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CONSPICUOUS CONSUMPTION, PURE PROFITS, AND THE LUXURY TAX

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ABSTRACT

We examine a model of conspicuous consumption and explore the nature of competition in markets for conspicuous goods. We assume that, in addition to intrinsic utility, individuals seek status, and that perceptions of wealth affect status. Under identifiable conditions, the model generates Veblen effects: utility is positively related to the price of the good consumed. Equilibria are then characterized by the existence of "budget" brands (which are sold at a price equal to marginal cost), as well as "luxury" brands (which are sold at a price above marginal cost, despite the fact that producers are perfectly competitive). Luxury brands are not intrinsically superior to budget brands but are purchased by consumers who seek to signal high levels of wealth. Within the context of this model, an appropriately designed luxury tax is a non-distortionary tax on pure profits.

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1. Introduction

In his celebrated treatise on the "leisure class," Thorstein Veblen [1899] argued that wealthy individuals often consume highly conspicuous goods and services in order to advertise their wealth, thereby achieving greater social status. Veblen's writings have spawned a significant body of research on "prestige" or "status" goods.[1] It is readily apparent that the desire for prestige continues to influence the demand for certain consumer products. The automobile industry provides several examples. A recent article in the Wall Street Journal noted that "a BMW in every driveway might thrill investors in the short run but ultimately could dissipate the prestige that lures buyers to these luxury cars" (Aeppel [1992]). In contrast, Suburu attempts to combat the prestige factor; its recent advertisements suggest that "if your car improves your standing with your neighbors then you live among snobs."

Recent incarnations of Veblen's theories often proceed from the premise that the utility derived from a good is positively related to its price (see e.g. Leibenstein [1950], Braun and Wicklund [1989], or Creedy and Slottje [1991]). Indeed, a positive relationship between utility and price is often equated with the notion of conspicuous consumption, and is commonly referred to as a "Veblen effect."[2] This strikes us as an inappropriate starting point for a theory

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[1]See for example Leibenstein [1950], and more recently Frank [1985], Basu [1987], Ng [1987], Basmann, Molina, and Slottje [1988], Braun and Wicklund [1989], Creedy and Slottje [1991], and Ireland [1992]. More generally, other recent studies, including Akerlof [1980], Jones [1984], Besley and Coate [1990], Bernheim [1991b], Cole, Mailath, and Postelwaite [1991], and Fershtman and Weiss [1992], explore the impact of status-consciousness on economic behavior.

[2]The following passage typifies modern discussions of prestige goods: "Conspicuous consumption, or Veblen effects, are said to occur when individuals increase their demand for a good simply because it has a higher price" (Creedy and Slottje [1991]).

of conspicuous consumption. It is hard to imagine circumstances in which the price of an object would affect utility directly. Veblen proposed that individuals crave status, not that they seek to pay high prices for the sheer pleasure of being overcharged. Thus, utility should be defined over consumption and status, rather than over consumption and prices. Although the prices that one pays for goods may affect status in equilibrium, this relationship should be derived, not assumed.

Once the need to derive an equilibrium relation between price and utility is acknowledged, one must determine whether or not any plausible model of conspicuous consumption would generate Veblen effects. It is not at all obvious that, in such an equilibrium, higher price would enhance utility. Suppose for example that individuals care about status and that status is positively related to the public perception of an individual's wealth. Then, as Veblen suggested, individuals might attempt to enhance their status by displaying their wealth. However, there is no particular reason to believe that this is most effectively accomplished by paying higher prices. Instead, one might prefer to purchase a larger quantity of conspicuous goods at a lower price, or a higher quality conspicuous good at a higher price.[3]

This paper examines a model in which each individual's status depends upon public perceptions of his wealth. Consumers have private information about the value of their assets, and attempt to signal their wealth by consuming a conspicuous good. The producers of this

[3]Certain social customs in Thailand illustrate the practice of advertising wealth through quantity, rather than price. According to Shenon [1991], "It is considered acceptable, even by some Western-educated Thai women who would otherwise describe themselves as feminists, for a man to take one or more mistresses and even to be seen with them in public, so long as all of the women and their children are provided for financially... Mistresses are to some degree a demonstration of wealth, and as a rule, the more mistresses, the wealthier the man. A handful of Bangkok's flashier millionaires are said to have 10 or more extramarital companions."

good compete under conditions that would ordinarily produce a perfectly competitive outcome (price equal to marginal cost). The good is completely homogeneous across firms, except that producers visibly label their products (labelling does not affect utility directly).

We show that, under identifiable conditions, the equilibria of this model are characterized by the existence of "budget" brands (sold at a price equal to marginal cost), as well as "luxury" brands (sold at a price above marginal cost). Luxury brands are purchased by consumers who seek to signal high levels of wealth. It is important to bear in mind that the luxury brands are not intrinsically superior to the budget brands -- they are simply sold at a higher price. The manufacturers of these brands earn strictly positive economic profits, despite the highly competitive nature of the market. Thus, the model explains the observation that brand-name producers apparently charge high premia on many status goods, even when these goods are easily imitated.[4] Moreover, our model implies that firms will not ordinarily dissipate excess profits through rent seeking activities, such as advertising. Thus, evidence of high profitability among the manufacturers of luxury goods does not necessarily support the inference that competition is less than perfect.

The model does not constrain consumers to signal wealth by purchasing the expensive luxury brands; it is also possible to signal by consuming large quantities of less expensive brands. Thus, a positive reduced form relation between utility and price (a Veblen effect) is generated from more primitive assumptions on the structure of consumer preferences.

It should be emphasized that the existence of Veblen effects depends critically upon the

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[4]Ireland [1992] describes an interesting case of this involving a very expensive brand-named basketball shoe: "The shoes became so much a passport to social success among poor urban teenagers that a campaign to limit their commercial promotion and advertising was initiated."

fact that the model incorporates a personal bankruptcy constraint. In particular, by purchasing expensive, conspicuous goods, an individual may increase the risk of bankruptcy. This assumption captures two empirical regularities: first, many wealthy individuals are at significant risk of bankruptcy (see for example Allen [1991]); second, this risk is often associated with the acquisition of costly, conspicuous possessions.[5] In the absence of a bankruptcy constraint, the model would <u>not</u> produce Veblen effects; consumers would signal wealth by consuming large amounts of budget brands, rather than by purchasing smaller amounts of luxury brands.

Why does the risk of personal bankruptcy give rise to conditions under which individuals may choose to signal their wealth by overpaying for luxury brands? Consumption of conspicuous goods reduces expenditures on other goods. With declining marginal rates of substitution, this would ordinarily imply that conspicuous consumption is more costly for low income households. Personal bankruptcy protection, however, establishes a lower bound on consumption. As the probability of bankruptcy rises, a unit increase in conspicuous consumption leads to a smaller decline in the expected consumption of other goods. At high levels of conspicuous consumption, the marginal cost of conspicuous spending is actually lower for low income households. As a result, it is less expensive for high income households to deter imitation by overpaying for a smaller quantity of goods, rather than by paying a lower price (and spending more in total) for a larger quantity of goods. In the abstract, this argument resembles Milgrom and Roberts' [1986] analysis of advertising as a signal of product quality.

[5]One reporter recently summarized this relationship as follows: "In the 1980s, people lived out their materialistic dreams, overspending on BMWs, huge boats, Caribbean vacations and dream condos, bankruptcy lawyers say. Then came the real estate crash and the job layoffs. Now, lawyers say, their clients are using their credit cards for basic necessities, including food and children's clothes" (Carton [1991]).

Our model of conspicuous consumption also has some provocative implications for tax policy. The fact that pure profits survive vigorous competition among suppliers suggests that the equilibrium prices of luxury brands are demand-driven, rather than supply-driven -- that is, luxury brands are sold at the consumer's preferred price. Within our model, this preferred price is tax-inclusive, and does not vary with the tax rate. Thus, as long as the tax per unit does not exceed the difference between the consumer's preferred price and marginal cost, an excise tax on luxury brands amounts to a non-distortionary tax on pure profits.

This observation is of particular interest in light of the Omnibus Budget Reconciliation Act of 1990, which established substantial federal taxes on the sale of various conspicuous goods, including expensive automobiles, yachts, jewelry, and aircraft. One should not conclude from our analysis that these taxes are non-distortionary; whether the demand for luxury items is best described by our model or some alternative is a question that can be settled only through empirical analysis. However, a central prediction of our model -- that the tax-inclusive price will be unaffected by the luxury tax -- is supported by some anecdotal evidence. Specifically, Rolls Royce, Jaguar, and BMW have each run promotional campaigns in which they have offered to reimburse customers for the full amount of the luxury tax.[6]

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[6]A recent advertisement for Rolls Royce reads: "If the luxury tax is all that separates us, it's time to talk. From today through December 31, 1991, Rolls-Royce Motor Cars Inc. will reimburse you for the full amount of the federal luxury excise tax incurred when you purchase or lease a new Rolls-Royce or Bentley." Similar, Jaguar advertised: "Now you can have Jaguar luxury, <u>free</u> of the luxury tax... Just buy or lease a new 1990 or 1991 Sovereign, Vanden Plas or XJ-S from your Jaguar dealer and we'll send you a reimbursement check equal to the luxury tax based on the manufacturer's suggested retail price." It is particularly interesting to note that Jaguar did <u>not</u> offer this deal on the XJ-6, which is its least expensive automobile. Finally, an advertisement for BMW reads: "We will pay the luxury tax on any new BMW purchased and delivered by December 31, 1991."

The paper is organized as follows. We describe the model in section 2. Section 3 contains the central results on equilibrium prices and profits. Section 4 considers the possibility that firms might dissipate positive profits (specifically, through advertising), and concludes that this will not occur. Implications for tax policy are described in section 5. We examine some critical assumptions in section 6. Section 7 concludes.

2. The Model

2.1 Households

Consider a household that must allocate resources over two consumption goods. One good is "conspicuous," in the sense that its characteristics, as well as the quantity consumed, are publicly observed. The second good is "inconspicuous," in the sense that it is consumed privately, and not observed by others. Because of our assumptions about observability, only conspicuous consumption can potentially serve as a signal of wealth. We will use the inconspicuous good as the numeraire.

The household is endowed with resources, A. It first allocates a portion of these resources to purchase the conspicuous good; let s and x denote, respectively, total conspicuous expenditures and the quantity purchased. Next, the household receives income, which is uncertain. Since conspicuous consumption has already been chosen, consumption of the inconspicuous good, z, is determined as a residual. These assumptions about the sequence of decision-making, though highly stylized, are appropriate for modeling situations in which conspicuous goods are durable and not easily sold in second-hand markets. See section 6 for further discussion.

Households differ according their expected level of income, Y. There are two types of households. Some expect their income to be higher (Y_H), while others expect it to be lower (Y_L, where $Y_L < Y_H$). The associated population frequencies are γ and $(1-\gamma)$, respectively. Each household knows its own type, but cannot observe the type of any other household. A higher income household ultimately receives $Y_H + \epsilon$, where ϵ is a mean-zero random variable; a lower income household receives $Y_L + \epsilon$. Let $F(\cdot)$ denote the cumulative distribution function associated with ϵ, and let $f(\cdot)$ be the associated density function.[7] We do not rule out the case where $Y_K + \epsilon < 0$ for $K = L, H$; that is, liabilities may arise. Income is measured in units of the inconspicuous good.

In addition to conspicuous consumption, x, and inconspicuous consumption, z, each household also cares about status. Status depends upon public perceptions of the household's total expected wealth, $R = A + Y$.[8] Since R is not publicly observable, other households will form inferences about a particular household's wealth based upon its actions. Knowing this, each household may alter its actions in order to create the impression that it has greater wealth. This gives rise to a signaling problem. We will simplify this problem by assuming that all uninformed parties form identical inferences about a household's total wealth, and by focusing on separating equilibria. Public perceptions of a household's total wealth can then be described by a single number, $\hat{R}$. Household preferences over x,z, and $\hat{R}$ are summarized by the following utility function:

$$U(x,z,\hat{R}) = u(x) + v(z) + \lambda\hat{R}$$

where $\lambda > 0$ is a parameter. We refer to u(x) and v(z) as "intrinsic utility." We assume that

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[7]The distribution of ϵ is identical across types.

[8]Note that status depends upon perceptions of <u>expected</u> wealth, R, rather than <u>realized</u> wealth, $R+\epsilon$. In other words, esteem is based upon perceptions of a household's capacity for generating income, and not upon chance events, unrelated to innate characteristics, that might have affected a particular realization of income. The analysis would be unchanged if status depends upon perceptions of realized wealth, as long as personal bankruptcy (discussed later) is unobservable. If status is related to perceived realizations and if personal bankruptcy is observable, then analytical complexities arise; however, it does not appear that this would qualitatively alter our conclusions.

u and v are concave functions, that

$$\lim_{x \to 0} u(x) = -\infty, \quad \lim_{x \to \infty} u(x) = \infty, \quad \lim_{z \to 0} v(z) = -\infty, \quad \lim_{z \to \infty} v(z) = \infty,$$

and that, for any $\bar{t} > 0$, $u''(t)$ and $v''(t)$ are bounded for $t \geq \bar{t}$.

We assume that consumption of the inconspicuous good is bounded below by some $\underline{z} > 0$. If $\underline{z}$ exceeds $(R - s + \epsilon)$, the residual resources available to the household at the point in time when it arranges its inconspicuous consumption, the household declares bankruptcy. This allows it to renege on some portion of its liabilities, and to keep the amount $\underline{z}$.[9] Thus, the actual level of inconspicuous consumption is given by

$$z = \max\{\underline{z}, R - s + \epsilon\}.$$

We assume that the household's conspicuous consumption, x, is unaffected by a declaration of bankruptcy. In other words, the conspicuous good cannot be repossessed. This assumption requires some justification. In practice, significant time may pass between the acquisition of a conspicuous good and a declaration of bankruptcy, during which the conspicuous good may be partially or completely consumed. Moreover, bankruptcy courts often allow individuals to retain expensive automobiles, yachts, large houses, and other conspicuous possessions.[10] One could, at the cost of introducing considerable analytic complexity, assume that, in the event of bankruptcy, a household consumes some fraction μ $(0 < \mu < 1)$ of its conspicuous possessions, while the remainder, $(1-\mu)x$, is repossessed. It does not appear that this would disturb the qualitative features of our analysis.

Once a household has spent s to purchase x units of the conspicuous good, its expected

[9]Alternatively, the government might supplement the income of this household, providing it with inconspicuous consumption of $\underline{z}$ through some social insurance or welfare program.

[10]See for example Downey [1991] or Hylton [1991].

intrinsic utility is given by

$$\xi(R,x,s) = u(x) + \Psi(R-s)$$

where

$$\Psi(t) = F(\underline{z}-t)v(\underline{z}) + \int_{\underline{z}-t}^{\infty} v(t+\epsilon)f(\epsilon)d\epsilon .$$

$\Psi(t)$ measures the expected intrinsic utility derived from consumption of the inconspicuous good when the individual's expected residual resources after expenditures on the conspicuous good are t. Its properties are critical to the analysis.

Note that $\Psi(t)$ is bounded below by $v(\underline{z})$. In the absence of additional assumptions, this can give rise to perverse outcomes. Suppose for the moment that the conspicuous good is available at some price p, so that $s = px$. Then clearly $\xi(R,x,s)$ is maximized for $x = \infty$. This suggests that households should optimize by consuming an infinite amount of the conspicuous good and then declaring bankruptcy (which would leave them with $\underline{z}$ units of the inconspicuous good). One could rule this strategy out by modeling credit markets explicitly. Instead, we simply impose the constraint $s \leq A + B$ for some finite number B, thereby implicitly ruling out borrowing beyond the level B. We will also take $A + B$ to be sufficiently large so that liquidity is not an issue.

Increasing the expected residual resources t available after conspicuous consumption clearly increases expected intrinsic utility from the inconspicuous good, since

$$\Psi'(t) = \int_{\underline{z}-t}^{\infty} v'(t+\epsilon)f(\epsilon)d\epsilon > 0.$$

The curvature of $\Psi(t)$, however, depends on the relative importance of two countervailing effects. The first is associated with decreasing marginal utility, and the second results from bankruptcy protection. These separate effects are evident in the following expression:

$$\Psi''(t) = \int_{\underline{z}-t}^{\infty} v''(t+\epsilon) f(\epsilon)\, d\epsilon + v'(\underline{z}) f(\underline{z}-t).$$

The first term of $\Psi''(t)$ captures the effect of decreasing marginal utility. As expenditure on the inconspicuous good increases, the marginal utility of inconspicuous consumption declines, since $v''(\cdot) < 0$. In the absence of bankruptcy protection (i.e. $\underline{z} = -\infty$), this would make $\Psi(t)$ concave. Because of this effect, the sacrifice of inconspicuous consumption is more costly to lower income households. Higher income households can therefore deter imitation by consuming the conspicuous good.

The second term of $\Psi''(t)$ captures the effect of bankruptcy protection. As residual resources fall, an individual is more likely to declare bankruptcy and consume $\underline{z}$. Thus, his expected consumption becomes less sensitive to his resources. This makes conspicuous consumption less costly for lower income individuals. By itself (for example if $v''(\cdot) = 0$, so that this component of utility is linear), this effect would render $\Psi(t)$ convex. Because of this effect, lower income households may be more inclined to mimic conspicuous consumption.

We make two assumptions that influence the relative importance of these two effects, and guarantee that $\Psi(t)$ is initially convex, and ultimately concave.

ASSUMPTION 1. $\Psi'(R_H) < \Psi'(R_L)$.

ASSUMPTION 2. $\lim_{\epsilon \to \infty} \dfrac{f(\epsilon)}{1 - F(\epsilon)} = \infty$.

Assumption 1 ensures that the first unit of conspicuous consumption is more costly for lower income households. It requires the effect of diminishing marginal utility to dominate the personal bankruptcy effect ($\Psi''(t) < 0$) when residual resources are high (for t belonging to some sufficiently large subset of $[R_L, R_H]$). Note that Assumption 1 does not imply the standard "single crossing property" commonly used in signaling models, since it only applies when $s=0$.

The following conditions are, in combination, sufficient to guarantee that Assumption 1 is satisfied: (i) $v(\cdot)$ is either a CARA or CRRA utility function, (ii) $f(\cdot)$ is a normal density function, and (iii) R_L is large.[11] In the context of this analysis, condition (iii) is entirely appropriate: we are envisioning a pool of ex ante identical individuals whose observable characteristics do not rule out the possibility that they have substantial total wealth. Assumption 1 sets the stage for signaling: unless the marginal costs of conspicuous consumption are higher for the lower income individuals over some range, no signaling is possible.

Assumption 2 guarantees that, at sufficiently high levels of conspicuous consumption, incremental consumption is more costly for higher income households. Equivalently, it ensures that the effect of bankruptcy protection dominates the effect of diminishing marginal utility when t is sufficiently small (possibly negative), so that $\Psi''(t) > 0$. This assumption is satisfied by the normal distribution, as well as other common distribution functions. It is essential for producing our conclusion that higher income individuals will prefer to signal by overpaying for a small quantity of luxury goods.

Hence, $\Psi(t)$ is initially convex, and ultimately concave. In Figure 1, we graph $\Psi(R_L - s)$ and $\Psi(R_H - s)$ as functions of s for a typical $\Psi(\cdot)$. Note that $\Psi(R_L - s)$ starts out steeper (by assumption 1), but eventually becomes flatter (by assumption 2). This constitutes a violation of the "single crossing property"; due to the reversal of marginal costs, indifference curves defined over x and $\hat{R}$ -- using the budget constraint to determine s -- cross twice, rather than once.

From Figure 1 it is clear that, under our assumptions, there exists a finite, positive level of conspicuous expenditure, s^*, that maximizes the difference between the expected utilities derived from the inconspicuous good by the two types of households. This property is critical to our analysis of competitive behavior. We therefore state it as a lemma, and provide a formal proof.

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[11]Together, conditions (i) and (ii) imply that, for all d, $v''(t+d)/f(t)$ approaches $-\infty$ as t goes to ∞. To understand the importance of this observation, consult the expression for $\Psi''(t)$. Assumption 1 is in fact much less demanding; it merely requires that the limit of $v''(t+d)/f(t)$ is less than $v'(z)$.

LEMMA 1. There exists some finite $s^* > 0$ that solves

$$\max_{s \geq 0} \ \Psi(R_H - s) - \Psi(R_L - s).$$

PROOF. Recall that

$$\Psi''(t) = \int_{\underline{z}-t}^{\infty} v''(t+\epsilon) f(\epsilon) d\epsilon + v'(\underline{z}) f(\underline{z} - t).$$

By our assumption on $v(\cdot)$, $v''(t+\epsilon)$ is bounded for $\epsilon \in [\underline{z} - t, \infty)$. Let D denote its lower bound. Then

$$\Psi''(t) \geq [1 - F(\underline{z} - t)] D + v'(\underline{z}) f(\underline{z} - t).$$

But, by assumption 2, this is positive for -t sufficiently large. We conclude that there exists an $\hat{s}$ such that if $s > \hat{s}$, $\Psi''(R_H - s) > 0$.

Next, note that for $s' > \hat{s}$,

$$\Psi(R_H - s') - \Psi(R_L - s') = [\Psi(R_H - \hat{s}) - \Psi(R_L - \hat{s})] - \int_{\hat{s}}^{s'} [\Psi'(R_H - s) - \Psi'(R_L - s)] ds$$

$$= [\Psi(R_H - \hat{s}) - \Psi(R_L - \hat{s})] - \int_{\hat{s}}^{s'} [\int_{R_L - s}^{R_H - s} \Psi''(t) dt] ds < \Psi(R_H - \hat{s}) - \Psi(R_L - \hat{s}).$$

The final inequality follows from the fact that for all $s \in [\hat{s}, s']$, $\Psi''(t)$ is positive on $[R_L - s, R_H - s]$, given the definition of $\hat{s}$. Thus, increasing s beyond $\hat{s}$ reduces the value of the objective function.

Since $[0, \hat{s}]$ is compact and since $\Psi(t)$ is continuous, the objective function reaches a maximum somewhere on $[0, \hat{s}]$. By assumption 1, the maximum cannot occur at $s = 0$. The lemma therefore is proven. Q.E.D.

It is worth emphasizing that this result depends upon the failure of the single-crossing property. If the diminishing marginal utility effect always dominated, guaranteeing that the marginal cost of the potential signal was always higher for low income households (as in more standard models), then maximization of $\Psi(R_H - s) - \Psi(R_L - s)$ would be accomplished through infinite conspicuous expenditure (s^* would not be finite).

For analytic convenience, in what follows we will assume that s^* is unique. One can easily dispense with this simplification at the cost of some additional notation and analysis.

2.2 Firms

The conspicuous good can be produced by a large number of firms.[12] These firms are divided into two groups. The first group consists of incumbents. There are F incumbents, indexed $f \in [1,\ldots,F]$. The rest of the firms are potential entrants. All firms produce the same homogenous conspicuous good, at the same constant marginal cost c. The production technology exhibits constant returns to scale (average cost equals marginal cost).

Each firm's product is "branded" or "labeled," so that anyone can easily identify which firm produced it. Branding does not affect utility directly, and in any ordinary (inconspicuous) context, branding would be irrelevant. We assume that all firms brand their products. Alternatively, one could allow the firms to choose between labeling and not labeling. In equilibrium, some would label, and the outcome would be the same as described here.

All consumers observe the prices announced by all firms. Since consumers also observe brand labels, they can infer any household's expenditure on conspicuous products. We endow incumbents with the following minor advantage over entrants: consumers will buy the product from an incumbent, unless they can strictly improve their utility by buying from an entrant. In the context of conspicuous goods, this assumption is natural and appealing. It should be noted that this structure necessarily yields zero profits under standard assumptions about demand.

[12]We have assumed that both households' initial resources and income consist of the inconspicuous good. Consequently, we abstract from the processes by which that good is produced and allocated.

2.3 Timing

The game unfolds as follows. First, each incumbent f announces a price, p_f, for the conspicuous good. Second, potential competitors observe these prices, and then decide whether to enter. If a firm chooses to enter, it announces a price for the conspicuous good.[13] Third, consumers observe all announced prices, and determine the amount of conspicuous good to be purchased from each firm. Each consumer carries out these transactions, spending in total the amount s and acquiring in total the amount x. Fourth, consumers observe each others' branded conspicuous consumption bundles, and form inferences about each others' wealth. Fifth, income is realized, and residual resources are used for inconspicuous consumption. The payoff to each consumer is given by $U(x,z,\hat{R})$, where x is the amount of the conspicuous good consumed in the third stage, $\hat{R}$ is the inference that others draw about the consumer's utility in stage 4, and z is the amount of the inconspicuous good consumed in stage 5. Firm's payoffs are given by profits (revenues minus costs).

2.3 Equilibrium

Our game is divided into two main phases. In the first phase (stages 1 and 2), firms compete by naming prices. In the second phase (stages 3 through 5), individuals select consumption bundles and draw inferences about each others' characteristics. The second phase is a signaling game. We reduce the set of equilibria through the use of a refinement that is similar in spirit to subgame perfection: for any outcome of the first phase, actions and inferences constitute a separating equilibrium in the second phase, and this equilibrium satisfies the intuitive criterion (see Cho and Kreps [1987] for a discussion of the intuitive criterion, which is

[13]Since one can take F, the number of incumbents, to be large, allowing for further entry in the second stage may seem superfluous. One might therefore be inclined to delete this stage. We do not believe that this would alter our results. However, it would render the analysis more complex, as the current structure allows us to ignore problematic subgames (e.g. if all firms name a very low or very high price). The reader should bear in mind that potential entry in the second stage only serves to strengthen competitive pressures.

equivalent to equilibrium dominance).[14] Given this behavior, we look for Bertrand-style equilibria in the first phase.

It is useful to describe the second phase equilibria in a bit more detail. Let P denote the set of prices announced by firms in the first and second stages. Define $\underline{p} = \min P$, and $\bar{p} = \max P$. Note that, unless $\underline{p} = \bar{p}$, and individual's conspicuous consumption, x, does not uniquely determine his total conspicuous expenditure, s. Depending upon which brands he selects, he may spend as little as $\underline{p}x$, or as much as $\bar{p}x$. In fact, for any s satisfying $\underline{p}x < s < \bar{p}x$, it is possible to purchase x units of the conspicuous good for exactly s.[15]

No rational consumer would ever spend more than the minimal amount needed to acquire a given quantity of the inconspicuous good. However, a consumer may be willing to spend more than $\underline{p}x$ to acquire x units of the conspicuous good. Since others can observe his level of consumption, x, his selection of brands, and brand prices, they can infer his total expenditure, s. By spending extravagantly on expensive brands, an individual with higher wealth may be able to convince others of his opulence, thereby enhancing his status.[16]

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[14]Equilibrium with complete pooling can be ruled out with the intuitive criterion. There do exist equilibria with imperfect separation which survive the intuitive criterion and stronger refinements. These equilibria also give rise to the kinds of results developed here, so for simplicity we focus exclusively on separation.

[15]Specifically, the individual could purchase ηx units at $\bar{p}$ and $(1-\eta)x$ units at $\underline{p}$, where $\eta = (\frac{s}{x} - \underline{p})/(\bar{p} - \underline{p})$.

[16]Implicit in our notion of equilibrium is the assumption that others will actually choose to compute an individual's conspicuous expenditures from his observed purchases, and that they will use this information to draw inferences about his wealth. Technically speaking, since an individual's inferences about others do not affect his own utility, no one has any incentive to draw correct inferences. We have, in effect, endowed each individual with a strict preference for drawing accurate inferences about each others' characteristics. There are many ways to justify this assumption. For example, in some later period individuals may receive more utility from interacting with others of higher status; consequently they may be willing to expend effort in order to determine the status of potential acquaintances.

Formally, a separating equilibrium consists of total conspicuous quantity and expenditure choices (s_L, x_L, s_H, x_H) satisfying incentive compatibility,

$$\xi(R_L, x_L, s_L) + \lambda R_L \geq \xi(R_L, x_H, s_H) + \lambda R_H$$

$$\xi(R_H, x_H, s_H) + \lambda R_H \geq \xi(R_H, x_L, s_L) + \lambda R_L$$

and feasibility,

$$\underline{p} \leq s_H/x_H \leq \bar{p}$$

$$\underline{p} \leq s_L/x_L \leq \bar{p}.$$

Moreover, these choices must be optimal given the relationship between inferences and actions that are not taken in equilibrium.

Our description of a separating equilibrium is incomplete in the following sense: although we have specified total conspicuous consumption (x_L and x_H) as well as total conspicuous expenditure (s_L and s_H), we have not indicated which brands are purchased. There may well be an infinite number of conspicuous consumption bundles containing x_K units, and requiring an expenditure of exactly s_K ($K = L,H$).[17] Fortunately this is immaterial, since consumers do not care about brand selection, except insofar as it affects total cost. Indeed, consumers are completely indifferent between all conspicuous consumption bundles containing the same total number of units, and requiring the same total expenditures. We resolve this indifference in favor of incumbent brands: consumers will not purchase the conspicuous good from entrants unless this <u>strictly</u> improves their utility. In the context of conspicuous goods, this assumption is natural and appealing (there are recognized brand names). The resulting advantage for

[17]Suppose, for example, that there are three brands, A, B, and C, sold at three prices, $p_A < p_B < p_C$, and suppose that $p_A < s_K/x_K < p_C$. Then there is an infinite number of bundles, (x_A, x_B, x_C), satisfying $p_A x_A + p_B x_B + p_C x_C = s_K$, $x_A + x_B + x_C = x_K$, and $x_j \geq 0$ ($j = A,B,C$).

incumbents is minor, and would not suffice to protect positive profits if the good in question was inconspicuous. Although this assumption does not tie down consumer choice completely (e.g. there may still be indifference across conspicuous consumption bundles containing only incumbent brands), our results are not sensitive to the manner in which residual indifference is resolved.

One final condition is needed to guarantee that an interesting signaling problem arises. Let x_K^* denote the amount of conspicuous good that an individual of type K would purchase if he was not concerned about status, and if goods were priced at marginal cost. Formally, x_K^* solves

$$\max_{x} \xi(R_K, x, cx).$$

We will assume that

$$\xi(R_L, x_H^*, cx_H^*) + \lambda R_H > \xi(R_L, x_L^*, cx_L^*) + \lambda R_L.$$

This condition states that, with marginal cost pricing, individuals with lower wealth would be willing to mimic the first-best conspicuous consumption choices of wealthier individuals if, by doing so, they could achieve the status of those with higher wealth.

3. Results

In this section, we characterize the separating equilibria of this model. We begin by arguing that, in the third stage, the type Ls will always choose conspicuous quantity ($x \geq 0$) and brand (equivalently, expenditure s) to satisfy

$$\max_{x,s} \xi(R_L, x, s)$$

subject to

$$\underline{p} \leq \frac{s}{x} \leq \bar{p}.$$

The argument here is standard. In equilibrium, the Ls are correctly identified. Therefore, they cannot reduce $\hat{R}$ by deviating from their prescribed choice. Consequently, if there is another $x \geq 0$ and feasible p that raises the value of $\xi(\cdot)$, it must make them better off. This contradicts the supposition that an equilibrium prevails.

The free entry assumption, combined with the usual Bertrand-style argument, immediately implies that some firm (either incumbent or entrant) must, in equilibrium, sell its product at price c. Moreover, all type Ls will buy from such firms. Thus, in equilibrium, we have $(x_L,s_L) = (x_L^*,s_L^*)$, where $s_L^* = cx_L^*$.

What will the type Hs do? The intuitive criterion implies that the type H choice (x_H,s_H) must solve

$$\max_{x,s} \ \xi(R_H,x,s)$$

subject to

$$\underline{p} \leq \frac{s}{x} \leq \overline{p}$$

and

$$\xi(R_L,x,s) + \lambda R_H \leq \xi(R_L,x_L^*,cx_L^*) + \lambda R_L.$$

That is, the type Hs maximize their expected intrinsic utility, buying from a combination of different firms offering prices between $\underline{p}$ and $\overline{p}$, subject to the constraint that the types Ls must choose not to mimic them.

To see that this is indeed an implication of the intuitive criterion, suppose that the type H choice, (x_H,s_H), does not solve this problem. Then there is some other feasible (x_H', s_H') such that

$$\xi(R_H,x_H',s_H') + \lambda R_H > \xi(R_H,x_H,s_H) + \lambda R_H$$

and

$$\xi(R_L,x'_H,s'_H) + \lambda R_H \leq \xi(R_L,x_L^*,cx_L^*) + \lambda R_L.$$

Recall that for any quantity x consumers can achieve any expenditure level between $\underline{p}x$ and $\bar{p}x$ simply by purchasing x from more than one firm. Moreover, one can always make the second inequality strict by finding the solution to the optimization problem, and taking x'_H slightly below the optimal value. Thus, by the intuitive criterion, agents must infer H when they observe (x'_H, s'_H). But then type Hs have an incentive to deviate. Consequently, the equilibrium does not pass the intuitive criterion.[18]

For the moment, ignore the first constraint, and consider the case where $\underline{p} = 0$ and $\bar{p} = \infty$. In that case, it is easy to see that the second constraint (incentive compatibility) <u>must</u> bind: increasing x_H raises the value of the objective function, and can never make the first constraint bind, so the household increases x_H until the second constraint binds. We can therefore substitute the constraint (algebraically manipulated using the definition of $\xi(\cdot)$) into the objective function to obtain

$$\max_{x,s} \; [\Psi(R_H - s) - \Psi(R_L - s)] + [\xi(R_L,x_L^*,cx_L^*) + \lambda(R_L - R_H)].$$

The second bracketed term is invariant with respect to x and s. The first term is maximized at $s_H = s^*$, which was defined in lemma 1 (section 2.1). The associated value of x is determined by the binding incentive compatibility constraint:

$$x^* = u^{-1}[\xi(R_L,x_L^*,cx_L^*) + \lambda(R_L - R_H) - \Psi(R_L - s^*)].$$

Given our assumptions on $u(\cdot)$, x^* always exists. Define

[18]Note that this argument does <u>not</u> apply when (x_H,s_H) solves the programming problem.

$$p^* = \frac{s^*}{x^*}.$$

Under our assumptions, $x^* > 0$ and $s^* > 0$, so $p^* > 0$.

Now reintroduce the first constraint. As long as $\underline{p} \leq p^* \leq \bar{p}$, (x^*,s^*) is still a solution to the optimization problem. Consequently, the type H agents will choose $x_H = x^*$ and $s_H = s^*$.

Our central result concerns cases in which $p^* > c$. Note that since p^* does not depend on c (and exceeds zero), one can satisfy this inequality simply by choosing c small. Alternatively, since[19]

$$\lim_{\lambda \to \infty} p^* = \infty,$$

one could also obtain $p^* > c$ by taking λ large.[20] When $p^* > c$, we automatically have $\underline{p} < p^*$ (this follows from a previous argument, since some firm will set price equal to c for the type Ls). Next we argue that, in equilibrium, we also have $\bar{p} \geq p^*$.

Suppose that $\bar{p} < p^*$. Then an entrant could name exactly p^*. The intuitive criterion implies that all type Hs would purchase exactly x^* from that firm at p^*. The entrant would earn positive profits, so we could not have been in equilibrium. By the same reasoning, one can show that at least one <u>incumbent</u> must select $p_f \geq p^*$. It follows that type H agents only purchase the conspicuous good from incumbents.

We conclude that, in equilibrium, type H agents necessarily buy $x_H = x^*$ from incumbent

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[19]This follows from two facts: $\lim_{x \to 0} u(x) = -\infty$ (which implies that x^* goes to 0 as λ goes to infinity), and s^* is independent of λ.

[20]The fact that x^* goes to 0 as λ goes to infinity gives rise to the curious result that, for large λ, high income households actually consume less of the conspicuous good, even though they spend more on it. Luxury automobiles may provide an example: it is arguable that more expensive cars do not necessarily provide more valuable services.

firms, at a cost of $s_H = s^*$. Their total profits (per capita) are $\gamma(s^* - x^* c)$, recalling that γ is defined to be the frequency of higher income households. Since $s^* - x^* c = (p^* - c)x^* > 0$, profits are strictly positive.

It is useful to summarize our results for the case where $p^* > c$ in the form of a proposition. Define the effective (or average) prices $p_H = \frac{s_H}{x_H}$ and $P_L = \frac{s_L}{x_L}$.

PROPOSITION. If $p^* > c$, then in equilibrium

$$p_H = p^*$$

and

$$p_L = c.$$

In these cases: (i) type H consumers purchase the conspicuous good only from the incumbents who, in total, earn strictly positive profits, and (ii) effective prices, (p_H, p_L), and aggregate profits are independent of F (the number of incumbents).

Thus, positive profits are, in this model, consistent with perfect competition, in that we have assumed homogenous goods, free entry, constant returns to scale technology, and Bertrand pricing.

For completeness, we will briefly treat the case of $p^* < c$. Suppose first that $\Psi''(t) > 0$ for all $t < R_H - s^*$ (guaranteeing that this inequality is satisfied over this range requires stronger assumptions than those made in the preceding sections). Assume provisionally that the equilibrium satisfies $\frac{s_H}{x_H} > c$. Then

$$\Psi'(R_H - s_H) > \Psi'(R_L - s_H).$$

Consequently, we can find some (x_H', s_H') with $s_H' < s_H$ such that[21]

$$u(x_H') + \Psi(R_H - s_H') + \lambda R_H > u(x_H) + \Psi(R_H - s_H) + \lambda R_H$$

$$u(x_H') + \Psi(R_L - s_H') + \lambda R_H < u(x_H) + \Psi(R_L - s_H) + \lambda R_H$$

$$\leq \xi(R_L, x_L^*, cx_L^*) + \lambda R_L.$$

By the intuitive criterion, agents must infer H upon observing (x_H', s_H'). But the choice (x_H', s_H') is feasible (since agents can buy from several firms); consequently, type Hs would choose it. Thus, one cannot have an equilibrium where any agent pays an effective (or average) price greater than c. On the other hand, it can be shown that marginal cost pricing is an equilibrium when $p^* < c$.

Now consider relaxing the assumption that $\Psi''(t) > 0$ for all $t < R_H - s^*$. In that case, maximization of type H utility subject to non-imitation as well as $s_H/x_H \geq c$ may imply that higher income households should pay a price strictly greater than c (even though the unconstrained optimum entails an effective price, s^*/x^*, strictly less than c). It is therefore possible that non-convexities could give rise to a price above marginal cost even when $p^* < c$.

[21]Consider some $x < x_H$ with $x_H - x < \zeta$ and $s < s_H$ such that type Ls are indifferent between (x,s) and (x_H, s_H). For ζ small, type Hs strictly prefer (x,s) to (x_H, s_H). Choose (x_H', s_H') such that $s_H' = s$ and x_H' is slightly less than x. By construction, the Ls strictly prefer (x_H, s_H) to (x_H', s_H'). As long as $x - x_H'$ is sufficiently small, the Hs strictly prefer (x_H', s_H') to (x_H, s_H). Thus, the first two inequalities are satisfied. The third inequality is simply an equilibrium condition.

4. An Extension: Advertising

Whenever equilibria entail positive profits, it is natural to think that competitors might dissipate these profits through other channels. There is, however, no reason to believe that firms will dissipate the profits described in section 3.

To illustrate this point, consider a more elaborate model in which firms can advertise. Technically, there are many ways to introduce advertising into the model. Our strategy is to assume that λ is an increasing function of advertising (marketing), M. This can be justified as follows. Thus far, we have not modeled households whose observable characteristics rule out the possibility that they are of type H. Although these households have no incentive to signal, their opinions may affect the status achieved by other members of the community. The effect of advertising is to increase the number of these people who know the price of a good, and consequently what the good signifies about the consumer's income. That is, upon observing the consumption of a conspicuous product, more people infer R_H when the brand in question is more heavily advertised.[22]

All else equal, individuals will prefer to purchase the conspicuous good from the firm that advertises more heavily. One might think that this would cause firms to dissipate profits--if there were positive profits, another firm could set the same price and advertise slightly more to attract customers. But this proves not to be the case, for the same reason that firms do not dissipate profits by reducing price. Although increased advertising makes the product more attractive, it has the same effect on both Hs and Ls. As a result, advertising makes imitation by Ls more likely.

Formally, we illustrate this point as follows. For simplicity, we define the scale of wealth so that $R_L = 0$. This is not simply a normalization. In the current context, it implies

[22]Although we have assumed that esteem enters utility additively, this is not essential to the results of this section. There are many alternative ways to model esteem under which the analysis also goes through; we use the additive form to illustrate.

that there is no gain to purchasing an advertised brand rather than an unadvertised brand as long as one is perceived as type L.

If type H agents were free to choose x, s, and M, they would select values that solve the following maximization problem:

$$\max_{x,s,M} \; u(x) + \Psi(R_H - s) + \lambda(M)R_H$$

$$\text{s.t. } u(x) + \Psi(-s) + \lambda(M)R_H \leq u(x_L^*) + \Psi(-cx_L^*).$$

Assuming that the non-imitation constraint binds, this is equivalent to maximizing

$$[\Psi(R_H - s) - \Psi(-s)] + \xi(0, x_L^*, cx_L^*).$$

Note that the objective function does not depend on x or M. The solution is $s = s^*$. Any values of x and M satisfying

$$u(x) + \lambda(M)R_H = \xi(0, x_L^*, cx_L^*) - \Psi(-s^*) \equiv G$$

are then equivalent from the point of view of type H agents. In other words, firms are free to trade off x against M, but not in a way that affects total utility.

It is interesting that when firms advertise more, they sell less at a higher price. The model therefore predicts that firms should continue to advertise even when advertising conveys no information about product quality (for example, when products have well-established track records).

Incumbents would like to choose the levels of x and M that maximize profits (subject, of course, to the restriction that they provide consumers with an efficient vehicle for signaling). Mathematically, these are the values of x and M that solve

$$\max_{x,M} \gamma(s^* - cx) - M$$

$$\text{s.t. } u(x) + \lambda(M)R_H = G.$$

Whether or not these choices necessarily prevail in equilibrium depends in part upon our assumptions about the resolution of consumer indifference. It seems natural to assume that incumbents can vary x and M without loosing customers as long as their customers do not sacrifice utility. Under this assumption, the equilibrium values of x_H and M_H must solve the maximization problem described above. The solution is characterized by the two equations

$$u'(x_H) = \lambda'(M_H)R_H c\gamma$$

and

$$u(x_H) + \lambda(M_H)R_H = G$$

(here we have assumed that $\lambda''(M) < 0$).

Thus, allowing λ to depend on M does not result in dissipation of profits. Rather, it simply creates a new dimension over which incumbents maximize joint profits.

5. Implications for Tax Policy

The implications of our analysis for antitrust and regulatory policy are straightforward: one cannot infer either product market failure or market power simply from the existence of positive profits in markets for conspicuous luxury goods. The implications for tax policy are equally provocative.

Suppose that the government imposes a tax on the conspicuous good, and that the per-unit levy is related to the sales price, according to the function $\tau(p)$. Without loss of generality, assume that the producer pays the tax, so that p is the consumer's price, and $p - \tau(p)$ is the producer's price. For the moment, consider tax-price relationships of the form

$$\tau(p) = \max\{ 0, t(p - k) \},$$

where the parameters t and k satisfy $0 < t < 1$ and $k \geq c$. If such a tax schedule is imposed, then the arguments of section 3 require only minor modifications. Assuming that $p^* > c$, equilibria have the following properties: $p_L = c$, $p_H = p^*$, and $x_H = x^*$. Moreover, in the case where $k = c$, aggregate profits (per capita) are equal to $\gamma(s^* - cx^*)(1 - t)$, and total government revenue is $G = \gamma(s^* - cx^*)t$. More generally, for other values of $k \geq c$, profits and revenues are indeterminant within bounds (recall that consumers may expend s^* to buy x^* units in a variety of different ways, such as paying p^* for each unit, or by paying more than p^* for some units, and c for other units). However, as long as $k < p^*$, total revenues are bounded below by $\gamma(s^* - cx^*)t(p^* - k)/(p^* - c)$.[23] The sum of revenues and profits must equal $\gamma(s^* - cx^*)$. Thus, in the context of our model, an appropriately designed luxury tax amounts to a non-distortionary tax on pure profits.

The intuition for this result is fairly simple. The price of luxury brands is determined almost entirely by demand conditions. Assuming that $p^* > c$, cost only enters through the incentive compatibility condition. It appears there only because it determines the price of the budget brand. Thus, as long as the tax does not affect the equilibrium price of the budget brand (which is the case as long as $\tau(c) = 0$), and as long as tax-inclusive costs are less than p^*, a change in the tax-inclusive cost of producing the luxury brand cannot affect behavior. Instead, it simply redistributes pure rents from firms to the government.

It is worth emphasizing that traditional modes of analysis would produce highly misleading conclusions within the current context. Suppose that the inconspicuous good, z, is

[23]Assuming that all units were actually purchased at p^*, aggregate production would be γx^*, and government tax revenues would be $\gamma x^* t(p^* - k)$. It is easy to verify that any other combination of prices and quantities that yield total quantity x^* and total expenditure s^* generates at least as much tax revenue; therefore $\gamma x^* t(p^* - k)$ is a lower bound. Since $(s^* - cx^*)/(p^* - c) = x^*$, we can rewrite this bound as $\gamma(s^* - cx^*)t(p^* - k)/(p^* - c)$. This expression reveals that the government ends up with at least the fraction $t(p^* - k)/(p^* - c)$ of total surplus.

non-taxable. Assuming that the objective is efficiency, rather than distribution, what tax rates should be selected for the various brands of the conspicuous good? As long as revenue requirements are not too high, the preceding analysis implies that only luxury brands should be taxed. This conclusion follows from the fact that a tax on the luxury brands is equivalent to a lump sum tax, while a tax on the budget brands is distortionary. In contrast, the traditional approach suggests that the government should raise a significant fraction of its revenue by taxing budget brands.

Since all goods in this model are produced in competitive industries with constant-returns-to-scale, traditional reasoning suggests that Ramsey-style optimal tax formulas are applicable. As an approximation, one might assume, counterfactually, that demand reflects separable, quasi-linear preferences, in order to exploit the well known "inverse elasticity" rule (which states that the desirability of taxing any given good depends inversely on the good's compensated price elasticity of demand). From this starting point, the traditionalist would argue that it is optimal to raise all revenue by taxing a single good only if the price elasticity for that good is zero. But in our model, the demand for the luxury good is highly price elastic.

To see this, suppose that budget brands are sold at positive price $p_- < p^*$, and that luxury brands are sold at some other price $p_+ \geq p^*$ (as indicated earlier, when $p^* > c$ these conditions are satisfied in equilibrium). Let x_+ denote the quantity of the luxury brand purchased by a type H consumer. Since this consumer purchases x^* units of the conspicuous good for a total of s^*, it necessarily follows that

$$p_+x_+ + p_-(x^* - x_+) = p^*x^*.$$

Rearranging this equation, one obtains

$$x_+ = x^*(p^* - p_-)/(p_+ - p_-).$$

Using this expression, one can easily verify that

$$\epsilon_{++} = p_+/(p_+ - p_-) > 1,$$

where ϵ_{++} denotes the (negative of the) own price elasticity of demand for the luxury brand. Note that this is both a compensated elasticity and an uncompensated elasticity, since a change in quantity does not affect the utility of a type H consumer (in total, he spends the same amount of money for the same quantity and quality, and conveys the same signal).

The magnitude of ϵ_{--} (defined similarly) depends upon the curvature of u(·) and v(·). It is possible to select functional forms so that this elasticity is small in comparison to ϵ_{++}. Thus, the traditionalist could well reach the false conclusion that it is desirable to raise the bulk of government revenue by taxing budget brands, rather than luxury brands.

A more sophisticated traditionalist might object that the demand system described in preceding sections would exhibit substantial cross-price elasticities, thereby invalidating the simple inverse elasticity rule. This observation suggests that the more general form of Ramsey's optimal commodity tax formulas should be used. For the case at hand, these formulas can be written as follows:

$$\tau_+\epsilon_{++}/p_+ + \tau_-\epsilon_{+-}/p_- = C$$

$$\tau_+\epsilon_{-+}/p_+ + \tau_-\epsilon_{--}/p_- = C$$

where τ_- and τ_+ are per-unit taxes on the budget and luxury brands, respectively, ϵ_{+-} is the compensated cross elasticity of demand for the luxury brands with respect to the price of budget brands (similarly for ϵ_{-+}), and C is some constant. Is it possible to have a solution to this system for which $\tau_- = 0$? Since the expressions on the left hand sides of these two equations must be equal, $\tau_- = 0$ implies that $(\tau_+/p_+)(\epsilon_{++} - \epsilon_{-+}) = 0$. Since ϵ_{-+} and ϵ_{++} are of opposite signs, it follows that $\tau_+ = 0$. Consequently, if one wishes to raise positive revenue, one cannot possibly have a solution to the Ramsey equations with $\tau_- = 0$. Thus, even the sophisticated traditionalist is led to an erroneous conclusion.

There is, however, one sense in which one can partially reconcile traditional thinking on optimal taxation with the analysis of this paper. Note that total demand for all brands of the conspicuous good (x^*) is completely inelastic with respect to the price of luxury brands, but sensitive to the price of budget brands. Since these brands all provide the same intrinsic utility, and since (with separation) esteem is invariant with respect to changes in prices, it makes sense to tax the luxury brands.

A related point concerns the elasticity of government revenues with respect to the tax rate, ϵ_α. When $k = c$, it is trivial to verify that $\epsilon_\alpha = 1$. This is the same formula that one would obtain for the revenue elasticity of an ad valorem tax when the demand for the taxed good is completely inelastic. Note also that revenues increase with the tax rate. This is particularly interesting in light of the results of Bernheim [1991a], who used a related signaling model to describe corporate dividend policy. In that model, government revenues were invariant with respect to the dividend tax rate (as long as the rate was positive).

So far, we have confined our remarks to a very specific family of tax schedules. This family is of particular interest, since it includes the federal luxury taxes created by the Omnibus Budget Reconciliation Act of 1990. In particular, this Act imposed a 10% excise tax ($t = 0.1$) on the portion of the retail price of certain items that exceeds a product-specific threshold (k). The thresholds are: \$30,000 for automobiles, \$100,000 for boats and yachts, \$250,000 for aircraft, and \$10,000 for jewelry and furs.

It is nevertheless worth noting that the results of this section do not depend to any significant extent on the particular form of the luxury tax assumed here. The analysis proceeds similarly, and generates identical conclusions, as long as $\tau(c) = 0$, $p > c + \tau(p)$ for p slightly greater than c as well as for some $p \geq p^*$, and $\tau(q) \geq 0$ for all q.

The analysis has also presupposed that there is only one inconspicuous good, and one conspicuous good (of which there are, of course, many brands). The extension to an arbitrary number of inconspicuous goods is trivial. It is only slightly more difficult to introduce other conspicuous goods. The conclusions are essentially unchanged, except that the distribution of profits across conspicuous good markets is indeterminant. This implies that the response to an increase in the luxury tax rate on some specific conspicuous good is also indeterminant. It is possible, for example, that prices could simply adjust so that profits shift to a more lightly taxed industry (with sidepayments among firms, one might even expect this to occur). Thus, there may be advantages to adopting a reasonably broad-based luxury tax, such as the one envisioned in recent legislation.

In a related paper, Ng [1987] studied optimal taxation of a special class of commodities, which he labelled "diamond goods". The distinguishing characteristic of a diamond good is that consumers' preferences are defined over the amount of money spent to acquire it, rather than over the amount consumed. A change in the price of a diamond good does not alter the utility received by consumers -- in response to a price change, consumers simply adjust purchases to keep total expenditures fixed. Consequently, the optimal rate of taxation for a diamond good is infinite. In contrast, our analysis is not predicated on the assumption that consumers enjoy spending money. Consumers benefit from purchasing overpriced goods only because, in equilibrium, conspicuous consumption serves as a signal of wealth, thereby enhancing status. Our analysis also describes the nature of competition among producers of luxury goods, and demonstrates that there is a maximum non-distortionary tax.

6. Discussion of Assumptions

Throughout this paper, we have maintained two important implicit assumptions. Our objective in this section is to make these assumptions explicit, and to evaluate their validity.

The first assumption is that firms cannot make a secret price concession to any given buyer. If secret concessions are possible, then the equilibrium described in section 3 will break down: type H agents prefer to buy the conspicuous luxury good at a lower price, as long as they still get credit for purchasing it at the higher price.[24]

There is a solution to this problem. Each luxury brand producer clearly has an incentive to commit himself to a policy of making no secret concessions. Indeed, the argument in the preceding paragraph implies that the signaling value of conspicuous consumption is present only if the producer has made a credible commitment of this sort. One approach is to rely on intermediaries. By selling products to intermediaries (e.g. car dealerships) at publicly observable prices that exceed marginal cost, the manufacturer places a lower bound on secret price concessions (equilibrium prices cannot be less than "dealer invoice"). Another possibility is that manufacturers will rely on reputations. Once a luxury brand acquires a reputation for being sold at heavy discounts, the "snob value" associated with its purchase may be eroded.

A second implicit assumption concerns the resolution of indeterminacy (a point alluded to at the end of the preceding section). It is well recognized (e.g. in the literature on signaling in financial markets) that equilibria such as those considered in this paper are characterized by "money burning." (By money burning, we mean an action that imposes the same cost on all agents regardless of type). Agents must waste a certain amount of money to sustain the equilibrium, but, as a formal matter, they are indifferent between overpaying for conspicuous goods and other dissipative activities, such as literally burning money. We recognize that individuals throw money away in a variety of forms -- witness, for example, the phenomenon of heavy tipping by "high rollers." Even so, we would argue that, in practice, most methods of burning money are inferior to conspicuous consumption.

To effectively signal wealth, the act of burning money must be observed readily by large numbers of people, even if these people make little or no attempt to observe it. Thus, burning dollar bills on one's front lawn is an excellent way to destroy one's resources, but relatively few people will observe the spectacle and make the desired inference. This is true for two reasons:

[24]This also motivates manufacturers to thwart the distribution of imitations of their products, such as fake Rolex watches and Polo shirts.

first, only immediate neighbors will have the opportunity to observe this activity during the ordinary course of social activity, and second, the activity itself is rather brief, and therefore provides a rather small window for observation. In contrast, one's automobile, jewelry, and clothing are all observed regularly by numerous other individuals during the normal course of social interaction. In addition, expensive durable goods provide durable emblems of resource dissipation, thereby providing large windows for observation.

Consumers probably seek durable emblems of resource dissipation for another, separate reason. It is possible to burn resources almost continually during the normal course of social interaction, e.g. by tipping excessively at every opportunity. However, other individuals observe this behavior only at isolated moments. For tipping to function as an effective signal, others must believe that substantial resources are being consumed, which can only be the case if current behavior is representative. If excessive tipping was interpreted as indicative of high wealth, then individuals would have an incentive to falsely signal any time they were more than usually anxious to impress their current company. We may therefore entertain serious doubts about the wealth of an individual who is observed tipping heavily on any given evening. In contrast, by purchasing an expensive car, one obtains a durable emblem of an activity that, in one shot, has dissipated large amounts of resources. When others observe the car, they have no reason to wonder whether it is representative of automobiles that the individual drives at other points in time (this, of course, assumes that rental vehicles are readily identifiable).

On the basis of these arguments, it seems to us that the ideal candidates for resource dissipation are durable goods that many others will readily observe during the normal course of social interaction (i.e., that are conspicuous) and believe to be representative. Clearly, this does not completely resolve the issue of indeterminacy, nor does it rule out all possible alternatives. One might wonder, for example, why households do not simply publish tax returns or audited asset statements. If one takes our theory literally, it is also difficult to understand why consumers remove price tags from their conspicuous possessions. Obviously there are other important considerations that influence the choice of a signal; completely transparent exhibitions of wealth seem socially unacceptable.

Our theory does not explain why people should dissipate resources through the purchase of expensive automobiles, rather than through jewelry, clothing, or yachts. Consequently, as mentioned in the preceding section, the distribution of profits across conspicuous good industries is indeterminant. Given the diversity of actual behavior, we regard the fact that the theory allows for many methods of dissipation as a virtue, rather than a difficulty.

The observation that agents can burn money in a variety of different ways is much more troublesome in other contexts than it is in the current paper. Consider for example the literature on financial market signaling. Investors have strong incentives to learn all relevant information about stocks. Consequently, the firm does not need to undertake dissipative activities that investors will observe with little or no effort; rather, they can assume that investors will take the trouble to observe the signal. Similarly, they need not seek durable emblems of dissipation, since potential investors can always review financial records (an investor need not wonder whether the current dividend is representative -- he can simply look it up). Thus, one can entertain general doubts about models with money burning without being skeptical about the specific model examined in this paper.

Our analysis is also based on some highly restrictive explicit assumptions, but most of these are adopted only for the sake of analytic and expositional simplicity. We have already mentioned that the extension to cases with many different types of conspicuous and inconspicuous goods is relatively straightforward. It is somewhat more difficult to derive equilibria for models in which there are more than two types of agents. However, it can be shown that our results survive this modification. We refer the reader to Bernheim [1991a] for an analysis of a related model; the arguments here would be similar.

7. Conclusions

We have presented a formal model of conspicuous consumption, and have examined the characteristics of equilibria when conspicuous goods are produced by a competitive industry. We have found that these characteristics differ fundamentally from those obtained in more standard models. Several characteristics have intriguing potential implications for public policy. First, the existence of positive profits does not necessarily imply that competition is in any way imperfect. Second, within the context of our model, a properly designed luxury tax amounts to a tax on pure profits, and is therefore non-distortionary. Both conclusions contrast sharply with traditional thinking based on more standard models.

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Figure 1: Expected Utility from
Inconspicuous Consumption