E C O N O M I C S   B U L L E T I N

Merit goods and phantom agents

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Abstract

Besley (1988) is one of the few exceptional articles containing non−welfarist optimal tax devices. Feehan (1990) reports an error in his first−best rules. The present note argues that Besley's second−best rules optimize the welfare of phantom agents rather than the corrected welfare of real existing agents in society.

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1. Introduction

Slowly, but resolutely, normative economists were convicted that they should abandon the welfarist framework to be able to give a less narrow-minded account and a more inspired justification for their devices on optimal taxes or tax reforms. However, in practice, much less optimal tax rules are available for 'non-welfare' economists, compared to the by now almost innumerable amount of welfarist devices. The whole battery of analytical tools developed by consumer theory —mainly Roy's identity— is, by definition, no longer available to the non-welfarist normative economist. As a consequence, it becomes more difficult to interpret the first-order conditions; we call this the non-welfarist interpretation problem.

A more modest approach starts from the old Musgravian idea to discriminate between ordinary goods and (de)merit goods. Tobacco is the most famous example. People enjoy smoking, but in the end you will get lung cancer (with a certain probability which is quite high). So, smoking a cigarette would give you much less utility as what you might think at first sight. Rather than using the agent's utility to measure social welfare, Besley (1988) proposes to use 'corrected' utilities via a scaling factor applied to (de)merit goods.[1] For example, *"government might treat ten cigarettes by its system of value as equivalent to what the individual smoking those cigarettes would regard to be twenty"* (Besley, 1988, p. 374), which corresponds with a scaling factor equal to one half for cigarettes. Unfortunately, Besley's second-best rules do not optimize the 'corrected' welfare of real existing agents in society, but optimize the welfare of phantom agents: the agents with the 'correct' behaviour according to government.

To fix ideas, we present the problem within the framework of a single agent economy. The next section presents two different welfare functions, the 'corrected' rule and Besley's objective. In a third section, we show that within the class of CES utility functions, both rules (and the optimal tax formulas) coincide if and only if one uses a Cobb-Douglas preference specification.

2. Two different welfare functions

Consider an agent with a well-behaved[2] utility function

$$u : (\mathbf{x}, y) \mapsto u(\mathbf{x}, y), \tag{1}$$

defined over (i) non-merit goods $\mathbf{x} = (x_1, ..., x_K) \in \mathbb{R}_+^K$ with prices $\mathbf{p} = (p_1, ..., p_K) \in \mathbb{R}_{++}^K$ and (ii) a single (de)merit good $y \in \mathbb{R}_+$ with price $q \in \mathbb{R}_{++}$. Given an income m, the parametric demand system, denoted $(\mathbf{x}(\mathbf{p}, q, m), y(\mathbf{p}, q, m))$, follows from solving

$$\max_{\mathbf{x},y} \quad u(\mathbf{x}, y) \quad \text{s.t. } \mathbf{p}\mathbf{x}' + qy \leq m. \tag{2}$$

[1] For a critique on and an alternative for Besley's scaling approach, see Schroyen (2002). For a different approach which models (de)merit goods as externalities, see Pazner (1972), and Decoster and Schokkaert (1989) for an empirical application.

[2] By this, we mean smooth, strictly increasing and strongly quasi-concave.

Besley (1988) gives a clear description of the (de)merit good argument:

> We accept an essentially Utilitarian framework whilst permitting the social planner to recognize that the preferences used to determine consumption may be a 'faulty' representation of well-being. It is this divergence upon which we pin our merit good arguments. (Besley, 1988, p. 372)
> The analysis is premised on the idea that a social planner, or politician, 'knows best' but chooses to correct individual preferences in a very specific way, i.e. via altering the valuation of merit goods alone. There is no violation of individual preference orderings beyond this. (Besley, 1988, p. 382)

Besley's model is based explicitly on the fact that agents' preferences are defective in judging their own well-being when choosing quantities of the merit good y. Besley seems only interested in correcting the agents' valuation of well-being towards its true well-being. He proposes to rescale the original amount of the (de)merit good of the agent by a scalar θ so that the 'correct' utility generating potential of a quantity y of the (de)merit good equals θy. The good is a merit good for this agent (i.e. it has a higher utility generating potential than originally thought by our agent) if $\theta > 1$ and a demerit good if $0 < \theta < 1$. The 'correct' valuation function of our agent is defined as:

$$\overline{u} : (\mathbf{x}, y) \mapsto \overline{u}(\mathbf{x}, y) \equiv u(\mathbf{x}, \theta y). \tag{3}$$

The 'corrected' (indirect) social welfare equals

$$W(\mathbf{p}, q, m; \theta) \equiv u(\mathbf{x}(\mathbf{p}, q, m), \theta y(\mathbf{p}, q, m)). \tag{4}$$

The specification in (4) corresponds with Besley's description. However, his formal specification differs from it. The 'correct' valuation function in (3) not only gives the true well-being when consuming $(\mathbf{x}, y)$, but it can also be used to describe the behaviour of a phantom agent, who has the 'correct' behaviour for our agent according to the social planner. The parametric demand system of the phantom agent, denoted $(\overline{\mathbf{x}}(\mathbf{p}, q, m), \overline{y}(\mathbf{p}, q, m))$, tells us what *"the individual would choose for himself if he had the 'correct' preferences"* (Besley, 1988, p. 378). Thus, it follows from solving

$$\max_{\mathbf{x}, y} \quad \overline{u}(\mathbf{x}, y) \quad \text{s.t. } \mathbf{p}\mathbf{x}' + qy \leq m. \tag{5}$$

As mentioned in Besley, the solution of (5) is related to the solution of (2), because the 'correct' valuation via $\overline{u}$ is related with the utility function u (compare (1) and (3)). More precisely

$$(\overline{\mathbf{x}}(\mathbf{p}, q, m), \theta\overline{y}(\mathbf{p}, q, m)) = \left(\mathbf{x}\left(\mathbf{p}, \frac{q}{\theta}, m\right), y\left(\mathbf{p}, \frac{q}{\theta}, m\right)\right). \tag{6}$$

Besley's (indirect) social welfare (Besley, 1988, equation 4.1, p. 377) is defined as

$$\widetilde{W}(\mathbf{p}, q, m; \theta) \equiv u\left(\mathbf{x}\left(\mathbf{p}, \frac{q}{\theta}, m\right), y\left(\mathbf{p}, \frac{q}{\theta}, m\right)\right) = u(\overline{\mathbf{x}}(\mathbf{p}, q, m), \theta\overline{y}(\mathbf{p}, q, m)), \tag{7}$$

where the equality follows from (6).
Compare Besley's specification at the right-hand side of (7) with the 'corrected' specification in (4). In contrast with the 'corrected' version, Besley goes one step too far: his version looks at the quantities consumed by the phantoms, rather than by the existing agents.

3. Application to the CES-family of preferences

Because the approaches in (4) and (7) are different, they will lead to different tax recommendations in general. In the special case of Cobb-Douglas preferences, however, $u(\mathbf{x}, \theta y)$ is a monotonic transformation of $u(\mathbf{x}, y)$ so they both yield identical demand functions, which forces (4) and (7) to coincide. Somewhat stronger, within the class of CES utility functions, the Cobb-Douglas specification is the only one for which Besley's approach coincides with the 'corrected' approach:

Claim. Consider the class of CES utility functions, defined as

$$u_\sigma : (\mathbf{x}, y) \mapsto \left(\sum_{j=1}^{K} \alpha_j (x_j)^{\frac{\sigma-1}{\sigma}} + \alpha_y (y)^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}},$$

with $0 < \sigma < \infty$, the elasticity of substitution, and parameters $\alpha_1, ..., \alpha_K, \alpha_y \in \mathbb{R}_{++}$. If $\theta \neq 1$, then Besley's specification in (7) is the same as the 'corrected' specification in (4) if and only if our agent has Cobb-Douglas preferences ($\lim_{\sigma \to 1} u_\sigma$).

Proof. For a given $\theta \in \mathbb{R}_{++}$, with $\theta \neq 1$, Besley's specification in (7) is the same as the 'corrected' specification in (4) if and only if for all $\mathbf{z} = (\mathbf{p}, q, m) \in \mathbb{R}_{++}^{K+2}$, we have

$$u(\overline{\mathbf{x}}(\mathbf{z}), \theta \overline{y}(\mathbf{z})) = u(\mathbf{x}(\mathbf{z}), \theta y(\mathbf{z})). \tag{8}$$

From (2), (5), and (6), we know that both $(\overline{\mathbf{x}}(\mathbf{z}), \theta \overline{y}(\mathbf{z}))$ and $(\mathbf{x}(\mathbf{z}), \theta y(\mathbf{z}))$ satisfy the budget equation at prices $\mathbf{p}$ and $\frac{q}{\theta}$; since utility function specifications guarantee a unique optimum, we have

$$\begin{aligned} (8) \quad &\Leftrightarrow \quad (\overline{\mathbf{x}}(\mathbf{z}), \theta \overline{y}(\mathbf{z})) = (\mathbf{x}(\mathbf{z}), \theta y(\mathbf{z})), \text{ for all } \mathbf{z} \in \mathbb{R}_{++}^{K+2} \\ &\Leftrightarrow \quad \overline{\mathbf{x}}(\mathbf{z}) = \mathbf{x}(\mathbf{z}), \text{ for all } \mathbf{z} \in \mathbb{R}_{++}^{K+2} \\ &\Leftrightarrow \quad \mathbf{x}\left(\mathbf{p}, \frac{q}{\theta}, m\right) = \mathbf{x}(\mathbf{p}, q, m), \text{ for all } (\mathbf{p}, q, m) \in \mathbb{R}_{++}^{K+2}. \end{aligned} \tag{9}$$

From the CES specification, we have

$$x_j(\mathbf{p}, q, m) = \frac{m \left(\frac{\alpha_j}{p_j}\right)^\sigma}{\sum_{j=1}^{K} \alpha_j^\sigma p_j^{1-\sigma} + \alpha_y^\sigma q^{1-\sigma}}, \text{ for all } (\mathbf{p}, q, m) \in \mathbb{R}_{++}^{K+2}. \tag{10}$$

Combining (9) and (10), we get

$$(8) \Leftrightarrow \theta^{\sigma-1} = 1,$$

which leads to the desired result, given $\theta \neq 1$. □

Our claim tells us that a non-welfarist might still proceed following Besley's lines, though it does not leave too much room for generality. A non-welfarist might also recalculate all formulas using the 'corrected' welfare specification, but the typical non-welfarist problem —Roy's identity cannot be used— makes the results more difficult to interpret (see, e.g., Schroyen, 2002, who uses a first-order approximation to interpret (first-best) non-welfarist commodity tax rules). This stands to reason, because the essence of non-welfarism is to create a gap between the agents' and government's view on well-being.

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