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Uncovering regulator's (implicit) social welfare weights under price cap regulation

Edilio Valentini

Università G. D'Annunzio di Chieti-Pescara, DEST, Facoltà di Economia, Viale Pindaro 42, I-65127 Pescara, Italy

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Abstract

This paper provides a simple procedure that can be used in empirical works aimed at uncovering the preferences of regulators over consumers. The inverting procedure proposed by Ross (1984) [Ross T.W., 1984, Uncovering Regulator's Social Welfare Weights, Rand Journal of Economics 15, 152–155.] is adapted to a regulatory situation characterised by price cap regulation.
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1. Introduction

The aim of this paper is to provide a simple procedure that can be used in empirical works aimed at uncovering the preferences of regulators, expressed in terms of social welfare weights, over different groups of consumers. Such a procedure can be applied when the regulatory instrument is a tariff-basket price cap whose characteristics respect those of the generalised price cap (GPC) which has been recently proposed by Iozzi et al. (2002).

Empirical attempts to uncover regulators' social welfare weights have already been carried out in the U.S. for such cases as telephone, postal and electricity services (Ross, 1985), water (Resende, 1997) and natural gas distribution (Klein and Sweeney, 1999). These papers rely on Ross (1984), who provides an

E-mail address: valentin@unich.it

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immediate technique to obtain the social preferences of a fully informed regulator maximizing a weighted sum of consumers' surplus subject to a profit constraint by the regulated firm. In this context, the social preferences, which are implicit in the prices that can be directly chosen by the regulator, are extracted by inverting the first order conditions derived from the classical Ramsey pricing problem.[1]

Unfortunately, the prices observed in most regulatory contexts do not directly reflect the regulator's preferences. Firstly, a typical regulatory framework is characterised by some form of asymmetric information which prevents the regulator from directly setting the prices that would guarantee the second-best allocative efficiency. Asymmetric information may force the regulator to delegate some choices to the firm which is, of course, the most informed agent in this sort of relationship. This is the situation that identifies also the pricing decisions in the price cap context where the regulated firm has some degree of discretion in choosing the structure of prices which is most adequate to the demand and cost conditions. Secondly, price caps usually perform in dynamic contexts where the convergence towards Ramsey prices can be guaranteed – at least from a theoretical point of view – only in the long run (see, for instance, Vogelsang and Finsinger, 1979; Brennan, 1989; Iozzi et al., 2002). These observations imply that the prices observed at a given period of time are normally not Ramsey prices, and the use of inverting procedures based on Ramsey pricing models would not be correct in these circumstances. These sorts of complications were already raised by Ross (1984) who, listing possible areas for continuing his research, stated that "there is more work to be done on the theory itself. Regulatory pricing schemes are often so complicated that our formulas do not apply. [...] How must our rules be changed to allow us to analyze more of the price schedules that are used in regulatory situations?" (Ross, 1984, p. 155). This paper is mainly devoted to providing a theoretically sound answer to this question — by adapting Ross's inverting procedure to a regulatory situation characterised by the presence of a price capped multi-product monopolist.

The next section derives the theoretical framework that is used in Section 3 to formalise the inverting rule that allows to uncover the regulator's social welfare weights in the price cap contexts. Section 4 concludes.

2. The theoretical framework

Let us consider a regulator who has in charge the control of the M prices chosen by a multi-product firm which is monopolist in all the markets it supplies. The regulated firm's profit is defined as $\Pi(\boldsymbol{p})=\boldsymbol{p}'\boldsymbol{q}-C(\boldsymbol{q}(\boldsymbol{p}))$. By $q_m(\boldsymbol{p})$ and p_m, $(m=1, \ldots, M)$ we indicate, respectively, the generic m-th element of the $(M\times 1)$ vectors $\boldsymbol{q}$ and $\boldsymbol{p}$ representing the output quantities and the prices in the M markets. Adapting Ross (1984), the regulator's welfare function is a weighted sum of the surpluses of the N individuals (or groups of individuals) consuming the M goods,

$$W(\cdot)=\beta^1 s^1(\boldsymbol{p})+\ldots+\beta^N s^N(\boldsymbol{p}), \tag{1}$$

where $s^n(\boldsymbol{p})$ is the total surplus obtained by consumer n $(n=1, \ldots, N)$, and

$$\beta^n=\frac{\partial W}{\partial s^n}. \tag{2}$$

represents the regulator's preference, or social welfare weight, over consumer n.

[1] The approach proposed by Ross (1984) is equivalent to the Ahmad and Stern (1984) inverse optimum problem developed to derive the implicit welfare weights underlying a commodity tax structure.

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