A model to teach non-rival and excludable goods in undergraduate microeconomics

Aaron D. Wood

Department of Economics, Sykes College of Business, The University of Tampa, 401 W. Kennedy Blvd. Box: O, Tampa, FL, 33606, United States

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ABSTRACT

Non-rival and excludable goods, often referred to as artificially-scarce goods or club goods, are discussed in principles of microeconomics textbooks, but they are not given a rigorous graphical analysis. This paper presents a model for non-rival and excludable goods that aligns with the intuition conveyed in introductory microeconomics textbooks. The model enables students to develop a rigorous understanding of the theory of non-rival and excludable goods, and it includes an allocatively efficient outcome, a private outcome, and a second-best solution outcome to exhibit the relative prices, quantities, profits, and welfare results that emerge in different regulatory frameworks. A numerical exercise solidifies the concepts presented in the theoretical model.

1. Introduction

In principles of microeconomics, students learn that there are four types of goods that are differentiated by various combinations of rivalry and excludability. These four types, however, do not receive equal attention in terms of student instruction. Private goods are rival and excludable, and they earn an exhaustive treatment because they demonstrate the effectiveness of the market mechanism. The other three types do not function efficiently in an unregulated setting, and they are often introduced together to discuss market failure and public policy. They are frequently presented to students with the help of a visual like Table 1. Of these three types, public goods and common-pool resources are often given a graphical analysis, while non-rival and excludable goods are often relegated to a brief definitional introduction or ignored. This leaves students with an uneven and incomplete understanding of the four types of goods.

Pioneered in the club goods research of Buchanan (1965) and given an excellent literature review by Sandler and Tschirhart (1997), non-rival and excludable goods are given a limited and inconsistent treatment in introductory microeconomics texts. In particular, texts do not provide a theoretical model to explain firm behavior or public policy in the context of these goods, and they refer to these goods by different names. Krugman and Wells (2015, pp. 490–491, pp. 503–504) refer to non-rival and excludable goods as artificially-scarce goods, and they explain that non-rivalry in consumption

Table 1
The Four Types of Goods.

	Rival	Non-Rival
Excludable	*Private Goods*	*Artificially-Scarce Goods/ Club Goods*
Non-Excludable	*Common-Pool Resources*	*Public Goods*

results in zero marginal costs to the firm, though excludability allows the firm to charge a nonzero price. As a result, the good gets consumed at an inefficiently low level, and they graph the deadweight loss that emerges. Acemoglu et al. (2015, pp. 212–213) relate that non-rival and excludable goods are referred to as artificially-scarce goods and club goods. They explain that these goods will be transacted in markets because consumers have a positive willingness-to-pay. However, because marginal costs are zero due to non-rivalry, the firm cannot set price equal to marginal cost and cover its total costs.

Mankiw (2015, p. 213), Mateer and Coppock (2014, pp. 229–230), and Cowen and Tabarrok (2015, p. 355, p. 357) provide a variant of Table 1 that refers to non-rival and excludable goods as club goods, and they discuss them in a strictly intuitive fashion using examples like satellite and premium television. Other texts include a variant of Table 1 but refer to non-rival and excludable goods by a different term; Chiang (2016, p. 348) calls them public goods with exclusion, Hubbard and O'Brien (2016, p. 166) designate them as quasi-public goods, and Frank et al. (2016, p. 381) denote them as collective goods. In this paper, I will refer to these goods as artificially-scarce goods; this term highlights that these goods will be inefficiently underconsumed, and it avoids connotations of optimal capacity sometimes associated with club goods that are too advanced for the scope of this analysis for elementary microeconomics students.

The lack of a theoretical artificially-scarce goods model is a gap in introductory microeconomics instruction, as excludable, non-rival goods are prominent in students' consumption bundles, and they are growing in importance to prospective employees and entrepreneurs. For example, streaming entertainment services have grown to near ubiquity with students as these firms generate ever-greater revenue. Netflix, the excludable, non-rival movie and television platform, has grown from a firm with 7,479,000 subscribers and revenues of $1,205,340,000 in 2007 (Netflix, 2008) to a powerhouse with 74,762,000 subscribers and revenues of $6,133,744,000 in 2015 (Netflix, 2016). Streaming music services have grown from 7% of music revenues in the United States in 2010 to 34.3% in 2015 (Friedlander, 2016). Now, excludable and non-rival music delivery services account for a greater proportion of music industry revenues than physical purchases of rival, excludable music content. Revenues for on-demand movie and television services are forecast to increase from $4.2 billion in 2012 to $6 billion in 2018 (Roxborough, 2013). 86% of undergraduates in the United States owned smartphones in 2014 (Dahlstrom and Bichsel, 2014), giving millions of students access to non-rival, excludable high-speed wireless networks on which to watch Netflix and listen to streaming music.

To provide students education in these goods and to ensure that they gain a sufficient understanding of all four types of goods, I present a graphical model to teach excludable and non-rival goods at the principles level. This model aligns with the intuition of artificially-scarce goods as presented in introductory microeconomics texts, as it demonstrates firm behavior and public policy regimes when contending with an excludable, non-rival good. It features three regulatory outcomes: an allocatively efficient outcome, a private outcome, and a second-best solution outcome. The allocatively efficient outcome explains why artificially-scarce goods are consumed at an inefficiently low level, as it shows that efficient regulation would
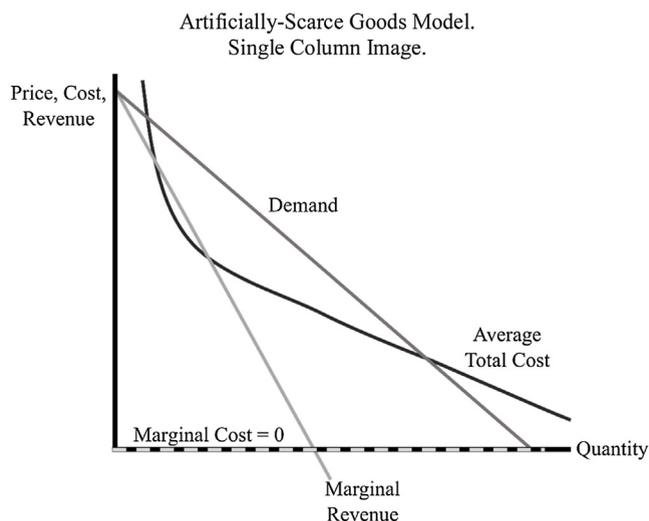

Fig. 1. Artificially-Scarce Goods Model.Single Column Image.