shares
LGT	15%
KTF	32%
SKT	53%

Source: PA Consulting Japan/Korea Report, February 2003

On the other hand, in Hong Kong, the market is significantly less concentrated and no single operator has a market share in excess of 50%, as do DoCoMo and KTF in their respective markets.

<sup>26</sup> The inverted U curve is translated to the left, as the market size is reduced.

<sup>27</sup> Note that this is not necessarily the case. Some markets with a large number of firms may still have a relatively large player.

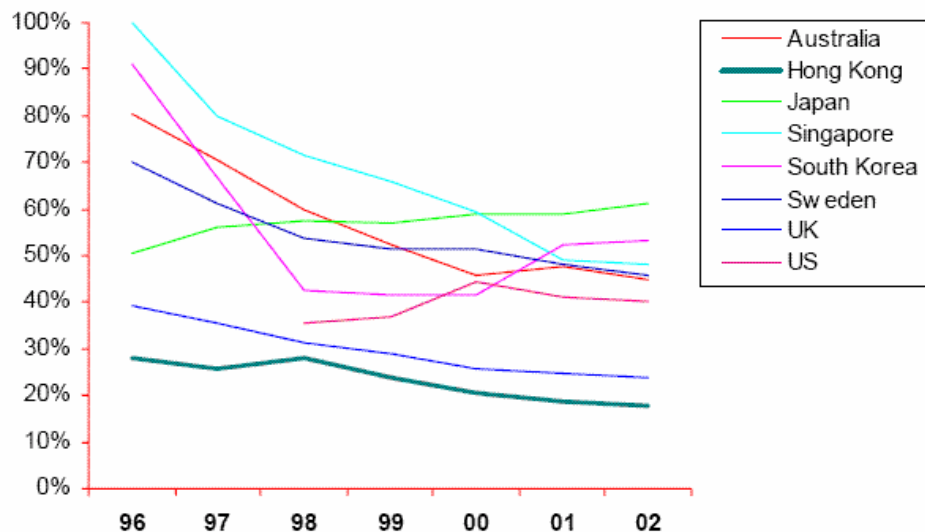
Table 5: **Hong Kong Mobile Operators**

Mobile Operators	Market Shares
Hong Kong CSL	15%
Hutchison	29%
Smartone	15%
Sunday Hong Kong	10%
New World	16%
Peoples Telephone	15%

Source: Asia Pacific Wireless Analyst (20 January 2004), September 2003

Compared to Japan, Korea and other jurisdictions, Hong Kong’s largest mobile operator has a relatively small market share, as illustrated in the following chart.

Chart 3: **Mobile market share of incumbent operators**



Data source: Exhibit 9, page 12, OFTA Report on the Effectiveness of Competition, Spectrum Analysis, op cit

In these circumstances, the economic theories outlined above regarding *firm size* and *deep pockets* suggest that under such conditions, firms will find it difficult to innovate. Bigger firms, with larger customer bases, would not find it as difficult.

**Conclusion to first contention (“more competition means more innovation”)**

On the basis of the above, it is therefore reasonable to expect that Hong Kong is more likely to be on the right side of the innovation ‘peak’ than on the left. The first contention – that more competition, through the presence of an additional competitor, will lead to more innovation – therefore appears unlikely to hold true. In these circumstances,

the proposed additional licence is more likely to damage than enhance the prospects for mobile data innovation.

## 5 One innovates, all innovate: the dynamics of innovation competition

This section examines OFTA's second contention - that if one (new) player is forced to innovate, the other (existing) competitors will be forced to follow by similarly innovating. This can be described as a "one innovates, all innovate" view.

Spelt out more fully, this contention relies on each of the following steps in order to deliver the desired result:

### **That a new player will be able to successfully innovate based on the licence that would be issued**

OFTA's paper does not reveal the basis on which it believes that such a licence, with its highly prescriptive outcomes-focussed conditions, can support a positive business case and successfully sustain a new 3G operator. However, this is clearly an essential step in delivering innovation according to OFTA's plan. It appears to have been assumed rather than proven or even yet examined.

### **That such innovation would represent a substantial competitive threat to the other operators**

OFTA provides no insight into why it believes this would be the case. Given that no operator has yet chosen to pursue such an innovation strategy in order to gain a competitive advantage over its rivals, this question requires consideration by OFTA. Based on the current market conditions in Hong Kong, we believe that the impact of innovative mobile data services is still very uncertain – for the obvious reason that, up to now, the take-up has been very low. In other words, OFTA's second contention, which relies on the assertion that mobile data will provide a strong comparative advantage, seems to be contradicted by the current licence holders' hesitancy to innovate.

### **That the other operators would respond to that threat by matching the innovation**

Again, OFTA does not explain why the current operators would necessarily choose or be in a position to respond by following the entrant's mobile data innovation strategy. There are several reasons why this might not be the case.

First, market rationalisation - eg the bankruptcy of one or several current mobile network operators - may be a non-trivial alternative possibility.

Second, even if they had the financial capacity to do so, they may choose not to do so, or, at least not in the short run. A number of empirical studies have looked at the occurrence and nature of reaction of incumbents to innovation by a firm previously **not** operating in the industry. This reaction tends to be slow and it was found that the more innovative the rival's new product introduction, the longer it takes to mount a response.<sup>28</sup> Moreover, even when the incumbent does respond to an outsider's innovation it tends not to do so successfully.<sup>29</sup>

Third, applying the inverted U theory outlined above, if Hong Kong is indeed to the right of the innovation peak, then innovation by all may be unlikely even if one player does. The constraints noted by firm size and deep pocket theories may prevent it.

### **That this is the most efficient means of delivering innovation**

Finally, it should also be demonstrated that this is the most efficient means by which innovation can be delivered. Given the highly prescriptive nature of the regulatory intervention (with proposed licence conditions including quotas on the network capacity, user revenues, and/or volumes of data usage), it must be asked whether other courses of regulatory action might be more conducive to innovation.

In laying down prescriptive licence conditions, OFTA clearly believes that it is able to anticipate conditions that correlate with what is socially desirable. Either it is correct in making these judgements, or it is not.

- If OFTA is correctly anticipates them, then the intervention is *unnecessary* - since in Hong Kong's competitive mobiles environment, innovations that are valued would be delivered in any event by the existing players
- If OFTA is not correct, then the intervention is *positively harmful* – because poor innovation will impede or drive out better innovation. This is because the conditions for valuable innovation to take place would be distorted by the existence of an inferior substitute. Furthermore, the existence of quotas would constraint the entrant's ability to efficiently respond to market demand. For example,
  - the new entrant might develop an innovation which is more desirable than an existing one, but which will damage its ability to meet the quota requirements (eg because it uses less capacity and will reduce the volume of data used, contrary to licence requirements); and

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<sup>28</sup> See MacMillan, I., M.L. McCaffery, and G. Van Wijk, (1985) "Competitors' responses to easily imitated new products - exploring commercial banking product introductions," *Strategic Management Journal*, 6:75-86; and also Robinson, W.T., (1988) "Marketing mix reactions to entry," *Marketing Science*, 7-4: 368-385.

<sup>29</sup> Gatignon H, T.S. Robertson and A.J. Fein, 1997, "Incumbent defense strategies against new product entry," *International Journal of Research in Marketing*, 14, 163-176

- new innovations by existing players would have to compete against compulsorily produced innovations by the entrant, reducing returns and incentives to develop such new innovations.

Thus, better innovations would be blocked by the prescriptions laid down in the new entrants licence.

Other courses of regulatory action should be considered - including the option of regulatory forbearance and preserving the status quo.

**Conclusion to second contention (“one innovates, all innovate”)**

Given that some of the above essential steps appear questionable, there are serious doubts as to whether an additional 3G licence, and the conditions upon which it would be issued, could shift the basis of competition away from price and lead all competitors to match the new entrant’s innovation strategy.

## 6 Conclusion

In the light of the foregoing discussion on the link between competition and innovation, it appears that the “more competition means more innovation” view is far too simplistic. Both economic theory and empirical evidence stress that some trade-offs are involved and that a one-sided view of the world is, as often, not reasonable. Having studied the issue for forty years, both at the theoretical and empirical levels, Scherer states:

The only simple conclusion stemming from [his work] and much other theoretical research stimulated by Schumpeter’s original conjectures is that the links between market structure, innovation, and economic welfare are extremely complex.<sup>30</sup>

Ignoring this complexity, OFTA’s preliminary conclusion assumes an unqualified yes.

While OFTA’s analysis is quite short, it seems to rely on the following assumptions:

- more competition means more innovation; and
- the entry of a heavily-regulated 3G innovator would pave the way for new and expanded services to be formulated.

Economics, both theoretical and empirical, establishes that

- more competition can harm innovation; and
- innovation by an entrant, especially when it is regulated, may not foster the virtuous innovative circle OFTA seems to anticipate.

Overall, we have serious doubts that innovation will occur as a result of OFTA’s proposed actions, indeed, it seems likely that these actions could harm, rather than improve, the efficient innovation of the Hong Kong mobile industry in general, and of the development of 3G mobile data services in particular.

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<sup>30</sup> Scherer F M, 1992, “Schumpeter and plausible capitalism”, *Journal of Economic Literature*, 30-3:1416-1433.

## Company overview

### NECG

The Network Economics Consulting Group (NECG) is an Australian consultancy with extensive international affiliations that undertakes work on a range of economic, regulatory, competition, trade practices and related issues for private sector and government clients in many regulated and unregulated industries.

### Who are we?

NECG consists of more than 50 consultants and research and support staff based at our head office in Canberra and in Sydney, and Melbourne. Augmenting our core team is an international network of other experienced people, including academics and industry and government experts, who share the same commitment to achieving the highest possible standard of work for our clients.

### Who uses NECG's services?

NECG's client base comprises participants in every major industry, most notably, telecommunications, new media, energy, water, transport and logistics, health, insurance, and financial services, and in the field of intellectual property. Among the clients who seek NECG's assistance are private and public companies, national and state regulators, international agencies, financial institutions, law firms, government entities, industry and professional service associations, key decision makers and those who advise them, and other industry participants.

### Our services

NECG undertakes assignments for domestic and international clients on the economic aspects of regulation, competition policy, trade practices, intellectual property rights and related issues. Much of this work requires developing and applying new ways to accurately model market behaviour and the effects of regulation and trade practices legislation on business transactions and growth strategies.

NECG's consultants have extensive experience advising on access pricing issues for regulated services in relation to applications for declaration, commercial negotiations and access disputes, and proposed undertakings before the Australian Competition and Consumer Commission (ACCC).

They also formulate responses to regulatory and pricing reviews, and provide analysis and expert evidence for regulatory and legal disputes in matters that have included landmark trade practices litigation.

NECG's work also covers privatisations, infrastructure appraisals, anti-competitive conduct investigations, mergers and acquisitions, regulatory risk analyses, financing, public policy analysis, and other diverse matters requiring careful assessment and strategic input.

In brief, NECG supports its clients by providing:

- Economic analysis of regulatory and competition issues facing firms
- Modelling of costs for regulatory and commercial purposes
- Assessment of prices, with a particular focus on regulatory compliance and analysis of the competitive dynamics in markets
- Quantitative and qualitative assessments of public policies, including cost benefit studies and the identification and evaluation of alternative policy options
- Preparation of reports and submissions to government inquiries and reviews
- Independent advice and analysis, including the preparation of expert statements, to assist lawyers, companies, and government policy and regulatory bodies involved in review and legislative proceedings
- Short courses, seminars and private briefings

### **NECG's focus**

NECG brings to assignments an in-depth understanding of its clients' circumstances and the industry and regulatory environments in which they operate. Our consultants take a practical and commercial approach to often highly complex and technical issues that have a direct bearing on problems faced by industry, government and investors. They also understand the need for timely and cost-effective work that is easily accessible to both technical and general audiences.

## Client Projects

### Telecommunications

Advising a major Australian telecommunications corporation on regulatory and competition issues, including analysing costing and pricing issues, and assisting with major ACCC investigations and proceedings.

Assisting a major carrier to develop its approach to third party access arrangements for a new service, and modelling the implications of alternative approaches to the pricing of that service.

Preparing a submission on the drafting of the new European telecommunications regime for a major Italian telecommunications corporation.

Providing telecommunications interconnection resources drawn from international best practice and adapted to meet the range of market and regulatory conditions within economies forming part of Asia Pacific Economic Cooperation (APEC).

### Gas

Providing expert evidence that has proved significant in numerous high-profile proceedings, including a landmark decision by the Australian Competition Tribunal to allow a multinational gas pipeline owner to operate uncovered by the national gas code. In advising the pipeline owner, NECG's evidence centred on market power and access issues.

Providing advice on the cost of capital for regulatory purposes, including asymmetric risk and market risk premium.

### Electricity

Advising a major generator and the National Generators' Forum on proposals by the National Electricity Code Administrator to restrict the circumstances in which rebidding should be allowed in the Australian national electricity market.

Analysing electricity markets and the mechanisms used to determine electricity distribution charges, focusing notably on the distinctions between price cap and rate of return regulation issues.

Advising on the privatisation of assets in South Australia's electricity sector arising from reforms throughout Australia and broader competition policy initiatives.

Reviewing the Northern Territory's high voltage electricity access regime for the National Competition Council.

## **Water**

Providing regulatory advice to a major water provider on a range of matters, including the importance and implications of unbundling tradable water entitlements from infrastructure entitlements; factors that affect the valuation of tradable water entitlements; an appropriate rate of return for water businesses, and strategies to deal with past contributions from customers.

Assessing the economic impact on the national and regional economies of water storage infrastructure in the Burnett region of central Queensland, and examining the economic and financial viability of the development.

Advising a major owner and operator of water infrastructure on the economic, strategic and commercial aspects of economic regulation.

## **Rail**

Advising a consortium on its successful bid for more than \$1 billion of Australian government-owned freight rail businesses.

Advising the Office of the South Australian Independent Industry Regulator on pricing and service guidelines for access to the Tarcoola-Darwin railway.

Advising the National Competition Council on the Western Australian rail access regime, including detailed analysis of the proposed asset valuation approaches.

Assisting a freight and transport company in relation to its application to the National Competition Council for the declaration of rail assets.

## **Airports**

Modelling the costs and benefits to the Australian economy from changes in the market structure of the Australian airline industry following Ansett's collapse.

Advising a consortium bidding to lease Sydney Airport on the impacts of economic regulation.

Analysing for the ACCC draft aeronautical pricing proposals based on a dual till approach submitted by the Sydney Airport Corporation Ltd.

Advising an international airline company during the course of statutory consultations with airports, and assisting with submissions to the Commerce Commission inquiry into airport pricing in New Zealand.

### **Financial services**

Analysing credit and debit payment card networks in Australia; work that has included, as part of a detailed analysis of the impact of proposals by the Reserve Bank of Australia to reform the credit card system in Australia, evaluating the impact of card scheme rules against surcharging in promoting economic efficiency, and analysing the role of interchange fees in securing efficient levels of network membership and usage.

### **Health services**

Analysing the economic characteristics of the therapeutic blood products market in Australia to enable the Commonwealth Government to determine how best to secure essential blood products. This work included assessing the economic and productive capacity of the Australian plasma fractionation industry, and the balance of future domestic needs and export opportunities.

Providing advice to the Victorian Department of Human Resources on price regulation in respect of certain hospital outlays. NECG's recommendations were accepted and are now the basis of policy in this area in Victoria.

### **Access to essential infrastructure**

Preparing submissions to the Productivity Commission inquiry into Part IIIA of the Trade Practices Act 1974 and Clause 6 of the Competition Principles Agreement governing access to essential infrastructure facilities. More than 20 corporations and industry associations, representing the bulk of suppliers in the airport, electricity and telecommunications industries in Australia, endorsed NECG's comprehensive submissions that made numerous recommendations for improvements to the national access regime.

### **Intellectual property**

Assisting the ACCC in its consideration of possible impacts of reforms to s.51(3) of the Trade Practices Act.

Organising and conducting a workshop for the New Zealand Ministry of Economic Development on copyright in a digital age.

## Trade practices

Advising the ACCC throughout legal proceedings issued against record companies and others for breaches of ss.45, 46 and 47 of the Trade Practices Act involving the parallel imports of sound recordings. In a landmark ruling handed down in December 2001, the Federal Court of Australia found the companies involved had breached ss.46 and 47 of the Trade Practices Act 1974 dealing with misuse of market power and exclusive dealing. NECG provided economic advice to the ACCC, and Managing Director Henry Ergas was the expert witness on behalf of the ACCC.

Advising the ACCC in its intervention in proceedings before the High Court of Australia involving a Federal Court decision on whether Melway Publishing Pty Ltd had breached s.46 of the Trade Practices Act. The ACCC's intervention led to a significant clarification of the test relevant to determining whether a firm had "taken advantage" of market power.

## Mergers and acquisitions

Providing reports on the economic issues relevant to s.50 of the Trade Practices Act during work conducted for:

- Australia's leading provider of integrated transportation and logistics services in relation to the company's acquisition of National Rail and Freightcorp, and
- a client's proposed merger in the printing and publishing industry.

Advising a major international airline carrier on regulatory, trade practices and wider economic issues associated with a planned acquisition of airline interests in Australia.

Advising on the potential for efficiency gains in a merger between two gas producers and securing regulatory approval for the transaction.

Advising a multinational corporation on its purchase of New Zealand's largest oil and gas producer, work that involved consideration of the existence and application of market power and the effects on competition.

## Labour market issues

Developing a model for one of Australia's largest employers of the impact of demographic trends on its recruitment and labour force retention policies.

## Henry Ergas – Managing Director

The managing director of NECG, Henry Ergas has extensive international experience advising government bodies and major corporations in Australia, New Zealand and the European Union. He is well known for his work in a wide range of industries including telecommunications, electricity, aviation, surface transport and financial services. In addition to being heavily involved in regulatory issues, notably with respect to service costing and pricing, Henry has provided statements and appeared as a witness in major access arbitrations and competition law cases.

Henry's recent assignments include work for private corporations including Telstra, Qantas, Visa International, Air New Zealand, BellSouth International, Pacific National, CLP Power Australia, Telecom Italia and law firms in Australia and overseas. Henry has provided expert testimony in a number of regulatory and legal proceedings, including recent landmark decisions handed down by the High Court of Australia, the Federal Court and the Australian Competition Tribunal.

He has also advised a number of regulatory and other government bodies, including the Australian Competition and Consumer Commission, the New Zealand Commerce Commission, the Independent Pricing and Regulatory Tribunal and the NSW Treasury.

Attesting to his strong background in competition policy, Henry chaired the Australian Intellectual Property and Competition Review Committee set up by the Federal Government in 1999 to review Australia's intellectual property laws as they relate to competition policy. The Committee reported in September 2000 and most of its recommendations have now been accepted by the government. In July 2001, Henry was appointed by the Attorney General of New Zealand as a lay member assisting the New Zealand High Court in cases involving appeals from decisions of the Commerce Commission and in other matters under the Commerce Act. In March 2004, Henry was appointed as a member of the ACORE Advisory Group. The Advisory Group advises the Board on matters pertaining to regulatory activities.

Henry has held teaching positions at a number of leading institutions. After a career as a senior economist at the OECD, he taught at the Kennedy School of Government at Harvard University and served as a consultant to the RAND Corporation in Santa Monica California, an adviser to the Australian Trade Practices Commission (now the ACCC), and a visiting professor at the Centre for Research in Network Economics and Communications at the University of Auckland. He was a Professor in the Graduate School of Management at Monash University, and taught at the Ecole Nationale de la Statistique et de l'Administration Economique in Paris.

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