The Super Norm

In 1911, Bobby Leach became the second person to survive the 57m drop down the Niagara Falls. Then he died by slipping on an orange peel. Well, it wasn't instantaneous…He slipped on an orange peel and then died from a leg infection that eventuated from the slip. And in the not-too-distant future, we too, may find ourselves facing the same fate as Bobby, dying from an injury as simple as a graze that turns into an infection.

According to the World Health Organisation [WHO] (2018), antibiotic resistance is one of the largest threats to global health, food security and development. While bacteria naturally develop resistance overtime, this process is being greatly accelerated by the overuse of antibiotics in humans and animals (McCullough, Pollack, Hansen, Glasziou, Looke, Britt & Mar, 2017). In Australia, antibiotics are being prescribed 4-9 times greater than Therapeutic Guidelines for illnesses which do not require antibiotics (McCullough et al., 2017).

While consuming antibiotics has positive externalities that stem from reduced transmission of pathogens between individuals and decreased burden on the health care system, the *overuse* of antibiotics is a negative externality (*Appendix 1*). Antibiotic consumption contributes to bacterial resistance and the subsequent creation of "superbugs". Consequently, an increasing number of infections are becoming harder to treat as antibiotics used for their treatment are losing their efficacy, and new drugs take years of research and resources to develop (WHO, 2018). Other detrimental effects include longer hospital stays, higher medical costs and increased mortality (WHO, 2018).

The classic economist's approach to rectifying deadweight losses from negative externalities is a Pigouvian tax or a quota. But could that work in the case of doctors overprescribing antibiotics? Setting a quota for antibiotic prescriptions is medically dangerous (for reasons hopefully obvious). And taxing antibiotics would likely lead to hairy arguments relating to its ineffectiveness and the risk of starting a bidding war, with those paying most getting served first, leading to inequitable distribution. It would also be a dangerous situation if those who are correctly prescribed antibiotics are deterred from purchasing it due to the tax, or if doctors were somehow taxed for giving out scripts.

So, where does that leave us? Well, a much better solution would be to examine the possibility of taxing antibiotics used in agriculture. Antibiotics are being used in livestock and food-producing animals as therapeutic or preventive measures, or more commonly, for growth stimulation (Animals Australia, 2017; Biba, 2017). It is estimated that global

consumption of antibiotics in agriculture amounts to 63,000 to 240,000 tonnes annually (Giubilini, Birkl, Douglas, Savulescu & Maslen, 2017). The use of antibiotics in the agricultural industry increases the risk of resistant bacteria developing in animals and transferring to humans (Biba, 2017).

A tax is preferable to a complete ban for animal health reasons but also because command-and-control approaches necessitate strong surveillance and are not cost effective (Hollis & Ahmed, 2013). They are also inefficient as the costs of reducing consumption to zero outweigh the benefits. In some cases, antibiotics can save an animal, and in others, simply promote growth. Thus, banning all uses of antibiotics is inefficient, but rather, the aim should be to deter from low-value unnecessary uses. In saying that, the EU's approach of banning antibiotics used as growth promoters also poses difficulties in proving what the antibiotic is being used for.

A tax could partially or completely internalise the external costs borne by society from drug resistance and therefore, reduce the quantity of antibiotics used (*Appendix 2*). A tax would be efficient in that consumption would be decreased in farms which can more easily switch to substitutes (for example, vaccinations or improved management practices) or use antibiotics for low-value purposes like growth. In contrast, farmers with high incidences of infections would likely continue to use antibiotics. Thus, farmers will decide according to whether the benefits outweigh the higher costs, and this would be better than an indiscriminate government ban (Giubilini et al., 2017). Additionally, a tax would be relatively easy to administer; it could be imposed at the manufacturing stage, farmer buying stage or end-consumer meat-buying stage. The tax revenue raised could be used to further research in the field of antibiotic resistance, or more generally, contribute to the funding of the healthcare system.

As with other types of Pigouvian taxes, it is extremely difficult to quantify the external costs. Setting the correct tax level is no easy feat, but a quota and cap-and-trade scheme would be even more practically infeasible. While some may argue that a reduction in animal antibiotic use would have minimal impact on the human situation, the tax would at the very least, contribute to a sustainable meat industry. A healthy livestock is clearly beneficial for humans. A tax is not a perfect solution, but it should be seriously considered as one way of preventing superbugs becoming the super norm.

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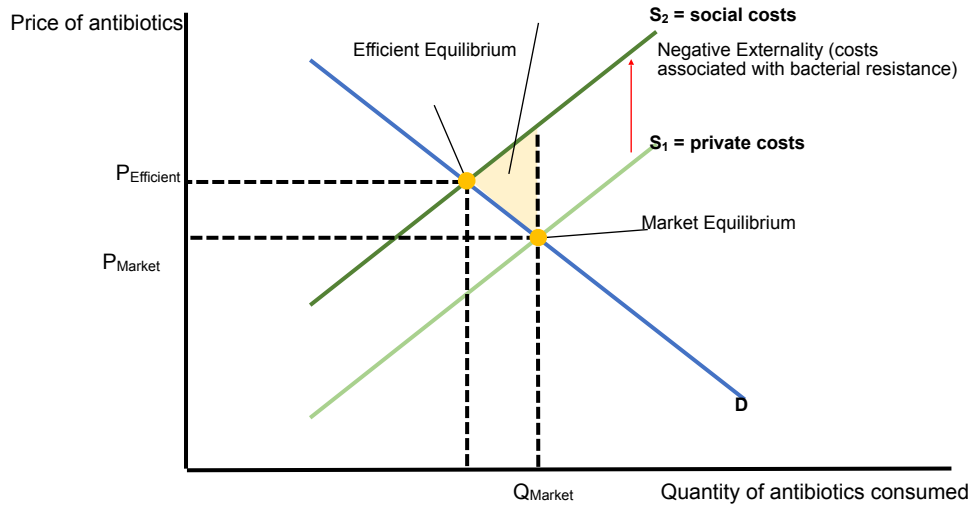
Appendix 1: The negative externality of antibiotics

Figure 1: The negative externality of antibiotics



Appendix 2: Pigouvian tax on antibiotics used in agriculture

Figure 2: Pigouvian Tax Allows the Efficient Equilibrium to be Met