

Open access to the treatment efficacy within an antibiotic class subject to bacterial resistance¹

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November 2012

¹We wish to thank participants at the CEA conference 2012 in Calgary and at the SCSE conference 2012 in Mont-Tremblant. Financial support was granted by FQRSC (*Fonds québécois de recherche sur la société et la culture*). Please address all correspondence to Bruno Nkuiya, Département d'économie, Pavillon J.-A.- DeSève, 1025, avenue des Sciences-Humaines, Université Laval, Québec, Canada, G1V 0A6. E-mail: robeny-bruno.nkuiya-mbakop.1@ulaval.ca.

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Abstract

In this paper, we are interested in how a pharmaceutical industry manages existing antibiotic drugs in the context of bacterial resistance. We consider a model based on an epidemiological framework where antibiotic recovery rates, *and thus intrinsic qualities*, may differ. Antibiotic efficacy is modeled as a common pool of a non-renewable resource to which antibiotic producers have open access. The paper derives antibiotic demands within a vertical differentiation model and characterizes the dynamics of infected individuals, antibiotic efficacy and treatment rates under the open-access and the socially optimal allocation. We show that the high-quality antibiotic drug loses its comparative advantage over time under both allocations, such that the low-quality drug should be used longer. This occurs at a later point of time in the social optimum and allows for a better control of infection in the longer run. In contrast with the ambiguous outcome reported in the literature, the socially optimal steady-state level of antibiotic efficacy is lower than that of the open-access allocation. We also extend our analysis to a strategic, duopolistic context.

Keywords: Bacterial resistance; Antibiotic management; Public health; Open access; Social optimum; Non-renewable resource.

JEL classification: I18; L13; Q21