

Regulating the environmental footprint of data consumption: efficiency and distributional effects of taxation and quotas

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Abstract

Digital production and consumption represent 4.4% of the French greenhouse gas emissions. This paper investigates and compares the distributional effects an environmental tax and quota on mobile data subscriptions. We develop a theoretical model of a monopolist offering mobile data subscriptions to two type of consumers. The analysis shows that, under price discrimination, the monopolist responds to a carbon tax by reducing both prices and data allowances. Introducing a quota on data consumption negatively impacts the quantity and the price of the bundle for the high-type consumer and does not impact the bundle for the low-type consumer. Moreover, for an equivalent reduction in emissions, a quota leads to a smaller loss in consumer surplus than a tax. The model is then extended to include competition and a continuum of consumer types. We show that the results obtained in the monopolistic setting remain robust under competition with horizontal differentiation. We find that, under a monopolist offering two mobile data subscriptions to a continuum of consumers differentiated by

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their preference for data consumption, the tax and the quota have opposite effects. Because the tax increases the average price per gigabyte in each subscription, some consumers downgrade from the high-type to the low-type subscription, while others exit the market. By contrast, following the introduction of a quota, new consumers enter the market, and some consumers even upgrade from the low-type to the high-type subscription. Finally, using French household data, we assess the distributional effects across income deciles, showing that such environmental policy instruments are not necessarily regressive in this market.

Keywords– Environmental and Digital Regulation; Price Discrimination; Distributive effects

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