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Optimal subsidies for anti-malaria drugs

W. Mimra, A. Rasch, L. Schilling, Economics, University of Cologne, GERMANY;

Objectivos (Objectives):

The WHO estimates that about 247 million cases of malaria occurred in 2006 resulting in about 881,000 deaths, with 90% of deaths occuring in Sub-Saharan Africa.

A sharp increase in deaths in the 1990s was mainly caused by parasite resistance against the most commonly used first-line treatments, chloroquine and sulfadoxine-pyrimethamine. Today the most effective anti-malaria drugs are artemisinin-based combination therapies (ACTs), where an artemisinin derivative is used jointly with a specific partner drug. This combination is not only effective, but also slows down the development of any resistant mutant as the chance that a mutant resistant against both drugs evolves at the same time is lower. However, the demand for ACTs in Africa has remained negligible, the reason being strictly economic: With consumer prices on average of US$ 8 per treatment, ACTs are 20 times more expensive than chloroquine and thus unaffordable for the majority of the infected population, living on less than US$ 1,25 a day. Against this backdrop an international initiative has set up the Affordable Medicines Facility-malaria (AMFm) to subsidize ACTs at the producer level in order to increase affordability of ACTs and parallely crowd out the corresponding monotherapies to slow the emergence of resistant parasites.

Metodologia (Methodology):

This paper derives an optimal subsidy scheme for ACTs, taking both specific market conditions as well as the AMFs main objectives into account. As most of the accredited ACTs are produced by single firms with superior knowledge about their production possibilities, the model is based on the theory of optimal regulation under asymmetric information. To account for externalities due to drug resistance, a dynamic version is considered.

The set-up is the following: There are two periods. In each period, a monopolist produces the anti-malaria drug. The monopolist is initially privately informed about his marginal cost which can be either high or low. Departing from traditional regulation theory, we introduce an external effect: the value of medication in the second period depends on period one consumption. This reflects the situation that a higher ACT coverage slows down the emergence of resistance and increases the effectiveness of any ACT component. Additionally, we modify the regulator's welfare function: Firstly, producer surplus is not taken into account as the focus is solely on developing countries' consumer surplus. Secondly, we introduce a negative shadow price for donor funds, reflecting the fact that the welfare loss due to transfer payments by the donors is weighed less against an increase in

consumer surplus. In a first step, it is assumed that the regulator has perfect commitment powers.

Resultados (Results):

As a benchmark, we consider the first best: the unit price in period one is adjusted downwards from marginal cost by a term reflecting the marginal value of lower resistance caused by period one ACT expansion. On the other hand, price in period 2, adjusted for period 2 effectiveness, is equal to marginal cost. The negative shadow price for public funds additionally lowers the unit price below marginal cost in both periods.

With asymmetric information, unit prices for the low cost type are, as expected, the same as in the first best. However, the informational rent of the low cost type may be higher as it is costly to distort the high cost type in period one due to the external effect. The magnitude of the distortion of the high cost type depends on the curvature of the external effect function and the corresponding second period feedback effect.

Conclusões (Conclusions):

The results support the international agency's plan to set subsidies such that producer distribution prices are well below marginal cost. However, optimal subsidies should exhibit significant quantity discounts which at present is not reflected in the AMFm’s subsidy scheme.