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Working Paper Series No. 1/2007

Price Cap Regulation of Telecoms in Barbados: A Preliminary Investigation

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May 2007

Abstract

Telecommunications reform in Barbados has opened up the market for new entrants in several areas of services that were previously monopolised as well as established a Price Cap on some of the services provided by the dominant firm in the industry. This paper provides a review of this reform process by analysing recent developments in the telecommunications industry as well as comparing the price cap model in place in Barbados to those in place in other countries. The study also presents an assessment of the performance of the regulated company, in terms of changes in productivity, profitability and prices as well as provides a simulation of potential price change for domestic and international services.

Introduction

In an attempt to improve access and enhance the efficiency, most countries have made significant changes to the institutional and regulatory framework of the telecommunications industry. Barbados' experience with deregulation in telecommunications began in 1996 when the Prime Minister appointed a Technical Committee to assist in the formulation of a National Telecommunications Policy. An important aspect of this review was to renegotiate the exclusive domestic and international licenses that were held by Cable and Wireless (Barbados) Ltd. and were only due to expire in 2010. Since then, deregulation has introduced competition in areas such as

customer premises equipment and cellular services – through interconnection to Cable & Wireless' domestic network.

Another important pillar of this reform process was the introduction of an incentive based rate setting mechanism (Telecommunications Act, Section 39, 3). Regulation of the industry has traditionally been Rate-of-Return based, where the regulator decided on some fair margin over the cost of providing services (last set at an after tax return of 11.82% or a pre-tax return of 16.85%). However since the analysis by Averch and Johnson (1962) showed that this type of regulation can lead to over investment in capital and inefficiency, the scheme has fallen out of favour with both policymakers and academics. As a result, after public consultations, the Fair Trading Commission (FTC) introduced effective 1st April 2005, a price cap mechanism to regulate the supply of telecommunications services. Under this new approach, prices that the regulated firm can charge depend both on inflation and productivity (FTC, 2005). In theory, price cap regulation should induce the firm to minimise cost and undertake cost-reducing innovations.

A number of recent studies have attempted to investigate the impact of this reform process on telecommunications performance and development. Gutiérrez (2003), for example, examines the effect of reform on telecom performance by deriving a second-generation regulatory framework index for 22 Latin American countries between 1980 and 1997. The author finds that sound regulatory governance in telecommunications has a positive impact on network expansion and efficiency, in both the static and dynamic specifications. Moreover, openness of markets to competition and divestment of former state-owned operators also had a positive impact on the industry's performance. Similar findings are obtained by Wallsten (2001), Bortolotti, et. al. (2001) and Gutiérrez and Berg (2000).

Bortolotti, et. al. (2001) differs from these other studies, since the authors explicitly model the impact of the existence of Price Cap regulation. The authors report that price regulation increases the firm's profitability, but could not unearth any significant impact on efficiency. In contrast, Ros (2003) – using observations on 20 Latin American and Caribbean countries between 1990 and 1998 – finds that the existence of price cap regulation had a significant and positive impact on telephone main lines in operation per 100 inhabitants. The author partially attributes this result to the certainty and predictability to the time-path of prices associated with price cap regulation.

Price Cap regulation therefore, if done incorrectly, has the potential to increase firm profitability with no significant impact on firm efficiency. The performance of the price cap should therefore be reviewed from time-to-time to ensure that it is fulfilling the goals of efficiency and equity. Indeed, FTC (2005) requires the regulated firm to provide semi-annual and annual regulatory financial statements as well as costing data. This paper discusses the rationale for a price cap mechanism in Barbados and also provides an investigation of the performance of the regulated company before and after the introduction of the price cap to identify any significant changes that occurred during the period. In doing so, the authors provide suggestions for the future of price regulation.

The remainder of this paper is structured as follows: Section 2 gives some background information on telecommunications reform; Section 3 outlines Barbados' approach to price cap comparing and contrasting it with that in place in Jamaica and more developed markets, while Section 4 presents an analysis of the trends in performance of the regulated company as well as simulations using the price cap model; Section 5 concludes with a summary of the main findings and policy recommendations.

Context of Telecommunications Reforms

Despite the vast differences in development levels and economies of scale and scope there is a distinct correlation between the United States, Britain and Caribbean countries on price regulation of the Telecommunications sector. Competition was not a fact of life as monopolies, such as Cable & Wireless in several of the Caribbean islands, AT&T in the United States and the state-run British Telecom in Britain operated as natural monopolies. In addition, although the pros and cons of rate of return regulation were points of some academic discussion during the early 1980s, it was never a serious policy consideration for Governments in the Caribbean. The goal of limiting companies, not only telecommunication companies, to a fair rate of return was entrenched in the United States (Brock, 1998) as it was in Barbados and any other Caribbean democracy for that matter.

The objective also of achieving rates that were “just and reasonable” resonated without question as a legally accepted ideal. But Brock (1998) notes: “Although simple in concept, the rate base rate of return method requires extensive controls over a company. The accounting system must be specified and the depreciation rates prescribed in order to make the profit figures reasonable.” Otherwise, Brock concludes, “the monopolist can escape the control of regulation by accounting changes that hide the true profits”.

Barbadian consumers, the most prominent of whom was University of the West Indies economist, the late Wendell McClean, for years engaged in pitched battles with Cable & Wireless during rate hearings on arguments related to cost accounting and depreciation. McClean won universal recognition in Barbados as a champion of consumer interests in his persistent involvement in rate hearings until his death in February 2000.

Liberalisation in Barbados, and in general the world, has been driven by the privatisation of former state-owned telephone companies in the 1980s and the competitive pressures of globalisation. These pressures also led to Price Cap regulation gaining ascendancy as a considered option of price regulation.

This period also marked a decline in support for natural monopoly thinking in some countries and a gradual reduction in the acceptance of rate of return regulation.

Market conditions in both developed and developing countries, however, did not achieve a transition of “pure competition”. In many developed and developing countries the monopoly continued to be dominant in some sectors, such as residential and international services. Price Cap models have therefore been developed with this in consideration and an assumption that at some point competition will be so robust in all sectors that the Price Cap mechanism would be dispensed with. The Price Cap mechanism, in the view of the authors, has the scope to go beyond the aims of providing an efficient method of equating costs and investment with prices and service. It can be a catalyst for competition, particularly in areas where communications is patchy, and residential households have limited access to the Internet or have been on a waiting list for fixed line service for an unacceptably long period.

Higher productivity has also been achieved by telecommunication companies after Price Cap regulation is introduced: Intven and Tetrault (2001) noted: “Good price regulation mimics the results of effective competition”. In the Caribbean, Jamaica and Barbados are examples of countries which have adopted Price Cap mechanisms earlier than some of their regional trading partners. There have been some variations, with Jamaica opting for a four-year trial period and Barbados for three. Trinidad and Tobago at the time of writing this paper was putting out a draft set of proposals for public discussion.

Competition in telephone service and the benefits of lower prices were noted in the United States in the early 1900's by Cohen (1992) who observed that rates were lower in states where there was competition. While price regulation is designed under both Rate of Return and Price Cap mechanisms to benefit the consumer or protect them from price gouging, the explosion of communication technology innovation in the 1990's has added other potential benefits of competition. These include the delivery of new services and education opportunities via broadband communications at affordable rates.

The degree to which effective competition is in place and regulated to ensure that anti-competitive practices such as cross subsidies are not allowed to surface is a critical consideration in any form of price regulation. A simple analogy would be two trains leaving a station on parallel tracks for the same destination. Both trains need to be on course at the same time and arrive at their destination because they both carry goods that are required by the citizens of the town where they are headed. In order for Price Cap to be effective, therefore, one train which represents the degree of competition in a country and the other carrying the benefits of Price Cap need to be travelling at equal distances and times apart. But with the Price Cap in place in Barbados going two years, fixed telephone service remains entrenched as a dominant monopoly where Cable & Wireless remains unchallenged. Wireless options for fixed telephone service is unavailable and a wireless alternative to Cable & Wireless' ADSL offering is still available in a few areas.

The competition in cellular, which is vibrant and has led to a high cellular phone penetration rate, is restricted to two companies, the Irish firm Digicel, which has operations in several Caribbean countries, and Cable & Wireless. The operations of Cingular Wireless were acquired by Digicel in 2006. The lack of competition in fixed line service was commented on by Deputy Prime Minister and Minister of Economic Affairs Mia Mottley in November 2006 when she reminded TeleBarbados, a new full service competitor, that it had an obligation to service the residential market. TeleBarbados, which is majority owned by Leucadia of the United States, is utilising a sub-sea fiber optic cable to offer broadband data communications eventually in a wide range of service areas. TeleBarbados recently acquired Freemotion, an Internet Service Provider (ISP), which has wireless access at speeds above dial-up but below true broadband connectivity. The availability of its services nationwide remains patchy. The future of wireless access is patchy and it remains to be seen how the pace of wireless data and fixed line service will evolve, with the financial involvement of TeleBarbados. Fidelity Wireless is aiming to enter the market shortly with wireless connectivity.

Statistics on key telecommunications indicators for Barbados, Jamaica, Trinidad and Tobago and four country groups for the period 1975 to 2005 are provided in Table 1. One of the most popular indicators of telecommunications development is teledensity or telephone mainlines per thousand persons. The table shows that Barbados has a fairly high level of teledensity. At the end of 2005, the country had 497 mainlines per 1000 persons, up from 110 at the end 1975 or an almost five-fold increase over the 30 year period. The level of teledensity in Barbados at the end of 2005 was also higher than the combined figure for Jamaica and Trinidad and Tobago and well above the world average and that for high middle income countries. In terms of mobile phones per 1000 persons, the story is quite similar. At the end of the 2005, the number of mobile phones per 1000 persons was estimated at 519, well above the world average and that for other high middle income countries.

As a result of the virtual monopoly that the main provider holds in the fixed line market, telephone revenue per main line has been relatively high in Barbados when compared to other countries. Revenue per mainline was estimated at US\$1379 in Barbados, or twice the world average and higher than upper middle income, and low to middle income countries. In the past it was even higher: in 1989 revenue per mainline was estimated at US\$1819 or almost three times higher than the

world average. Throughout the 1990s, it fluctuated around the US\$1691 mark, until falling precipitously in 2000 as the company prepared for competition in certain areas of its business.

Table 1: Telecommunications Indicators

| Country/Group | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 | 2005 |
|---|------|------|------|------|------|------|------|
| <i>Telephone</i> | | | | | | | |
| <i>Mainlines (per 1,000 persons)</i> | | | | | | | |
| Barbados | 110 | 139 | 192 | 281 | 341 | 463 | 497 |
| Jamaica | 27 | 26 | 33 | 45 | 118 | 198 | 170 |
| Trinidad and Tobago | 40 | 40 | 102 | 141 | 168 | 245 | 250 |
| High Income | 253 | 320 | 388 | 457 | 521 | 588 | 560 |
| Upper Middle Income | 40 | 55 | 72 | 89 | 137 | 195 | 199 |
| Low and Middle Income | 11 | 15 | 20 | 27 | 44 | 82 | 112 |
| World | 61 | 77 | 86 | 100 | 122 | 162 | 183 |
| <i>Mobile Phones (per 1,000 persons)</i> | | | | | | | |
| Barbados | n.a. | n.a. | n.a. | 0 | 17 | 106 | 519 |
| Jamaica | n.a. | n.a. | n.a. | 0 | 18 | 142 | 535 |
| Trinidad and Tobago | n.a. | n.a. | n.a. | 0 | 5 | 125 | 278 |
| High Income | n.a. | n.a. | 1 | 12 | 85 | 529 | 708 |
| Upper Middle Income | n.a. | n.a. | 0 | 1 | 11 | 174 | 395 |
| Low and Middle Income | n.a. | n.a. | 0 | 0 | 3 | 46 | 137 |
| World | n.a. | n.a. | 0 | 2 | 16 | 122 | 223 |
| <i>Telephone Revenue (per mainline, US\$)</i> | | | | | | | |
| Barbados | n.a. | 375 | 524 | 1744 | 1739 | 1373 | n.a. |
| Jamaica | n.a. | 1019 | 910 | 1618 | 1108 | 926 | n.a. |
| Trinidad and Tobago | n.a. | n.a. | 691 | 740 | 777 | 769 | n.a. |
| High Income | 319 | 528 | 467 | 832 | 1033 | 1247 | 1351 |
| Upper Middle Income | n.a. | n.a. | 450 | 473 | 600 | 740 | 837 |
| Low and Middle Income | n.a. | n.a. | 556 | 762 | 765 | 644 | n.a. |
| World | 350 | 528 | 533 | 793 | 817 | 773 | 831 |

Source: World Development Indicators

Barbados' Approach to Price Cap Regulation

The telecommunications industry in Barbados is regulated by the Fair Trading Commission (FTC) and the Ministry of Economic Affairs and Development. The FTC is responsible for instituting rate-setting principles, approving and monitoring rates and performing reviews of these rates for service, while the Ministry is responsible for the management¹ of telecommunications. Although the FTC is not technically part of the public sector, since the Director and employees of the Commission are not civil servants, it is not an entirely independent regulator as is the case in the U.S, since the FTC commissioners are appointed by the Minister of Consumer Affairs and through him/her are therefore accountable to Parliament for their actions. The Minister of Consumer Affairs also has the power to terminate any Commissioner deemed "unable or unfit to discharge the functions of a Commissioner". Parliament, however, does not have the power to reverse any of the decisions made by the Commissioners.

The regulated services are separated into four baskets: (1) residential access; (2) non-residential domestic voice telecommunications services²; (3) international telecommunications services³, and; (4) other retail telecommunications services⁴. These baskets vary by country. Jamaica, for example, has three baskets: unregulated services, fixed-to-mobile, interconnection and basic services, the UK has baskets for exchange line rentals, local, national and international call charges and the US has a baskets for residential and small business services, 800 services and other services used by businesses.

In Barbados, the Company is allowed a maximum seven percent annual increase in the price of residential access services. This price cap is fixed and therefore does not vary with the rate of inflation. To ensure that the service is affordable to all households, the Company was not allowed full price flexibility in this area. The regulator in Jamaica was also concerned with this issue and was even more detailed in its recommendations as it relates to residential rates. Rather than providing rates of change, the regulator in Jamaica developed a schedule for annual increases in the prices of line rentals, low-user line rental, business line rental, residential installation, business installation, low-user usage intra-Parish and low-user usage inter-Parish.

Non-residential domestic voice telecommunications and international tele-communications services, use the more common approach to price cap, where prices (P) of the services in the basket are allowed to rise by inflation (π) less the efficiency factor (X):

$$\% \Delta P^i = \pi - X$$

(1)

where i is the basket of services under consideration. In most countries inflation is usually measured by the retail price index (Barbados, UK), GNP deflator (US) or consumer price index (Jamaica),

¹ This includes issuing licences for the provision of telecommunications services, monitoring and ensuring compliance with the terms and conditions of the license, plan, manage and regulate the use of spectrum in/between Barbados and elsewhere, and ensure compliance with the country's international obligations, to name a few.

² These consist of business access and other exchange lines, business installation and other one-off services, payphone access, value-added services, payphone local, residential installation and other related one-off services, trunk/local/tandem fixed calling and domestic operator assistance.

³ Services falling in this basket include fixed international outgoing, payphone international, international operator assistance and international leased circuits.

⁴ These are domestic leased circuits, voicemail and Centrex.

while the X -factor is set by the Commission based on historical productivity changes. The X -factor for non-residential domestic voice telecommunications was set at 4.19 percent, while that for international telecommunications services is significantly higher at 11.57 percent. In contrast, the X -factor is set at 6 percent in Jamaica, 4.5 percent in the UK, and just 2.5 percent in the US. The large X -factor for international telecommunications services in Barbados reflects the anticipated fall in prices for this market owing to increased competition as a result of telecommunications liberalisation. Indeed, the Commission noted that it might not be necessary to regulate this basket in the future. The final basket of services, other retail telecommunications services, is not constrained by a Price Cap.

Each Price Cap plan in Barbados runs for three years and four months, during which the X -factor cannot be revised. This relative short cycle was chosen due to the changes currently taking place in the industry. In contrast, each price cap plan runs for four years in Jamaica while the UK has a five year cycle. If the rise in the companies' prices during the current year is below the allowable increase, the company is permitted to carry forward this "unused" price increase to the next for domestic voice telecommunications services and international telecommunications services, but not for domestic residential access.

The Price Cap model also makes adjustments for exogenous shocks that may affect the company. Exogenous shocks are captured through what is called a Z -factor and attempts to capture significant variations in input prices. The Commission only allows this adjustment to be included in the price cap calculation for: (1) legislative, judicial or administrative changes beyond the control of the Company; (2) the event only affects the telecommunications industry, or; (3) the event has an impact on one of the regulated baskets of services.

Unlike Jamaica where the price cap formula takes explicit account of changes in the quality of service, Barbados only monitors quality standards. This quality-of-service adjustment factor was initially set to zero in Jamaica, but the regulators have the authority to change the factor if the quality of regulated company significantly changes. The FTC, instead, chose to set a series of quality standards which the Company must meet or exceed.

4. Performance of the Telecommunications Industry

4.1 Prices and Profits

To provide an analysis of price cap regulation in Barbados it is important to examine the performance of the regulated company. Following previous literature in this area (see Parker, 1999), this Section of the paper will focus on profitability, competition and prices. Conceptually, under a price cap system changes in revenues should primarily be due to an expansion in the volume of demand by each customer, and or additional customers. Therefore profits can also be employed as an efficiency indicator, since there are no price adjustments (Millward and Parker, 1983).

Table 2 therefore provides profitability indicators for the regulated company for the period 1999 to 2006. Two measures of profitability are employed: return on equity (ROE) and return on assets (ROA). The table shows that profitability of the regulated company has risen significantly over the last two years. At the end of 2006, the ROE ratio was 42.6%, or 8.4 percentage points higher than in 1999. The ROA ratio showed a similar patten of growth, with this ratio expanding by 11.4 percentage points, to end the review period at 23.9 percent.

Table 2: Profitability of Regulated Company

| Indicator | 1999 | 2000 | 2003 | 2004 | 2005 | 2006 |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| ROE (%) | 34.2 | 32.7 | -19.7 | -13.2 | 42.2 | 42.6 |
| ROA (%) | 12.5 | 13.2 | -9.7 | -6.5 | 20.9 | 23.9 |
| International (% Assets) | 24.2 | 21.4 | 27.2 | 38.1 | 29.3 | 26.5 |
| Domestic (% Assets) | 28.9 | 31.2 | 55.1 | 71.0 | 63.3 | 57.3 |
| Information (% Assets) | 3.0 | 3.3 | 2.2 | 1.8 | 1.2 | 0.5 |
| <i>memo</i> | | | | | | |
| Assets (\$Mil) | 297.0 | 309.9 | 429.0 | 336.4 | 393.1 | 421.5 |
| Equity (\$Mil) | 108.4 | 124.6 | 211.3 | 164.9 | 194.1 | 236.4 |
| Net Income (\$Mil) | 37.1 | 40.8 | -41.6 | -21.8 | 82.0 | 100.7 |

Source: Annual Reports of Cable Wireless (Various Issues)

Profits for the company only fell in two years during the period under review, 2003 and 2004. This decline was primarily due to large write-offs for impairment and restructuring. According to the Company's Financial Report (2005a): "An impairment loss is recognised whenever the carrying amount of an asset or its cash generating unit exceeds its recoverable amount", while restructuring is "recognised when the Company has approved a detailed and formal restructuring plan, and the restructuring has either commenced or has been announced publicly". Unfortunately, there was no information in the annual report on how these figures were derived. Indeed, once one abstracts from these adjustments, the ROE ratio would have been approximately 33.5 and 30.6 in 2003 and 2004, respectively.

The figures above show that even after the introduction of the price cap mechanism in Barbados, the profits of the regulated company have continued to rise. It is critically important to note that the authors did not have disaggregated data on regulated and non-regulated services. Without this data it is unclear to what extent the Price Cap has had an impact on the company. This data is necessary to assess the company's efficiency vis-à-vis the Price Cap.

Despite this absence of data, the profitability of the regulated telecommunications company in Barbados is more than twice that earned in other countries. In the U.S the telecoms industry generally earns a return of between 6 and 14 percent on equity while British Telecom's returns are usually 19 percent (see Damodaran, 2001; Parker, 1999). To explain these rather high rates of return as well as the acceleration in profitability over the period, the authors also report the ratio of revenues from international, domestic and other services as a percentage of total assets. The results are also provided in Table 2. The table shows that international revenue has been fairly flat throughout most of the review period: fluctuating around the 27 percent average. However, revenue from domestic sources was quite strong. At the end of the 2006 financial year, domestic revenue was 57 percent of total assets compared to 29 percent in 1999. The rate of increase over the last three years, however, has been slowing somewhat. After peaking at 71 percent in 2004, the ratio fell to 63 percent in 2005 and 57 percent in 2006.

Table 3 provides a summary of price changes approved price changes for the regulated firm. The table shows that telecommunications charges, adjusted for inflation, are likely to remain unchanged in 2005/2006, increase by just under one percent in 2006/2007 and by 2.1 percent in 2007/2008. Assuming that the operating cost grows by seven percent or less, the Company's rate of

profitability (ROE) should rise by 1-2 percent per year in the short-term. Profits can also rise significantly if the Company is able to increase its efficiency, one of the goals of price cap mechanism.

Table 3: Price of Domestic Telephone Calls

| | 2004/05 | 2005/06 | 2006/07 | 2007/08 |
|----------------------------|---------|---------|---------|---------|
| Price Before Increase (\$) | 28.0 | 28.0 | 30.0 | 32.1 |
| % Increase | | 7.0 | 7.0 | 7.0 |
| Price After Increase (\$) | 28.0 | 30.0 | 32.1 | 34.3 |
| VAT (15%) | 4.2 | 4.5 | 4.8 | 5.1 |
| Price Inclusive of VAT | 32.2 | 34.5 | 36.9 | 39.4 |
| Inflation (%) | | 7.0 | 6.3 | 4.9 |
| Real Change (%) | | 0.0 | 0.7 | 2.1 |

Sources: Forecasts from International Monetary Fund (www.imf.org)

4.2 *Productivity Analysis*

Productivity is usually measured as the change in the degree of efficiency for the firm over a given period of time, and is obtained by comparing the changes in the consumption of inputs relative to changes in output. In this paper, the authors use the total factor productivity (TFP) measure that takes into account multiple inputs, rather than just one input, such as labour or capital. TFP change is therefore the difference between the changes in the company's output less the change in the weighted aggregated index of relevant inputs.

For telecommunications companies, output is usually defined in relation to usage or revenues. Ideally, output should be measured in terms of usage. For example, the number of subscribers or lines in service for each type of facility (international, domestic fixed line, domestic mobile, etc). This information is however not provided to the public or the company's shareholders in the Annual Report. The authors therefore had to use total revenues from all services (see Townsend and Stern, 2000, for a discussion of the applicability of this approach).

To measure the inputs, three categories are considered labour, materials and capital. Labour costs include all salaries and benefits paid to employees, materials are non-labour expenditures consumed during the year and capital costs is the degree to which physical investments are consumed by the production of services during the year. These values are normalised to abstract from price fluctuations.

Following Townsend and Stern (2000), labour inputs are deflated by the rate of wage increases for the telecoms industry (see Maynard and Moore, 2005), while materials and new investments employ the general retail price index as the deflator.

Measuring real changes in capital costs is more involved. To calculate capital consumption new investments are adjusted for inflation and added to the beginning of the year capital. The base year effective depreciation rate is applied to the adjusted fixed asset base to obtain an estimate of net fixed assets that abstracts from changes in the depreciation policy. The ratio of adjusted net revenues to adjusted net fixed assets is then employed to estimate the base year unit capital cost. The base year unit capital cost ratio is then applied to annual adjusted net fixed assets to obtain a measure of annual capital cost/consumption. A simple unweighted average is utilised to combine the three inputs

(labour, materials and capital) into a single input index. TFP is then calculated as the difference in the change in the output index and the change in the input index.

Using the annual reports for the regulated company between 2003 and 2006, the output and input indices are calculated and provided in Table 4. The table shows that beginning in 2005, the Company has been reducing the amount of inputs utilised in production: in 2005, most of this reduction was due to a fall in materials and capital consumption, while in 2006, the reduction in inputs was primarily due to a fall in labour inputs. According to the Company's Annual Report (2005b) most of these savings on inputs were primarily due to outsourcing of directory sales and increased out-payments as well as "a number of [other] cost initiatives as the Company continues to strive for improvement in efficiencies". Capital consumption in contrast contracted in 2005 primarily due to "impairment losses", i.e. write-downs in the recoverable amount of property, plant and equipment due to deregulation and competition. The reduction in the amount of labour inputs in 2006 primarily resulted from a fall in the number of companies from 868 persons in 2005 to 826 in 2006 (a net loss of 42 jobs). Capital consumption in 2006, on the other hand, picked up as the Company made significant investments in its mobile network, data network, ADSL ports and fixed line capacity. As a result of these changes, productivity of the regulated company is estimated to have risen by 18.2 percent in 2005 and 2.2 percent in 2006. If one abstracts from impairment losses (the estimated cost of the Company's lost of the position of the sole provider of telecommunications services) the estimates of productivity gains would be 12 percent for 2005 and 8 percent for 2006. These estimates, however, represent the minimum productivity change for each year, since output growth is likely to be underestimated due to the unavailability of data (usage and price statistics disaggregated by service). And given the use of the x-factor in the price cap, it would suggest that the rate of price increase should be slower.

Table 4: Changes in Productivity

| | 2004 | 2005 | 2006 |
|-------------------|-------------|-------------|-------------|
| Change in Inputs | 0.177 | -0.193 | -0.057 |
| Labour | 0.004 | 0.012 | -0.170 |
| Materials | 0.151 | -0.136 | 0.018 |
| Capital | 0.199 | -0.263 | 0.038 |
| Change in Outputs | 0.028 | -0.011 | -0.036 |
| TFP Change | -0.149 | 0.182 | 0.022 |

Source: Authors' Calculations

4.3 *Simulated Price Cap Model Results*

Table 5 presents the results of applying the price cap model to telecoms based on the figures obtained earlier. The evidence indicates that:

- the effects of inflation on telecoms costs are likely to be between 5 and 7 percent, with a possibility of being lower, and
- achievable productivity increases are likely to be around 4-6 percent for domestic services and 12-15 percent for international services.

The price cap model results therefore suggest that the rate of price change for domestic services should rise by at most 1 percent, while international services should fall by between seven and eleven percent.

These price proposals will, however, need to be assessed with reference to the impact of the regulated company's activities. Are these proposals likely to result in any reduction in the ability of the company to provide services or reduce its financial standing? In addition, it has been tradition in Barbados to support residential services through other service baskets. On the other hand, the reduction in prices could also generate some positive benefits for the company by boosting customer goodwill, reduction in bad debts and associated collection costs and a rise in other related services.

Table 5: Application of Price Cap Model

| | <i>Domestic</i> | <i>International</i> |
|--|-----------------|----------------------|
| <i>Scenario 1 - Low Inflation and Low Productivity</i> | | |
| Inflation | 5.0 | 5.0 |
| Productivity | 4.0 | 12.0 |
| Resulting Price Cap | 1.0 | -7.0 |
| <i>Scenario 2 - Low Inflation and High Productivity</i> | | |
| Inflation | 5.0 | 5.0 |
| Productivity | 6.0 | 15.0 |
| Resulting Price Cap | -1.0 | -10.0 |
| <i>Scenario 3 - High Inflation and High Productivity</i> | | |
| Inflation | 7.0 | 7.0 |
| Productivity | 6.0 | 15.0 |
| Resulting Price Cap | 1.0 | -8.0 |

Source: Author's Calculations

5. Conclusions and Policy Implications

In an attempt to improve access and enhance the efficiency, Barbados began the process of deregulating the telecommunications industry in 1996. Since then, deregulation has introduced competition in areas such as customer premises equipment and cellular services – through interconnection to Cable & Wireless' domestic network and the FTC has introduced price caps in areas that are not fully open to competition. The price cap model replaced the traditional approach of limiting companies to a fair rate of return, which has been criticised for reducing the incentive to make productivity improving investments as well as the ease with which the company can escape regulation through changes in its accounting system (e.g. depreciation rates); evidence of this is reflected in the revenue earned per mainline by the Company: during the 1980s and 1990s, revenue per mainline in Barbados was almost three times the world average.

To address this situation, the FTC price cap system controls the rate of price increase on three of the four baskets of services provided by the Company. Residential access is capped at seven percent per annum, while non-residential domestic voice tele-communications and international telecommunications can rise by no more than the rate of retail price inflation less some efficiency or *X*-factor. This *X*-factor is presently set at 4.19 percent for non-residential domestic voice telecommunications and 11.57 percent for international telecommunications services. The relatively large *X*-factor for international telecommunications services reflects the rising level of competition in this area.

Profitability of the regulated Company has risen significantly over the last two years. At the end of 2006, the ROE ratio was 42.6%, or 8.4 percentage points higher than in 1999, while the ROA ratio expanded by 11.4 percentage points, to end the review period at 23.9 percent. The profitability

of the regulated telecommunications Company is more than twice that earned in other countries. This expansion in profitability was driven primarily by strong revenue growth from domestic sources, and to a lesser extent productivity gains. At the end of the 2006 financial year, domestic revenue was 57 percent of total assets, or almost twice the value in 1999. The paper also estimates that productivity would have increased by at least 12 percent in 2005 and 8 percent in 2006. These estimates, however, represent the minimum productivity changes for each year, since output growth is likely to be underestimated due to the unavailability of data.

To address the issue of data availability, the FTC might want to guarantee that basic information is made available to consumers and academia. It is not unusual for a company to want to protect itself from detailed analysis by claiming that basic information must be considered confidential to ensure that it does not fall into the hands of its competitors. Barbados has two sets of legislation governing confidential information for Telecommunications products and services. It is recognised that the regulatory body would have to take into account the firm's right to confidentiality and match this with the citizen's right to information, especially in light of the absence of Free of Information legislation. However, this could be addressed by lagging the circulation of data so that it does not put the Company at a disadvantage relative to its competitors. The regulator should also weigh whether information deemed by a company to be confidential does not present an act of anti-competitive behaviour.

Barbados and other regional Governments may want to consider whether "off island" price cap regulation should be adopted. In some other regions regulators have found it necessary to ensure that wholesale telecommunications minutes and bandwidth capacity are not sold at prices that are unjustifiably high. In some circumstances, either in a case where a telecommunications company provides wholesale minutes based on access to their sub-sea cables or operates both sub-sea connectivity and a national network it has actually been reported that the prices of wholesale minutes are higher than retail minutes. This is contrary to the familiar situation where wholesale minutes tend to be lower than those for retail business. Speakers at the Capacity Magazine conference in Barbados in February suggested that some countries in Asia have sought to address this peculiar development by establishing Price Caps for "off island" service providers. Wholesale and retail pricing, particularly where a company can influence the cost of its service and determine the prices charged to competitors who are unable to bypass their networks, either at the wholesale or retail levels, raises questions about the degree to which competition may be effective.

Prior to the establishment of TeleBarbados and its start-up in 2006, and the Antilles Crossing sub-sea fibre cable landing, Cable & Wireless controlled all incoming wholesale capacity. Internet companies competing with Caribsurf, Cable & Wireless' internet service provider, argued that they were charged exorbitant rates which seriously retarded their ability to charge customers competitive rates and run successful businesses. With Cable & Wireless still maintaining the majority of business and residential customers for overseas and domestic calls the obligation of the regulator to respond to interconnection conflicts promptly becomes an added priority, if the benefits of competition are to be achieved.

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