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# Total factor productivity measures for Hong Kong telephone

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## Abstract

Since the early 1960s, the Hong Kong Telephone Company (HKTC)—the dominant firm in Hong Kong's local telephone market—has undergone several regulatory reforms. The company has been subject to price control, rate-of-return regulation and price-cap regulation. This paper estimates the total factor productivity (TFP) growth of HKTC. The empirical results show that the estimated TFP growth of HKTC was 2.31–3.56% per year between 1964 and 1998. TFP growth varied substantially under different regulatory regimes, and the importance of the scale effect relative to the technological effect diminished over time.

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*Keywords:* Hong Kong telephone company; Total factor productivity (TFP); Scheme of control

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## 1. Introduction

In recent years, there has been a growing interest in measuring the productivity and efficiency of telecommunications companies. Various methods have been used for measuring productivity change, including the growth accounting approach to total factor productivity (TFP) measurement, the Divisia aggregation method, the Malmquist index of TFP, the Törnqvist productivity index and *data envelopment analysis* (DEA).

The reasons are many for the increased interest in the study of productivity growth. Productivity studies have been carried out partly due to academic interest and partly due to

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regulatory purposes. Over the last two decades, there has been a global trend of liberalisation and privatisation in the telecommunications industry. In addition, new regulatory systems such as price caps have emerged to replace traditional rate-of-return (ROR) regulation, with the aim of facilitating the transition to competition. Faced with this regulatory challenge, academics have been interested in evaluating the performance of telecommunications companies in terms of productivity growth under different regulatory regimes. Moreover, under incentive regulation, the estimation of productivity growth has been an obligation thrust upon regulators.

This paper estimates the productivity growth of the Hong Kong Telephone Company (HKTC), which was the monopolist in Hong Kong's fixed-line local telephone market before 1995. This study compares the productivity growth of HKTC under different regulatory regimes, and considers whether the company has shared the productivity gains with its customers. The paper is structured as follows. Section 2 provides a brief background of the telecommunications industry in Hong Kong. Section 3 summarises empirical studies of productivity growth in telecommunications, and describes the methodology and data used in this productivity study. The empirical results are presented in Section 4, and Section 5 concludes the study.

## **2. Telecommunications in Hong Kong**

The dominant player in Hong Kong's telecommunications industry is Hong Kong Telecom (HKT).<sup>1</sup> For 70 years before 1995, the Hong Kong Telephone Company (HKTC)—a subsidiary of HKT—was the franchised monopoly serving the fixed-line local telephone market (Lam, 1996; Xu & Pitt, 1999). In the international market, Hong Kong telecommunications International (HKTI), another subsidiary of HKT, once held an exclusive licence for international services.

HKTC was incorporated in 1925, and granted a licence to provide local telephone services for 50 years until 1975. The Hong Kong government regulated HKTC fees by assessing its actual rate of return on capital employed. In 1975, when the government renewed HKTC's franchise for another 20 years, a formal Scheme of Control arrangement was imposed on the company. The Scheme permitted HKTC to earn 16% return on shareholders' funds.

The scheme effectively came to an end in 1991, when HKT began to set local tariffs below cost, and tried to subsidise HKTC with international revenue from HKTI (Mueller, 1991). This underpricing policy was seemingly intended to deter the entrants that were expected to arrive when the local market opened in 1995. In 1992, HKT proposed to replace the scheme of control with a price cap, and eventually reached an agreement with the government. From 1993 to 1998, the price cap for residential lines was set at the percentage change of the consumer price index (CPI) minus 3% (i.e., CPI–3).

The Hong Kong government started to liberalise the telecommunications industry in the 1980s. In 1983, the customer premises equipment market was opened up for competition. The government also allowed competition in cellular telephone after its introduction to Hong Kong in

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<sup>1</sup>The holding company of HKTC was originally HKT, which was renamed Cable & Wireless HKT in 1999, and Pacific Century CyberWorks HKT (PCCW-HKT) in 2000. There have also been organisational restructurings within the HKT group from time to time. For simplicity, the company names of HKTC (the local telephone dominant) and HKT (the holding company) are used throughout this discussion.

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