

HONG KONG'S BUSINESS
REGULATION IN TRANSITION

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ABSTRACT

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Abstract

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Key words: Regulation, monopoly, schemes of control, Hong Kong

JEL Code: L43, L51, L94, L96

1. Introduction

With minimum direct government interventions in private business, Hong Kong is widely regarded as the land of *laissez faire*. Compared with most economies in the world, the degree of direct government involvement in private business in the territory is indeed rather moderate. Nevertheless, Hong Kong does have a history of government regulation of monopolies, an aspect of economic reality that has often been overshadowed by its high degree of economic freedom.

In this paper we briefly review the history of regulation of monopolies in Hong Kong and examine the current situation. The regulated industries include electricity, telecommunications services, public transport, and airport services. These industries are not exactly alike in their economic characteristics, but they are all subject to legal or technical barriers to entry. Since the provision of services is not under sufficiently competitive conditions, public policy toward these

* We would like to thank Professors Takatoshi Ito, Thomas G. Moore and Roger Noll and the other participants of the Eighth Annual East Asian Seminar on Economics, Taipei, June 1997 for their helpful comments and suggestions.

industries has been devised with the purpose of limiting the monopolies' exercise of market power. As in many other economies, regulation of monopoly in Hong Kong has evolved over time to cope with changes in the economic environment and structure of the industries.

In the next section we provide an overview of the evolution of Hong Kong's regulation of monopolies and oligopolies. Section 3 analyzes the salient features of the scheme of control, the primary regulatory tool used in Hong Kong. The impact on firm behavior and the effectiveness of the schemes of control in achieving their goals are critically appraised in Section 4 by focusing on the electricity industry. In Section 5 we describe the transition from regulation to market liberalization in the telecommunication services industry. Finally, the implications of the regulatory changes in Hong Kong and directions for further changes are discussed.

2. Evolution of the Regulation of Monopolies

The history of regulation of monopolies in Hong Kong is relatively short. It can be divided roughly into three distinct phases: (1) Before 1963; (2) 1963-1995, and (3) after 1995. In the period before 1963, the regulation of monopoly was not a major issue for the government's economic policy. From 1963 to 1995, the government regulated the monopolies of the public utilities with a series of Schemes of Control. Since 1995, technological changes and economic development have led the government to consider ways to bring competition to the regulated industries.

Prior to 1960s, clearly defined and well-deliberated government policy on monopolies or near monopolies virtually did not exist. Following the economic philosophy of *laissez faire*, the Hong Kong government adopted a minimum interventionist approach to industries characterized as monopolies and was reluctant to play an active role in regulating them. This attitude was reflected clearly in a statement made by the government in 1921 in response to a request by the public to provide means of public transport between Victoria harbour and Repulse Bay: "So long as the Government continues its present policy of giving reasonable facilities for private enterprise to get under way it will have done all that can be expected of it."¹ As a result, public utility services were supplied largely by private firms under government franchises.

¹ Reported in Hong Kong Telegraph, 2 April 1921 and cited by Leeds (1984, p.29).

However, that is not to say that the government never intervened in private businesses. As early as 1863, the then Acting Governor and Commander-in-Chief, W.T. Mercer, set rules “for the regulation of Public Vehicles and Chairs and their Drivers and Bearers, and to license the Hire of Horses, within the Colony of Hong Kong.”² When public buses were introduced into Hong Kong in 1921, the government responded swiftly by amending the Vehicles and Traffic Regulation Ordinance. The amended ordinance gave the government new power to specify bus routes with details of the fares to be charged, the stopping places, and basic specifications of the vehicles.

These and other regulations set license fees, fares, standards, and penalties for malpractice. In the process, the government benefited from royalty fees paid by franchisees. An illuminating example is the early development of the public bus services in Hong Kong. When the public buses first appeared in Hong Kong in 1921, a number of bus companies entered and competed for business. The government decided in 1933 to grant the exclusive rights of offering public bus services in Kowloon and the New Territories to Kowloon Motor Bus (KMB). To maintain its exclusive right, KMB had to pay an amount as high as 20 percent of its gross revenue to the government as royalty during certain period of its franchise (Leeds (1984)).

The first Scheme of Control was introduced in 1964, about one hundred years after the first traffic regulation came into existence. It symbolized the start of the second phase of the regulatory history in Hong Kong. In that year, the government decided to impose a scheme of control to regulate the China Light and Power (CLP), the company that supplied electricity to Kowloon and the New Territories. Rapid expansion of industrial activities and the resulting surging demand for electricity in Kowloon led to frequent blackout and tariff increases. The public uproar against high tariffs and low service quality generated calls for government take-over of CLP. Under the threat of government expropriation, CLP proposed to limit its own rate of return and to set up a development fund to finance its future expansion.³ The scheme of control was the government’s response to the situation.

The scheme of control agreement was reached between CLP and the government in November 1964, but with retroactive effect to October 1963. The agreement, spanned over a

² Ordinance No. 6 of 1863, cited in Hall (1996, p.2).

³ See Cameron (1982) for a detailed description of company history of CLP.

period of 15 years, set the maximum permitted rate of return on the average net fixed assets devoted to electricity operations at 13.5 percent. After the first scheme of control on CLP was introduced, similar schemes of control spread to other industries where suppliers of services enjoyed significant market power. The end of the 1980s was the heydays of the schemes of control, when the industries covered by the schemes included electricity supply, local telephone services, public bus services, and airport services.

As the schemes of control multiplied over the years, their drawbacks gradually became apparent. Since the schemes of control did not limit price increases and returns were calculated on the basis of fixed assets, some companies took advantage of this loophole to increase tariffs and to expand their capacity, leading to high tariffs as well as excess capacity.

As Hong Kong's economy grew and technology advanced in some of the regulated industries, such as telecommunications, the government began to consider alternative regulatory mechanisms to improve the regulated industries' economic performance. The price-cap regulation, an alternative to the scheme of control regulation, was introduced first into the local telephone network services market in 1993 in the hope that it could reward the effort of the regulated firm to lower its costs.

Since the early 1990s, the government has taken steps to introduce competition to markets that were previously supplied by regulated monopolies. By now the competitive situation in a number of regulated industries has improved substantially. Instead of a monopoly, there are now four operators competing in the market for local fixed telecommunication services. A new bus company (Citibus) has entered the public bus market to compete against two incumbents. When the new airport at Chek Lap Kok begins operation in 1998, there will be two firms competing for airport cargo services compared with a monopoly at present, and three firms for ramp handling services compared with a monopoly now. All of the schemes of control have been lifted by August 1997 except those for the electricity industry.

Given the significant role played by the schemes of control, we shall analyse this mode of regulation in greater detail in the next section. We shall examine the mechanism behind the schemes of control, identify the features that distinguish them from regulations in other economies, and evaluate their effectiveness.

3. Salient Features of the Schemes of Control

3.1. Objectives of Regulation

As is well known in the economic literature, most public utilities are natural monopolies due to the economy of scale or network economy they enjoy. In other words, a sole supplier can provide the services demanded by society at the lowest possible unit cost. While efficient allocation of resources requires an output level at which the consumers pay a price equal to the firm's marginal cost of production, an unregulated monopoly would maximize its profit by restricting output, thus causing the price to exceed the firm's marginal cost.

The "first-best" regulation implies setting price equal to marginal cost (i.e. marginal cost pricing). But given the economy of scale, such a linear pricing rule will result in the firm making a loss. If subsidies to cover losses are considered impractical due to the usual principal-agent problem, then the "second-best" regulation would require the firm's price to at least be equal to its average cost (i.e. average cost pricing),⁴ so that the firm can break-even.

If two-part tariffs are used (as they are in public utilities such as telephone services and electricity), then the break-even point will be closer to the first-best outcome than that under linear pricing.⁵ In this case too, however, the calculation of marginal cost is plagued by asymmetric information that is typical of the principal-agent problem.

The schemes of control have been the Hong Kong Government's main policy instrument to regulate monopolies and near monopolies in public utilities. As stated by the government, "schemes of control exist because certain companies provide services to the public in a monopoly or semi-monopoly situation. This makes it necessary, in the public interest, for the Government to establish certain guidelines (known as schemes of control) under these companies will operate."⁶ This statement highlights the main motive behind the scheme of control.

⁴ More precisely, the second-best outcome is given by the largest output level at which price is equal to average cost.

⁵ If the monopoly can use two-part tariffs, the economic inefficiency as measured by the gap between the unit price and marginal cost would be lessened compared with that under linear pricing. However, the problem of monopoly profits will be further aggravated.

⁶ See Hong Kong Government (1988, p. 2).

At the very beginning of every scheme of control agreement reached between a regulated firm and the government, there is a clause stating that the scheme of control should be devised

- (a) to allow the regulated company a permitted maximum return, and
- (b) to provide a framework under which the company's financial affairs could be monitored and tariff applications could be made.

Clearly, the schemes of control are a kind of rate-of-return regulation. If such regulation is effective, then a regulated firm would not be able to earn monopoly profits by charging monopoly prices, but only a return that equals to its cost of capital.

3.2. Basic Features

As a kind rate of return regulation, Hong Kong's scheme of control regulation has its own unique characteristics: (1) It specifies the permitted rate of return of the regulated firms and define the rate base on which the total returns are calculated. (2) It requires each regulated company to establish a Development Fund (DF) to finance future expansion and to maintain the rate of return without frequent tariff changes. (3) It sets a fixed rate of return for the entire period of the agreement, which is typically quite long.

[Insert Figure 1.]

Figure 1 summarizes the common features of the schemes of control. A regulated firm must first submit its forecast of future demand, its investment plan, and justifications for the investment plan to the regulatory agency. After obtaining approval from the Economic Services Bureau (formerly the Economic Services Branch) of the Government Secretariat, the regulated firm can carry out its investment and production plans. The total revenue from sales, less the total operating cost and taxes, will first go to the investors. The debt holders receive their interest payment and the equity holders receive the permitted profit as compensation for their respective supply of capital. Any surplus (or deficit) is added to (made up by drawing down) the DF.

If the balance of the DF is insufficient to cover the shortfall in the gross revenue in a particular accounting year, the government may permit the regulated firm to deduct from the DF in subsequent years any amount due to it in that year and/or to approve an increase in tariff to cover

the losses.⁷ In addition, an annual charge of 8 percent on the average balance of the DF is credited to a reserve to reduce the tariff or limit tariff increases. Thus, the DF serves to smooth the actual rate of return, finance capital investment, and provide rate relief.

3.3. Permitted Returns

By definition, the permitted total returns to the regulated company depends on (a) the rate base and (b) the permitted rate of return. As stated in the schemes of control agreements, the regulated companies and their shareholders are entitled to earn a return that is reasonable in relation to the risks involved and the capital invested and retained in their business.

In theory, the rate of return should be based on the cost of capital, but in practice it was determined through negotiation between the government and each regulated company. This approach has led to a significant variation in the permitted rates of return and the way in which total returns are calculated not only across industries, but also across companies in the same industry.

3.3.1. Rate Base

In most schemes of control, fixed assets have been adopted as the rate base for the calculation of total returns. In the cases of the electricity companies CLP and Hong Kong Electric Company (HEC), the bus companies KMB and China Motor Bus (CMB), and Hong Kong Airport Terminal Service Limited (HATS), their total returns are calculated on the basis of their average net fixed assets. In the case of Hong Kong Airport Cargo Terminals Limited (HACTL), the permitted total returns are calculated on the basis of its gross fixed assets. One exception is Hong Kong Telephone Company (HKTC), whose total returns were calculated on the basis of its shareholders' equity.

Regardless of whether the gross or net fixed assets are used, the assets are measured at their historical costs. In addition to the acquisition costs for machinery, land and tangible assets, fixed assets also include capitalized refurbishment and improvements, assets under construction, prepayments, and goods in transit. The costs of construction include interest paid or payable on construction loans, but only up to a maximum of 8 percent per annum on the loan's principal.

⁷ Public Bus Services Ordinance, Cap 230, Section 28.

3.3.2. *Rate of Return*

For the five companies whose permitted returns were calculated on the basis of their net fixed assets, the maximum rate of return ranged from 13.5 to 18 percent per annum. The differences in the rates of returns could be attributed partly to differences in the undiversifiable risks of the industries, but they were also a result of the case-by-case approach to regulation. For example, the two regulated bus companies KMB and CMB were permitted a rate of return of 16 percent and 15 percent, respectively. According to the government, the differences in permitted rates of return reflected the companies' differential profitability before the imposition of the schemes of control. If that were indeed the case, then the effectiveness of regulation would be called into question. In particular, if the maximum rate of return to was set at or above that corresponding to monopoly profits, the regulation clearly would have failed to achieve the primary objective of the schemes of control i.e., restraining the monopolist's market power.

A crucial question is how to determine the cost of capital of the regulated firms. First, these companies were unregulated monopolies before the schemes of control were introduced. If the profitability of an unregulated monopoly was used as the benchmark to set the permitted return, the "opportunity cost" of an unregulated monopoly would become its costs of capital. Second, a monopoly under the prospect of regulation might inflate its profit strategically in anticipation of the upcoming regulation in order to bargain for a higher permitted rate of return.

The estimation of the cost of capital for a regulated industry is challenging both theoretically and operationally. In practice, two methods are often used in estimating a regulated firm's cost of equity capital, namely, the capital asset pricing model (CAPM) and the dividend growth model (DGM).⁸ In CAPM, the cost of equity capital is measured by the risk-free rate plus the firm's risk premium. The risk premium is measured by the covariance of the returns of the individual firm's stock with that of the market portfolio.⁹ The higher the covariance, the higher the risk level and the higher the required rate of return necessary to attract private capital.

⁸ See Armstrong, Cowan, and Vickers (1994, pp183-185).

⁹ CAPM has been criticized recently both theoretically and empirically. See Fama and French (1994).

DGM is based on the premise that the share price is determined by the initial dividend divided by the difference between the cost of equity capital and the rate of expected dividend growth. One can estimate the cost of equity capital by inverting that equation once the expected dividend growth rate is known or has been estimated.

Attempts to estimate the cost of capital of a regulated firm using either method are plagued by a number of difficulties, including some that are unique to Hong Kong. First, because the profitability of a regulated firm reflects the permitted rate of returns, it is logically problematic to use the stock market returns or dividend growth of the same firm to estimate its own cost of capital. Second, when the permitted rate of return on debt financed capital is way above the market interest rate of long-term debt, which is the case in Hong Kong, shareholders will have an incentive to alter the debt-equity ratio to increase the *net rate of return* to equity. Therefore, by definition, the permitted rate of return would always be too low when compared with the “cost of equity capital” calculated in the above fashion.

The difficulty in determining the cost of capital for the regulated industry has implications for implementing the rate of return regulation. Although economic efficiency is improved by narrowing the gap between price and marginal cost, it does not follow that the lower the permitted rate of return, the better off are the consumers and society. In a simple analytical model without uncertainty, we can show that the lower is the permitted rate of return (but still above the interest rate), the worse off society becomes. The underlying reason is when the rate of return is set low, the regulated firm may increase its profit by expanding its capacity without necessarily expanding its supply. This results in greater excess capacity in the industry and a bigger waste to society.

3.4. Development Fund

A Development Fund (DF) is an account kept by a regulated firm to enable it to maintain the permitted returns and to assist in its financing of fixed assets. So long as the fund has a positive balance, the firm is required to contribute an amount that is equivalent to 8 percent of the fund's balance to the “Rate Reduction Reserve” to be used to reduce the tariff in the following year. Thus, when the fund grows it will lead to a reduction in prices, and when the fund shrinks it may trigger price increases in order to maintain the rate of return.

A positive balance of the fund allows the firm to draw from it to cover any shortfall in the actual earnings. When the balance of DF is too small, it may not be sufficient to serve the purpose of guaranteeing the maximum returns the regulated firm is entitled to. However, once the DF is sufficiently large, the marginal benefit of the fund as a buffer to guarantee the permitted rate of return becomes small, while the cost in terms of forced transfer to the tariff rebate reserve becomes high.

When the DF is used to expand the firm's capacity, the firm pays 8% interest on the amount into the Rate Reduction Reserve, at the same rate as the DF's unused balance. Thus, the additional interest cost for using DF to finance capital investment is zero, so the real opportunity cost for using the fund for investment is the marginal benefit derived from the fund's role as a buffer to smooth actual returns. It follows that the regulated firm's dominant strategy is to expand the rate base with capital investment financed by the DF whenever the fund is sufficiently large. Furthermore, if the marginal benefits of the fund for the smoothing of returns are small because uncertainty in demand is small, then the dominant strategy would be to use the entire DF for capital expansion.

The design of the DF in the schemes of control bears some resemblance to the escrow fund mechanism proposed by Vickrey (1971). When discussing the pricing of public utility services in the presence of fluctuating demand, Vickrey proposed that any actual deviation of price from marginal cost could be dealt with by establishing a dual tariff system (i.e., a "reactive" tariff and a "retention" tariff) and an escrow fund.¹⁰ A retention tariff determines the amount of revenue that the company is entitled to retain out of the actual revenue. Any surplus would be put into an escrow fund. The company may use the escrow fund to finance investment in capacity. Thus, the escrow fund provides an incentive for the company to maintain its plant capacity at an appropriate level.

Despite the apparent similarities between the DF and Vickrey's escrow fund, their functions are fundamentally different. The DF is used primarily to protect the interest of regulated firms, but Vickrey's escrow fund is based on marginal cost pricing and is

¹⁰ Vickrey's retention tariff and reactive tariffs are similar to the permitted returns and actual returns except that tariffs are prices charged for services provided, whereas returns are based on fixed assets.

designed to maintain economic efficiency while avoiding the need of frequent changes in the utility's tariffs.

3.5. Duration of Schemes of Control Agreements

The schemes of control in Hong Kong take the form of long-term renewable agreements between the government and the regulated firms. The maximum permitted rates of return are fixed for the entire period of the agreements. The duration of the schemes of control agreements, however, vary across industries. The longest period was 20 years when the scheme of control was imposed on HKTC in 1975. The effective period of the schemes of control for the two bus companies was set at 10 years. The duration of the current schemes of control agreements for the two electricity companies is 15 years.

Presumably, a long term contract offers a better incentive for the regulated firms to make long-term investments than a frequently changing regulatory regime, thus providing an incentive to achieve the optimal amount of cost savings. However, such benefits associated with long-term agreements do not seem to be present in the case of Hong Kong's schemes of control. First of all, the schemes of control typically contain periodic reviews and the possibility of modification of the initial agreement. The review period was set at five years for the two electricity suppliers and two years for the two public bus companies. More importantly, since a regulated firm can pass its cost on to the consumers, something it cannot do under the "price-cap" regulation, the incentive to save costs is not enhanced by lengthening the agreement's duration.

Most important of all, the formulae for calculating permitted returns have given the regulated firms a perverse incentive to increase capital investment beyond what is economically efficient and raised the total costs of production. As we shall see in the following section, this effect is most conspicuous in the electricity industry.

4. Experience with the Schemes of Control: the Electricity Industry

The electricity supply industry in Hong Kong was the first industry to operate under the schemes of control, and will probably be the last one to leave the schemes. It provides the best illustration of the weaknesses of the schemes of control. Among others we shall ask: 1) How did the

schemes affect the firms' behavior? 2) What was the impact of the schemes on the industry's economic efficiency? 3) How effective were the schemes in achieving their objectives? Let us first provide some background information about the electricity industry before answering these questions.

4.1. Industry Background

Electricity in Hong Kong is supplied by two companies. The Hong Kong Electric Company Limited (HEC) supplies electricity to Hong Kong Island and the neighboring islands, while the China Light and Power Company Limited (CLP) supplies electricity to Kowloon and the New Territories. Electricity generation of CLP is carried out by its associated company, the Castle Peak Power Company Limited (CAPCO), which is 60 percent owned by Exxon Energy Limited and 40 percent owned by CLP, but the associated transmission and distribution systems are wholly owned and operated by CLP.

By the end of 1996, the total installed electricity generating capacity of HEC was 2,955 million watts (MW). The total installed capacity of CAPCO was 7,515MW. In that year, the electricity sales of HEC was 8,876 million kilo-watt hours (kwh). This amount represented 28 percent of total electricity sales in Hong Kong. In the same year, CLP sold 22,839 million kwh of electricity, accounting for 72 percent of the market.

The current schemes of control on CLP and HEC came into effect on October 1, 1993, and on January 1, 1994, respectively, due to differences in the two companies' financial years. Both schemes guarantee a 15 percent permitted rate of return for 15 years. The electricity companies make forecasts for future electricity demand and submit major investment plans for approval by the Economic Services Bureau of the Government Secretariat.

The two electricity companies do not have exclusive rights to supply electricity in their respective territories, but they are the sole supplier in their own geographical areas. Despite the lack of exclusive rights, there has never been any serious attempt by local or overseas investors to enter either market, and they have not made any attempt to enter each other's territories either. Their networks are interconnected by the cross-harbor cable, which is designed mainly as an emergency back-up facility, not for the purpose of transmitting a large amount of electricity under normal

circumstances. Given the nature of their schemes of control, however, there is really no need to enter a rival's territory so long as one's own fixed assets are allowed to grow.

4.2. Effect on Firm Behavior

In a competitive industry, a firm will choose the optimal combination of capital and labor to minimize its production cost. An unregulated monopoly also has the same incentive to do so because lower cost means higher profit. A monopoly under the schemes of control regulation, however, may not benefit directly from any cost reduction if its rate of return has already reached the permitted rate of return. Under these circumstances, the only way for the monopoly to increase its total profit is through expansion of its fixed assets.

The existence and magnitude of the distortion a la Averch-Johnson (1962) in Hong Kong's electricity industry can be empirically tested due to peculiarity of the regulatory regime. In the period from 1964 to 1978, CLP was regulated by the scheme of control while HEC operated as an unregulated monopoly. Both firms have been regulated under similar schemes of control since 1979. The periods before and after the switch have provided us with an opportunity to test Averch-Johnson's prediction.

Because capital investment can be used as a means to increase profits, we would predict that the regulated CLP employed more capital per labor than the unregulated HEC, provided that other things were equal. But other things might not be equal (e.g. the two firms operated at substantially different scales), we would instead predict that the capital/labor ratio of CLP grew at a faster rate than that of HEC between 1964 and 1978, but the opposite would be true after 1978.

We have found that the capital/labor ratio of the unregulated HEC remained higher than its regulated counterpart, CLP, throughout the period of 1964 to 1978. Nevertheless, during the 15 year period from 1964-1978, the average annual growth rate of the capital/labor ratio of CLP was 9.06 percent while that of HEC was only 7.94 percent. Furthermore, the growth rates of two firms reversed after HEC voluntarily joined the scheme of control. In the period from 1979 to 1996, the capital/labor ratio of HEC grew at 8.82 percent per annum, faster than CLP's 8.13 percent. The changes in the firms' capital/labor ratio during these two periods are thus consistent with the

prediction that the regulated firms responded to the schemes of control by speeding up their capital investment.

Relatedly, Peles and Whittred (1996) have demonstrated that the Hong Kong electricity companies, in response to the nature of their schemes of control, have used more fixed assets relative to current assets in comparison with U.S. electricity companies.

4.3 Effect on Economic Efficiency

In short, the data on capital expenditures and employment of the two electricity suppliers have revealed a marked difference in their investment behavior before and after the schemes of control were imposed. While the intention of the schemes of control was to protect the consumers' interest by fixing the rate of return, the regulated electricity suppliers responded to the schemes by expanding of their physical capital. The loss in economic efficiency due to such a distortion in input combination is a cost to society.

No less important than the static allocative efficiency is dynamic efficiency which measures the growth in total factor productivity (TFP) over time. To assess the impact of the schemes of control on the regulated electricity companies, we have studied whether there are any observable changes in TFP of the electricity firms before and after the schemes of control was introduced. Using historical data, we make two comparisons based on the estimation of the regulated firms' TFP changes: (a) the difference between the TFP changes of the HEC and CLP from 1970 to , 1978 when CLP was subject to the of control but HEC was not,¹¹ (b) the difference between the TFP growth of HEC before and after it was under the scheme of control.

The statistical results do not show any statistically significant improvement in the TFP for both companies in the period of 1970-1978, and the TFP growth remained insignificant in the period from 1979 to 1996 when both firms were operated under the schemes of control. That is to say, the TFP growth of electricity companies in Hong Kong was insignificant in the last three decades.

In terms of total factor productivity, Hong Kong's electricity industry seems to have under performed when compared with the electricity industry in the U.S. (see Ansar (1990), Gollop and

¹¹ The choice of a shorter period instead of the entire period of 1964-1978 was dictated by data availability.

Roberts (1981). During the 1950s and early 1960s, the total factor productivity growth of the U.S. electric power industry was on average above 4 percent annually. Even though the growth slowed down significantly in the late 1970s and the 1980s, it remained between 1-2 percent.¹²

To put the above findings in a broader perspective, let us compare the TFP growth of the electricity industry with that of Hong Kong's unregulated gas industry. A recent study shows that the TFP of Hong Kong China Gas grew at an average rate of about two percent per annum during the period of 1975-1995, on par with the economy-wide increase of TFP in Hong Kong (see Kwan and Png (1994)). This is in sharp contrast with the situation in electricity industry in which the TFP remained stagnant for about thirty years. While the difference in performance between the two industries may be the result of many factors, the schemes of control regulation seem like a possible cause.

The loss in static and dynamic efficiency would be better appreciated by considering the excess generation capacity of the two electricity monopolies. While the schemes of control require the government regulator to review and approve the major investment projects of the electricity companies, the mechanism does not seem to have succeeded in resisting the companies' incentive to expand capacity. As a matter of fact, both companies have been investing aggressively to expand their electricity generation capacities despite excess capacity. In 1996 HEC's reserve margin, i.e., the difference between installed capacity and maximum demand as a percentage of maximum demand, stood as 47 percent, which was much higher than the international norm of 30 percent. Despite the already substantial excess capacity, HEC completed the installation of a new 350 MW unit in 1997 as part of the current scheme of control agreement.¹³

For CLP, the situation is even more serious. The growth of demand for electricity has slowed significantly in recent years partly due to the relocation of local manufacturing industries to southern China, but the expansion of capacity continues unabated. The first of four 625 MW blocks of additional generating capacity, approved by the government in 1994, was installed in a new power station in 1996 and the second one was installed in 1997. The build-up in generation capacity and

¹² The slowdown in the productivity growth rate in the U.S. electric power industry has often been attributed to the lack of flexibility of the regulatory regimes.

¹³ The Interim Report, Hongkong Electric Co. Ltd. (1997).

the slow growth in demand have pushed the reserve margin of CLP to over 60 percent. In addition, the remaining two 625 MW blocks have been scheduled to be commissioned in 1998-2001.¹⁴

4.3. Effectiveness of the Schemes of Control

4.3.1. Profitability of Electricity Companies

The first scheme of control agreement between CLP and the government stipulated that the regulated firm was permitted to earn a maximum rate of return of 13.5 percent on fixed assets regardless the way in which the capital investment was financed. Later when the scheme of control was up for renewal in 1979, the revised agreements added a new feature, namely, fixed assets financed by shareholders' equity were allowed to earn a 1.5 percent premium on top the permitted rate of return for fixed assets financed by external borrowing and "borrowing" from the Development Fund.¹⁵ The shareholders of the regulated companies not only are guaranteed the 15 percent rate of return, but also the additional return from the difference between the permitted return on debt financed fixed assets and the actual borrowing costs.

Using the debt and equity data reported by the two electricity companies and the assumption that the cost of borrowing was 9 percent, the *net rate of return* on equity would be around 20 percent, substantially higher than the 15 percent maximum permitted under the scheme.

When questioning the effectiveness of the rate of return regulation 35 years ago, Stigler (1962) suggested that one should not look only at the profit and loss accounts of the regulated firms, because they would usually hide the critical information from accounting statements. Whether such practice has actually occurred may be tested indirectly by examining the fortunes of investors in the regulated firms' stocks.

Using stock return data of HEC and CLP and adjusted for dividend payments, we have calculated that the stock returns on equity for both firms were on average 22.35%, even higher than

¹⁴ Economic Services Branch, Government Secretariat: Legislative Council Panel Paper: China Light and Power's Excess Generating Capacity, May 1997.

¹⁵ External borrowing includes bank loans, suppliers' credits, amount of payable on leasehold land purchased on installment from the government, etc.

the net rate of returns during the period of 1980 to 1996. In the same period, the rates of return to the shareholders of both electricity companies were higher than that of Hang Sang index, where most of the Hang Sang index constituent companies were not regulated firms.

Our findings suggest that the schemes of control were ineffective in protecting consumer interests because the returns to the shareholders of the regulated electricity companies exceeded the opportunity cost of equity capital by a very substantial margin.

4.3.2. Tariffs

As the other side of the same coin, consumers have failed to enjoy a low cost supply of electricity. To provide an independent piece of evidence, let us compare the level and rate of change of the tariffs of CLP and HEC during the period of 1963-1979, when the former was regulated but the latter was not. The two firms' tariffs have moved closely during this period, suggesting that the schemes of control did not effectively alter the pricing behavior of the regulated firm CLP. An international comparison shows that the level and the rate of increase of electricity prices in Hong Kong are at the high end among the economies with comparable conditions (Table 1).

In sum, the regulatory experience of electricity industry suggests that the schemes of control have failed to achieve their main objective of restraining the regulated firms' monopoly power. Moreover, the regulation has given rise to abnormally high excess capacity, which might have caused inefficiency in input combination and lack of productivity growth. The first reason behind the schemes' failure is the nature of the rate of return regulation, as it gives weak incentive to the regulated firms to lower cost. In addition, the formulae for calculating returns in the case of the schemes of control have indeed provided a perverse incentive for the regulated firms to expand their fixed assets beyond what is economically efficient and socially sensible. The second reason is asymmetric information which makes it very difficult, if not impossible, for the regulator to monitor the regulated firm effectively. As a result, it is not easy for the regulator not to be "captured" by the regulated firms.

In the next section, we shall see a different path of development in the local telecommunications industry, where competition has gradually replaced regulation.

5. From Regulation to Competition: Telecommunications Services

The telecommunications services industry supplies a variety of services to different groups of customers. At the most general level, the industry can be divided into three segments: (a) local fixed telecommunication network services (FTNS), (b) mobile telecommunications services and (c) international services. These three segments are characterized by their different technologies and regulatory schemes.

The Economic Services Bureau of the Government Secretariat is responsible for setting an overall policy framework. Within this framework, the Telecommunications Authority (TA) is the regulatory body of the telecommunications industry and the administrator of the Telephone Ordinance (which governs the establishment and operation of basic telecommunications services) and the Telecommunication Ordinance (which regulates the so-called non-basic and competitive services).

Facing strong competition from neighboring regions that aspire to become the top financial and business center in the Asia-Pacific region, the government regards it as vital to have in place a good telecommunications infrastructure and to provide communications services to meet local and regional needs. The government set three policy objectives to guide the development of Hong Kong's telecommunications industry: (1) the widest range of quality telecommunications services should be available to the community at reasonable cost; (2) telecommunications services should be provided in the most economically efficient manner possible; and (3) Hong Kong should serve as the pre-eminent communications hub for the region now and into the next century.¹⁶

Competition is viewed as a mechanism that engenders efficient supply of services and provides a discipline on suppliers to ensure that prices are fair to consumers. As a result, the policy framework adopted by the government seeks to create an environment which makes entry by new suppliers possible, provides a that fair rate of return to investors, and is pro-consumer. Thus, progressive liberalization and the licensing of competing suppliers are important aspects of the industry's development.

The three segments of the telecommunications services industry are characterized by different kinds of market structures. The international telephone services are provided by Hong Kong Telecommunications International (HKTI), an unregulated monopoly. The mobile services are

¹⁶ Office of Telecommunications Authority, Hong Kong Government, Position Paper, (1994).

in a state of intensive competition. The market structure of local FTNS falls between the two extremes, experiencing a transition from a regulated monopoly into a regulated oligopoly.

5.1. Local Fixed Telecommunications Network Services

For quite a long time, telecommunications services have been regarded as an example of natural monopoly, i.e., the most efficient service can be provided by only one service operator. Under this premise, HKTC was granted a fifty year exclusive license in 1925 to provide the territory with a public telephone network. In return for this monopoly right, HKTC was required to pay a royalty to the government each year and gave concessions to the government by charging the government half of the regular tariff rates for its phone lines. In addition, HKTC was required to bear the universal telephone service obligation and seek government approval for any changes in rental charges.

The surge in demand for telephone services in the 1950s and the early 1960s outstripped HKTC's ability to provide the phone services, leading to long waiting time for telephone installation. As a reaction, HKTC proposed a substantial increase in the rental charges to reduce the waiting time and to finance the capacity expansion of the telephone network. The government initially refused the request for the rental increase, but later approved a smaller increase in 1964. As part of the agreement, HKTC accepted that a target return of 9 percent on average capital employed. The right of approval for any increases in the rental charges of telephone lines remained in the hands of the government.

HKTC's requests for substantial rental increases to cover rising cost in the early 1970s prompted the government to introduce the scheme of control on HKTC when its license was up for renewal in 1975. The scheme of control with HKTC, while resembling that reached between the government and CLP, had its unique features. It allowed HKTC to retain its monopoly for another 20 years while limiting the maximum permitted rate of return on shareholder equity to 16 percent after tax. After deducting the total operation costs, the permitted return and the tax, 80 percent of the remaining surplus would go to a DF while 20 percent would go to the shareholders' equity in the form of bonus shares. That is to say, in contrast with the schemes of control for all other utilities firms, the scheme of control on HKTC did not cap the accounting returns to shareholders' equity

because any revenue above the permitted return would be shared by the company's shareholders and its DF. As a result, the real return to shareholders could be higher than the *maximum* permitted rate of return.

Although the DF could be used to expand HKTC's telephone network as well as to smooth its permitted returns, in practice it was used only for the latter purpose because the company had sufficient resources to finance its expansion of fixed assets. Like the other DFs, the DF of HKTC represented which a liability to the company and would accrue interest at the rate of 8 percent per annum on its average balance. This interest payment was deductible from the profits of HKTC and used for tariff relief.

Starting in 1993, the rate of return regulation in the local FTNS segment was replaced by a new price-cap regulation. Under the new regulation, HKTC could revise the charges for its services on an annual basis but no more than the general inflation rate (based on the Consumer Price Index (CPI)) minus four percent (known as CPI-4). The rental charges for residential lines may not be increased by more than the general inflation rate less 3 percent per annum (known as CPI-3). The residential telephone tariffs from 1993 to 1995 (the year HKTC's exclusive franchise expired) are given in Table 2. When the tariffs are compared with those of other Asian Newly Industrializing Economies (NIEs) and the U.S., we see that Hong Kong had the highest connection charges except Taiwan and the highest monthly rental fees except the U.S. Despite the fact that local calls were free of charge in Hong Kong but not in the other included economies, the total monthly charges were higher in Hong Kong than in the other three Asian NIEs if each household made less than 100-150 three-minute local calls per month.

5.1.1 From Regulation to Competition

Technological changes have made the natural monopoly argument in granting exclusive franchising increasingly irrelevant. The digital transmission and fiber optical cable technologies have drastically reduced the cost to develop networks, thus bringing down the barriers to entry.

The expiration of the exclusive franchise of HKTC at the end of June 1995 provided an opportunity for the government to open the local telecommunications market to competition. In that year, three additional FTNS licenses were granted to Hutchison Communications Limited, New

T&T Hong Kong Limited and New World Telephone Limited for the provision of telecommunications services between fixed points in Hong Kong on a competitive basis. This move ended HKTC's 70 years of monopoly in the local fixed-line telecommunications market.

Hong Kong's approach of liberalization of the telecommunications market is different from that of other economies in two respects. First, because the exclusive franchise for international telephone services granted to HKTI will not expire until 2006, in 1995 competition was introduced only to local FTNS. Second, consistent with Hong Kong's free market philosophy, a *market driven* open licensing approach was adopted over an alternative approach of creating a duopoly by tendering for a second network. The open licensing approach seems preferable in terms of both promoting efficiency within the industry and ensuring that consumers enjoy the full benefits of competition.

Under the new regulatory provisions, the TA has adopted a number of measures aiming to limit the market power of the dominant operator HKTC and to foster competition in the FTNS market. These measures include (a) to introduce number portability to reduce customers' switching cost, (b) to maintain the universal service obligation on the dominant firm, (c) to formulate tariff-setting provisions to prevent anti-competitive pricing behavior by the dominant firm, and (d) to assist the new service providers in negotiation of interconnections with the dominant firm.

Number portability.

To facilitate a smooth entry by the three new FTNS operators and to create a level playing field, the TA has introduced the number portability plan that allows the residential and business users to keep their existing telephone numbers when they switch service providers. This measure has reduced the costs to HKTC's existing customers when they switch to a new service provider, hence making the services offered by the new entrants more attractive to consumers.

Universal Service Obligation (USO)

As specified in the government's position paper of 1994, Telecommunications Policy of Hong Kong, HKTC must carry the universal service obligation in circumstances where HKTC remains the dominant carrier, but the three new local service providers are required to pay HKTC an

amount known as the Access Deficit Contribution (ADC) calculated on the basis of international calls to cover part of the costs of USO (because currently local services are still cross-subsidized by international services).

In a recent report on market liberalization of local FTNS, the Consumer Council recommends that an independent Universal Service Fund be established to subsidize the USO. This is clearly an improvement on the current system that HKTC meets the USO while others contribute. A more important issue is to find a way to terminate the cross-subsidization of the local services by international services.

Pricing strategy.

The tariffing rules set by the TA state that the dominant firm HKTC is prohibited from offering discriminatory tariff discounts to customers from their published tariffs. In contrast, the three new entrants are not subject to the same constraint as long as their individual market share does not exceed 20 percent of the local telephone market.

Interconnection

Interconnection is a critical issue in the process of market liberalization because the new operators can only provide their services through the incumbent firm's established network at the initial stage of entry. The current government policy is to allow the terms and conditions of the interconnection between the new entrants' networks and the fixed link telecommunications infrastructure of HKTC to be determined through commercial negotiation on the principle that the connection charges should be based on long-run incremental costs. However, if an agreement cannot be reached, or the TA considers the terms and conditions reached to be anti-competitive and against the public interest, the TA has the power to determine the terms and conditions itself.¹⁷

HKTC and the other three FTNS suppliers reached a provisional agreement on connection charges in July 1995, and the charges were set at 9 cents per minute.¹⁸ They have not yet reached any agreement, however, about the charges in accordance with the principles set out by the TA.

¹⁷ Section 36A of the Telecommunication Ordinance.

¹⁸ The connection charges for mobile phones are 6.7 cents per minute and those for value-added services are 4.2 cents per minute.

HKTC and NTT have sought the TA to help them determine the charges, but the determination has yet to be made.

5.1.2 Effect of Market Liberalization

As an indirect indication of the effect of market liberalization on cost savings by the existing monopoly, let us see how HKTC responded to the opening of the local FTNS market. Hong Kong Telecom (HKT), the sole parent of both HKTC and HKTI, announced a three-year plan in March 1995 to reduce the number of its employees by 2,500, which represented 16 percent of its total number of employees and the largest reduction in the company's history. Such streamlining did not seem to have adversely affected the performance and services provided of the company. On the contrary, the growth rates of HKT's revenues from the local telephone services have continued to be in double digits. The 12.3 percent of growth rate in revenues in the financial year ended in March 1997 is even higher than the previous years.¹⁹

As Hong Kong's experience in opening up the local FTNS has demonstrated, the regulator can play an important role in the process of liberalization. Promotion of competition does not call for premature deregulation, which may set back the progress toward market liberalization. Moreover, the regulator may have to be pro-active and take measures to ensure that adequate competition is developing and consumers' interests are protected.

5.2. Mobile Telecommunications Services

Mobile telecommunications services are at the present the most competitive segment of Hong Kong's telecommunications market. This segment differs from local FTNS at least in two aspects: First, there are minimum regulatory barriers to entry. The government has issued as many licenses as needed maintain competition. Second, technologies in mobile telecommunications evolve rapidly. New entrants with better technology can penetrate the market relatively easily, thus putting competitive pressure on the incumbent operators.

In 1994, the TA conducted a review on the way forward with regard to the licensing and regulation of mobile telecommunications services. On the basis of the review, the TA decided to

¹⁹ Annual Report, 1997, Hongkong Telecom.

invite applications for up to four licenses for the provision of Cordless Access Services (CAS) and up to six licenses for the provision of personal communications services (PCS). This decision had a significant impact on the mobile phone business. In late 1995 - almost a year before the issue of the PCS licenses - the existing cellular operators responded to the threat of imminent entry by PCS (which are expected to enjoy a cost advantage) with deep cuts in tariffs and prices for handsets, and with aggressive advertising campaigns to increase their customer base.

Paging services have minimal regulatory barriers to entry. There is practically no limit on the number of licenses. It is because that the TA adopts a class licensing approach for mobile communications services where frequency constraints do not limit the number of potential operators. A license will be issued within days of application. Therefore, competition among paging service providers is most intense.

The mobile telecommunications services are characterized by rapid technological advances. The rapid changes in mobile communications technology illustrate the powerful force of creative destruction. A good example is the development of CT2 Telepoint (i.e., the second generation international standards for cordless handsets that uses digital radio technology) market in Hong Kong. Introduced into Hong Kong in 1992, CT2 generated a very positive response from the consumers. Within two years of service launch, CT2 subscribers reached 170,000, representing close to 3 percent of the total population of Hong Kong. However, CT2 system's advantages of low cost and light handsets in comparison with cellular phones quickly evaporated after cellular communications technology improved substantially. In 1996, all the service providers of CT2 were out of business.

5.3. International Services

In contrast with the situation in the other two segments of the industry, the international telephone services are still operated by an unregulated monopoly. Up to 2006, HKTI enjoys an exclusive franchise on international telecommunication circuits and telephonic services and video-telephone services connected to the public switched telephone network.

Under both local and international pressure, in recent years the government has been pursuing opportunities to liberalize the international telecommunication segment subject to HKTI's

exclusive franchise. The basic approach of the government is to define the areas to which the exclusive license applies as narrowly as possible.

In March 1995, the TA announced that call-back services did not constitute an infringement upon HKTI's exclusive franchise. Also, as non-telephonic international services such as fax and data communications, video-conferencing and other value-added services became increasingly popular in the business community, the TA stated in May 1996 that the simple resale of HKTI's international private-lease circuits for fax and data services, private internal communications networks within companies and organizations, video conferencing, and customer mobile terminals for mobile-satellite services did not breach the terms of HKTI's monopoly on international services. As a result, these new international services have since been open to competition.

To limit the monopoly power of HKTI, the government has also allowed companies and organizations to 'self-provide' their own external circuits for intra-corporate traffic. In addition, companies and organizations may also provide their own international private circuits by, for example, directly leasing satellites for private use. The first Self-Provided External Telecommunications Services (SPETS) license was issued in 1995. Since then, a total of 24 SPETS licenses have been issued. The government has also kept future technical innovations such as international satellite cellular phone services outside of HKTI's exclusive franchise.

Given the above development, the competitive condition of the market for international services is now vastly different from what it was in 1981 when the 25-year exclusive license was granted. This is an example of technological advances circumventing the regulatory barriers. However, the government has been slow in responding to calls for liberalizing the international services and restricting the monopoly power of HKTI. The government should either find a way to end HKTI's exclusive franchise before 2006, or else it should seriously consider imposing price-caps on the presently unregulated monopoly.

6. Conclusions

Business regulation defines the relationship between the government and business. It often alters the incentives and thus the conduct of the regulated firms. Hong Kong's business regulation is in a state of transition. Government regulation of monopoly by schemes of control in Hong Kong

reached its peak in 1980s when schemes were imposed on many public utilities, but most have now been dropped as the government has recognized their drawbacks and started to introduce competition into these industries. In the above two sections, we have used the electricity industry to illustrate the drawbacks of the schemes of control and the telecommunications industry to illustrate the benefits of introducing competition to a regulated industry.²⁰

The schemes of control in Hong Kong differ from the rate-of-return regulation adopted in other economies in terms of the determination of returns, the presence of a development fund, the duration of agreements, and the price adjustment mechanism. They have failed to achieve its objectives for two reasons. First, as any rate of return regulation, the schemes provide a weak incentive for the regulated firms to lower their costs and a perverse incentive for the firms to expand their fixed assets due to their peculiar way of determining returns (i.e., returns depending primarily on capital investment). Second, asymmetric information makes it very difficult, if not impossible, for the regulator to monitor the regulated firm effectively and avoid being captured by the latter.

To introduce competition to the electricity industry, a necessary step would be the separation of electricity generation from its transmission and distribution. The newest technology for electricity generation and the scale of demand in Hong Kong can accommodate many small electricity firms that are able to operate at the minimum efficient scale, provided that the transmission and distribution network is open to them. To achieve an open market for electricity, the Government not only has to find a way to link up the transmission networks of the two geographical monopolies and have it managed by a separate company (i.e. a regulated monopoly), but also must find a way to introduce new entrants into a market that has already suffered from huge excess capacity.

Failure by the government to forestall the perverse developments in this industry years ago has resulted in a messy situation for which there is no easy way out. To avoid aggravating the problem of excess capacity further, some arrangement would have to be sought to sell the incumbent firms' existing capacity to new entrants. However, at present no competition and anti-trust laws have yet existed in Hong Kong to provide a legal basis for the government to impose such a solution.

²⁰ There are studies that show direct competition between electric power companies causes firms to operate at lower average cost, sell electricity at lower prices, and avoid excess capacity. See, for instance, Primeaux (1986).

The most competitive segment of the telecommunications industry is that for mobile communications services, because the government has imposed minimum regulatory barriers to entry and because rapid technological innovations allow new entrants to put severe competitive pressure on the incumbents. The local fixed telecommunication network services segment of the market comprises a dominant incumbent and three new entrants. The Hong Kong experience with this segment of the industry is that the regulator can play an important role in market liberalization by ensuring that adequate competition is developing and consumers' interests are protected.

Ironically, the least competitive segment is that for international telephone services. International telecommunication circuits, telephonic services and video-telephone services connected to the public switched telephone network are still provided by the unregulated monopoly HKTI under an exclusive franchise that expires in 2006. So far the government's strategy is to narrow the scope of the franchise as much as its terms allow, but a more critical question is whether the franchise itself should be terminated before expiration. If the government decides not to scrap the exclusive franchise before 2006, then it should consider regulating the monopoly with regulatory instruments such as price-caps.

Looking beyond electricity and telecommunications, we can see changes in other public utilities industries as well (see Cheng and Wu (1997) for details). As indicated in Section 2 above, a new bus company has entered the public bus industry to join two incumbents, whose schemes of control were not renewed when they expired in August 1997. In addition, an open tendering system has replaced private negotiation as a mechanism for awarding bus routes. When the new Chek Lap Kok International Airport begins operation in 1998, there will be two firms competing for airport cargo services compared with a monopoly at present and three firms for ramp handling services compared with a monopoly now.

The progress in the last few years has encouraged the policy makers to move ahead in the direction of regulatory reform and market liberalization. There is definitely room for both. Although the effort has already started to pay off, the paces of progress are uneven. The government has announced that it intends to open more markets to competition that until recently have been governed by exclusive franchises and will encourage further competition in the markets that have already been opened.

These moves are expected to have a positive impact on the productivity growth in these industries. However, the territorial monopolies in electricity industry remain intact while they are still under the schemes of control. Unless HKTI's exclusive franchise is terminated before expiration, international telephone services will continue to be monopolized. In public transport, a greater degree of de-regulation may have to wait till there is a solution to the issue of universal services.

Even though competition in airport services will increase after the new airport is open in 1998, the nature of regulation will undergo a very fundamental, and perhaps bizarre, change. The air cargo services and ramp handling services providers will no longer be subject to government regulation, but will instead be "regulated" by the Airport Authority, a government owned corporation that has a statutory obligation to conduct its business according to "prudential commercial principles". So far no details have been revealed about the way in which the air cargo services and ramp handling services providers will be regulated. However, if "prudential commercial principles" are to be the principal guidelines for the Airport Authority's business dealings with its franchisees, then the outcome would be achieved through negotiation between an upstream monopoly and a downstream duopoly or triopoly. In that case, it is not clear how public interests will be served well.

Less bizarre but equally problematic is the role of government owned corporations in the public transport industry, namely, the Mass Transit Railway Corporation (MTRC) and the Kowloon Canton Railway Corporation (KCRC). If MTRC and KCRC continue to be primarily profit-oriented as they are now, then the government should introduce regulation to restrain their monopoly power and to protect consumers' interest.

In conclusion, to improve its regulatory regime and/or to bring about greater competition to industries that are traditionally regulated monopolies for the purpose of promoting economic efficiency, the government will have to formulate a comprehensive and sound public policy for each industry to guide its future initiatives.

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Table 1. Average Electricity Prices in Selected Economies

Countries	1995			1993	
	Price HK\$cent/kwh	Index	Price changes from 1993	Price HK\$cent/kwh	Index
Australia*	48	66	10%	44	77
U.S.*	51	70	-1%	51	90
Indonesia	59	81	16%	51	90
Thailand	59	81	5%	56	98
Malaysia	61	84	11%	55	97
Korea	61	84	-5%	64	114
Taiwan	62	85	-13%	71	125
Singapore	64	88	16%	55	96
Hong Kong	73	100	28%	57	100
U.K.*	76	104	6%	72	126
Philippines	89	122	14%	78	137
Japan*	177	193	16%	153	203

Notes: All prices are in nominal terms and US\$ 1 = HK\$ 7.8.
 OECD countries are marked by *.
 Prices of OECD countries are the average prices for industry and households.

Data sources: Data for OECD countries are from the International Energy Agency (1997).
 Remaining data are from Lam (1997) and China Light and Power Co.

Table 2. Residential Telephone Tariffs in Selected Economics

	Connection			Monthly subscription			Local call		
	1995	1994	1993	1995	1994	1993	1995	1994	1993
Hong Kong	69	77.6	77.6	8.4	8	8	0	0	0
Korea	10	10	10	3.4	3.4	3.4	0.04	0.04	0.04
Singapore	56	52.4	50	5.9	5.5	5.2	0.01	0.03	0.02
Taiwan	113	228.7	255.2	2.3	4.6	4.6	0.04	0.04	0.04
U.S.	43	43.5	43.5	11.7	11.3	11.3	0.09	0.1	0.1

Notes: Local call tariff is for three minutes. All charges are measured in US\$.

Source: ITU Statistical Yearbook 1995; World Telecommunication Development Reports, 1995, 1997.

Figure 1. The Scheme of Control Mechanism

