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Price caps and the error in X-factor calculations

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Abstract

Calculation of the X-factor used for price caps has a fundamental flaw when it is based on conventional growth accounting total factor productivity analysis. This error is discussed and the appropriate corrective action is indicated. In an example based on the X-factor used for determining the change in the price for local exchange carriers' interstate access service in the United States, it is shown that the appropriate X-factor is about 25 percent greater than that based on conventional growth accounting total factor productivity analysis. Published by Elsevier Science B.V.

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1. Introduction

A significant appeal of price cap regulation is in its seeming ability to provide better incentives than rate of return regulation for cost reduction and technological innovation (Sherman, 1985, 1992). For example, in 1990 the Federal Communications Commission determined that an incentive-based price cap system would more closely represent the results of a competitive market than did the prior regulatory method of rate of return regulation (*Policy and Rules Concerning Rates for Dominant Carriers*, Second Report and Order, CC Docket No. 87-313, 5 FCC

¹ The views expressed are those of the author and do not necessarily represent the policies of the Federal Communications Commission or the views of other Federal Communications staff members.

Rcd 6786, 6789 (1990))². Specifically, the price cap plan was “designed to mirror the efficiency incentives found in competitive markets . . . by encouraging LECs to move prices for interstate access services to economically efficient levels, to reduce costs, to invest efficiently in new plant and facilities, and to develop and deploy innovative service offerings” (*Price Cap Performance Review for Local Exchange Carriers*, First Report and Order, CC Docket No. 94-1, 10 FCC Rcd 8961, 8965 (1995)). In order to promote consumer welfare and economic efficiency, ceilings were set on prices that were intended to allow carriers to cover their costs and earn a normal, competitive rate of return (Sappington and Weisman, 1996). If prices were set too high, consumers would fail to share the benefits of the carriers’ efficiency; if prices were set too low, the return on capital would be insufficient to attract investment into the industry (Armstrong et al., 1994).

To achieve the desirable objectives, price cap regulation typically specifies the rate at which the prices that a regulated firm charges for its services must change, on average, after adjusting for inflation (Beesley and Littlechild, 1989; Kridel et al., 1996). In the case of interstate access charges, the Federal Communications Commission permits prices to increase by a measure of inflation minus a productivity offset, or X-factor. The X-factor represents the amount by which LECs can be expected to outperform economy-wide productivity gains (*Policy and Rules Concerning Rates for Dominant Carriers*, Second Report and Order, CC Docket No. 87-313, 5 FCC Rcd 6796 (1990)). Formally, the X-factor is defined to equal the sum of the change in LECs’ productivity less the change in productivity of the aggregate economy plus the change in input prices for the aggregate economy less the change in LECs’ input prices. A total factor productivity (TFP) approach has been adopted for estimating LECs change in productivity (*Price Cap Performance Review for Local Exchange Carriers*, Fourth Report and Order, CC Docket No. 96-262, 12 FCC Rcd 16642 (1997))³.

A number of very explicit assumptions underlie TFP analyses. In particular, the conventional growth accounting method of measuring TFP of firms is to assume that there are constant returns to scale and that observed inputs and outputs have been generated by firms in competitive, long run equilibrium. With prices of output and inputs fixed, the firm chooses input levels so as to maximize profit (Jorgenson and Griliches, 1967; Berndt and Fuss, 1986). The measure of TFP growth obtained

² The Federal Communications Commission has determined that competition should be the model for setting just and reasonable LEC rates because “Effective competition encourages firms to improve their productivity and introduce improved products and services, in order to increase their profits. With prices set by marketplace forces, the more efficient firms will earn above-average profits, while less efficient firms will earn lower profits, or cease operating. Over time, the benefits of competition flow to customers and to society, in the form of prices that reflect costs, maximize social welfare, and efficiently allocate resources (*Price Cap Performance Review for Local Exchange Carriers*, First Report and Order, CC Docket No. 94-1, 10 FCC Rcd 8961, 9002 (1995)).

³ All of the Federal Communications Commissions’ reports and orders referred to are available via the Internet at <http://www.fcc.gov>.

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