

# Conspicuous Consumption, Human Capital, and Poverty\*

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## Abstract

Poor families around the world spend a large fraction of their income on the consumption of goods that appear to be useless in alleviating poverty. We argue that this consumption can be interpreted as an attempt to signal status, and therefore, that the persistence of poverty may be partly due to an inefficient signaling equilibrium. Specifically, we suggest that there is a trade-off between conspicuous consumption and human capital as signals for unobserved income. This trade-off produces a signaling equilibrium in which the expected fraction of expenditure on conspicuous consumption out of total income is decreasing with human capital, which gives rise to a poverty trap.

KEYWORDS: Conspicuous Consumption, Human Capital, Poverty, Status.

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# 1 Introduction

The consumption bundle of the poor includes many goods that seem to be useless in alleviating poverty. For instance, according to Banerjee and Duflo (2007), even the poorest households, those with an income of less than one Dollar a day per capita, spend on average across different countries 1 to 8 percent of their income on tobacco and alcohol, and the median spending on festivals, which varies substantially across different countries, is as high as 10 percent of annual income in some regions of India.<sup>1</sup>

These consumption patterns are puzzling because they seem to come at a significant cost for the poor.<sup>2</sup> The typical poor spend only 2-3 percent of their income on their children's education, refrain from sending a large fraction of their children aged 7-12 to school, are poorly fed, suffer from health problems, and report that they are worried and anxious to an extent that interferes with their sleep and work. In many cases, they fail to make trivial investments in their business and save so little that they cannot avoid cutting on their meals when they suffer a temporary decline in income (Banerjee and Duflo, 2007). It seems, therefore, that even with their limited resources, the poor could do much more to gradually improve their situation if they only reduced the consumption of those goods that seem useless in alleviating poverty.<sup>3</sup> In this paper, we offer an explanation for the reason they may fail to do so.

Our explanation highlights the connection of the consumption patterns of the poor with

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<sup>1</sup>Rao (2001a, 2001b) argues that expenditures on festivals amounts to 15 percent of households' total expenditures in rural India. Interestingly, the poor typically spend less than one percent of their income on other types of entertainment that are common in high-income countries, such as movies, theater, and video shows (Banerjee and Duflo).

<sup>2</sup>This is notwithstanding the fact that the consumption patterns described above can generate social capital and possibly also future income. Some other forms of conspicuous consumption, such as jewelry, can also help smooth future income.

<sup>3</sup>The consumption of flashy jewelry worn especially as an indication of wealth, known as "bling" among young African Americans, is another example of conspicuous consumption that could come with a significant cost in terms of persistence of poverty. We are not aware of any study that documents the consumption of bling and its impact on poverty, however, Missy Elliott, a successful rapper, argued in 2004 that 'bling culture' encourages young black men and women to spend their money irresponsibly, and that artists should encourage young people to invest in stable, long-term assets (wikipedia).

the persistence of poverty. It is based on the idea that individuals care about their status and seek to impress others by engaging in conspicuous consumption, which provides a signal about unobserved income.

Conspicuous consumption is nearly universal in human societies, and not only in them.<sup>4</sup> The argument among evolutionary biologists, following the seminal contribution of Zahavi (1975), is that higher status, or more precisely the costly signal that generates this status, such as the peacock's tail, is positively correlated with other desirable genetic characteristics that are associated with higher fitness. Hence, a higher status increases mating opportunities and so confers an evolutionary advantage.<sup>5</sup>

We further suggest that there is a trade-off between conspicuous consumption and accumulated factors of production, such as human capital, as signals for unobserved income. We develop a signalling model in which income is correlated with individuals' human capital and show that it gives rise to a convex saving function with respect to income, despite of our assumption that preferences are homothetic. This saving pattern implies that there could exist a threshold income below which dynasties converge to a low-education/low-income steady state (a poverty trap), and above which dynasties converge to a high-education/high-income steady state, or to a sustained growth path.

According to the theory that we propose here, festivals, consumption of tobacco and alcohol, and the display of expensive clothing and jewelry, are more transparent than other types of consumption, and hence may provide a signal for income or wealth.<sup>6</sup> Obviously, investment in the health and the education of one's children may also serve as a signal about

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<sup>4</sup>See the survey by Pinker (1997).

<sup>5</sup>Experiments illustrate that sexual motives induce conspicuous behavior. Griskevicius et al. (2007), for example, show that romantic motives seem to produce highly strategic and sex-specific conspicuous displays of consumption and benevolence, where males tend to spend more on conspicuous consumption compared to women. Similarly, Wilson and Daly (2004), show that men respond more strongly than women to romantic situations, by willing to discount future income for present consumption.

<sup>6</sup>Because the consumption of tobacco and alcohol is, at least in part, performed socially we believe that it fits the definition of conspicuous consumption. In fact, Thorstein Veblen, who coined the phrase conspicuous consumption, used alcohol (and other stimulants) as prime examples of conspicuous consumption that serves as a signal for the superior status of those who are able to afford the associated indulgence (Veblen, 1899).

wealth, but unlike conspicuous consumption, the fruits of such an investment can typically be observed only in the long run, and that delays the satisfaction that is obtained from impressing others.<sup>7</sup>

The claim that festivals serve as signals of unobserved wealth is supported by Bloch, Rao and Desai (2004). They demonstrate, based on survey data from South India, that a daughter's marriage (dowry and celebrations) is the costliest event in the life of an Indian family and can amount to more than six times a family's annual income.<sup>8</sup> It often drives parents into severe debt at high interest rates, and may push families into deep poverty. Bloch et al. argue that there is a clear distinction between dowries, which may be interpreted as the price paid for desirable grooms (and consist of most of the cost of getting a daughter married) and wedding celebrations, which have a symbolic value and are intended to create a spectacle.<sup>9</sup> Accordingly, they show that the costs of celebrations, which are customarily borne by the bride's family, vary significantly according to the "quality" of the groom, and could amount to one third of a family's annual income.<sup>10</sup>

We develop an overlapping generations model in which individuals' preferences are defined over their consumption, status, and investment in their offspring's human capital. The status of an individual is defined by the social beliefs about the individual's unobservable income. Individuals' incomes are unobservable, but are correlated with the individuals' observable human capital and with the individuals' observable expenditure on conspicuous consumption. We show the existence of a unique fully separating equilibrium where individuals' expenditure on conspicuous consumption serves as a signal about individuals' income. In this equilibrium, it is possible to infer the exact income of each individual based on the individual's level

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<sup>7</sup>In addition, a "purely wasteful signal" that doesn't generate direct utility or allows for accumulation of wealth (such as investment in the education of one's offspring) provides a stronger indication for unobserved income.

<sup>8</sup>See Botticini and Siow (2000) for a study of the market for dowries.

<sup>9</sup>Srinivas (1989) and Roulet (1996) also emphasize the prestige motive underlying marriage expenses.

<sup>10</sup>The evidence that Bloch et al. present in support of their claim is based on the existence of a positive correlation between the expenditure on celebrations and a non-local groom, whose family's income is not known to the local villagers. Their theoretical argument is based on the idea that the probability that the villagers in the bride's village learn the quality of the groom is increasing in the expenditure on celebrations.

of human capital and expenditure on conspicuous consumption. The model also admits a pooling equilibrium with no conspicuous consumption, and a wide variety of partially separating equilibria. But the fully separating equilibrium is the only equilibrium that satisfies a version of the intuitive criterion (Cho and Kreps, 1987), which is the standard refinement that is applied to equilibria in signaling games.

We show that if human capital is non-observable, then a constant fraction of income is allocated to conspicuous consumption, and that gives rise to a constant saving rate (in the form of investment in the education of offspring). If, however, human capital is observable, then the fully separating equilibrium may imply a negative association between income and the share of conspicuous consumption out of total income. Consequently, the saving rate may be increasing with income, which may generate a poverty trap. Hence, we illustrate that observable human capital and in particular the trade-off between observable human capital and conspicuous consumption as signals of wealth, may play a crucial role in the emergence of a poverty trap. Indeed, a recent finding that is consistent with the mechanics of this trade-off is described by Charles, Hurst, and Roussanov (2007) who show that college educated individuals spend about 13 percent less than their high school educated counterparts on ‘visible goods,’ controlling for current and permanent income.

The rest of the paper proceeds as follows. The next section surveys the related literature about poverty traps and concern for status. In Section 3 we present the model. Section 4 is devoted to equilibrium analysis, and Section 5 to equilibrium dynamics. Section 6 concludes. All proofs are relegated to the appendix.

## **2 Related Literature**

### **2.1 Poverty Traps**

There is a sizable literature in economics that tries to explain the persistence of poverty. Most of this literature assumes that individuals are fully rational and that the poor, like other individuals, care about their own and their offspring’s future well-being, and therefore

are willing to give up part of their present consumption for the sake of the future. However, as suggested by Dasgupta and Ray (1986), Banerjee and Newman (1993) and Galor and Zeira (1993), credit constraints prevent the poor from passing the threshold of investment that permits a gradual escape from poverty.<sup>11</sup> While the evidence suggests that the poor do indeed have limited access to credit,<sup>12</sup> there is little empirical support for the existence of significant investment indivisibilities. Moreover, this approach fails to account for the evidence surveyed above, which suggests that the poor could in fact do better to improve their situation over time if only they saved more and spent less on the consumption of goods we view as conspicuous.

It has also been observed that a poverty trap can emerge regardless of non-convexities in the technology if individuals' propensity to save increases with income, and credit markets are imperfect (Moav, 2002). While empirical evidence strongly supports the underlying assumption that the rate of saving increases with income, and in particular, that the poor's savings rate is very low, the reason that the poor fail to save and spend their income on festivals, tobacco, and so on, remains unclear.<sup>13</sup>

The paper that is perhaps closest to ours in its motivation is Banerjee and Mullainathan (2007), who were the first to address the puzzling behavior of the poor described above in a theoretical model. They argue that poor individuals spend a larger fraction of their income

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<sup>11</sup>In Dasgupta and Ray (1986), the mechanism is based on a nutritional threshold, below which individuals cannot work. See also Benabou (1996), Durlauf (1996), and Mookherjee and Ray (2003) who, among many others, propose different mechanisms that generate poverty traps based on non-convexities in the technology and credit constraints. In many of these models, as well as in Becker and Tomes (1979), Loury (1981), Galor and Tsiddon (1997), Maoz and Moav (1999), and Hassler and Rodriguez-Mora (2000) random shocks allow for some intergenerational mobility. Similarly, in our model individuals may escape poverty if they experience a strong positive shock to income. However, the combination of observable human capital and conspicuous consumption reduces the likelihood that this would happen.

<sup>12</sup>See for example Besley (1995).

<sup>13</sup>Another puzzle is related to the fact that the poor tend to have many children, which limits their financial ability to support the health and education of each child. Moav (2005) addresses this puzzle and shows that despite homothetic preferences (defined over consumption and the quality and quantity of children) and convex technology, a poverty trap can emerge in this case, as less educated individuals have a comparative advantage in producing child quantity rather than quality.

on “temptation goods,”<sup>14</sup> resulting in a convex saving function in income, which, in turn, can generate a poverty trap. In particular, they show that individuals, who are aware of their limited self control, reduce savings so as to reduce future wasteful consumption, which acts like a tax on their future wealth. Banerjee and Mullainathan’s result is a consequence of their assumption that individuals have non-homothetic preferences that induce a weaker preference for temptation goods as individuals become richer.<sup>15</sup> In contrast, in this paper, individuals’ preferences are homothetic, and the fraction of income spent on conspicuous consumption is endogenously determined in the signaling equilibrium. In particular, the key result of our model is that, despite homothetic preferences, this share is decreasing with the level of human capital, allowing for the emergence of a poverty trap.

We further assume that output is a linear function of inputs, so that it is not subject to decreasing marginal productivity. In a model without concern for status, this linear production structure, combined with homothetic preferences, generally results in a linear dynamical system that gives rise to steady-state growth of income, or to a unique globally stable steady-state level of income. We show that the introduction of observable human capital and conspicuous consumption into such a framework may curve the dynamical system in a way that could give rise to a threshold level of income below which dynasties converge to a poverty trap steady-state level of income and above which dynasties converge to a divergent growth path of income.

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<sup>14</sup>For example, Banerjee and Duflo (2007) show that in spite of their low body mass index, the poor tend to spend up to 7 percent of their income on “expensive calories” such as sugar while neglecting relatively cheaper, more nutritious, alternatives.

<sup>15</sup>In another paper, Banerjee and Mullainathan (2008) suggest that “comfort goods” can help divert workers’ attention from pressing problems at home so that workers who can afford such goods can pay more attention at work. The poor cannot afford comfort goods and so cannot pay the needed attention and hence stay poor. This poverty cycle is the result of an interaction between attention at home and comfort goods, which make the optimization problem non-convex, and produces a corner solution despite the fact that both output at work and at home are linear functions of attention.

## 2.2 Concern for Status

Starting with Smith (1759) and Veblen (1899), a huge theoretical literature in the social sciences has been devoted to the idea that people care about and try to manipulate their status.<sup>16</sup> Some of the theoretical models in this literature interpret conspicuous consumption as a signal about unobserved income as we do here,<sup>17</sup> while others focus on the idea that people care about their relative consumption.<sup>18</sup> Empirical support for the notion that people rely on conspicuous consumption to influence their perceived status includes the work of Bloch et al. (2003) that is mentioned in the introduction, and of Chung and Fisher (2001) who explore the spending patterns of recent immigrants into Canada. Charles et al. (2007) argue that since the marginal return to signaling through conspicuous consumption is decreasing in the average income of a person's reference group, less conspicuous consumption should be observed among individuals who have richer reference groups. Their prediction is consistent with their finding that consumption of 'visible goods' such as clothing, jewelry and cars is decreasing in the wealth of one's racial reference group, so that Blacks and Hispanics consume relatively more such goods than comparable Whites.

As explained in the introduction, our contribution to this literature consists of the argument that the share of conspicuous consumption in the consumption bundle is expected to be negatively correlated with observable human capital, and that this may have an impact on the persistence of poverty.

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<sup>16</sup>For recent empirical work that shows that people care about their status and relative position in society see Luttmer (2005), Clark and Oswald (1996), McBride (2001), and Dynan and Ravina (2007). See also the survey by Kahenman and Krueger (2006) and the references therein.

<sup>17</sup>See for example, Ireland (1994), Cole et al. (1995), Bagwell and Bernheim (196), Glazer and Konrad (1996), Corneo and Jeanne (1998), and Charles et al. (2007).

<sup>18</sup>See for example Duesneberry (1949), Pollack (1976), and Frank (1985) for some of the early such models. Recently, Hopkins and Kornienko (2004) and Becker and Rayo (2006) analyzed the welfare implications of such preferences.

### 3 Model

Consider an overlapping generations model of a one-good economy with a continuum of individuals. The good can be used for consumption, conspicuous consumption, and investment in human capital. Each individual lives two periods, has a single parent, and a single child. This parent-child relation creates a dynasty. When individuals are “young”, or in their first period of life, their parents are “old,” or in their second period of life.

In their first period of life, (young) individuals invest in human capital. An individual who invests  $e \geq 0$  units of the good in human capital when young acquires  $h = h(e)$  units of human capital, which enters the production process in the following period, when the individual is old. In particular, we assume that

$$h(e) = \theta + \gamma e, \tag{1}$$

where  $\theta > 0$  and  $\gamma > 1$ . Individuals defer their consumption to the second period of their life, and hence use any resources they own when young to enhance their human capital.<sup>19</sup>

In their second period of life, (old) individuals spend a fixed amount of their time working. An individual with human capital  $h$  produces a non-negative quantity

$$y = h + \pi$$

of the good, where  $\pi \in [\underline{\pi}(h), \bar{\pi}(h)]$  is an unobserved component of income with an expected value of zero that is drawn from a continuous distribution. Old individuals allocate the resources they produce among consumption,  $c$ , conspicuous consumption,  $x$ , and a bequest to their offspring,  $b$ . Hence, their budget constraint is given by,

$$c + b + x \leq y. \tag{2}$$

Individuals’ preferences are represented by the following Cobb-Douglas utility function:

$$u(c, b, S) = B (c^{1-\beta} b^\beta)^{1-\lambda} S^\lambda, \tag{3}$$

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<sup>19</sup>If offsprings’ preferences affect their investment in education (c.f., Saez-Marti and Zilibotti, 2008) then this may imply a stronger correlation in human capital across generations, which would further contribute to the persistence of poverty.

where  $\beta \in (0, 1)$  and  $\lambda \in (0, 1)$  are parameters that capture the relative weight given to consumption, bequest, and status,  $B \equiv ((1 - \beta)^{\beta-1} \beta^{-\beta})^{1-\lambda}$  is a constant coefficient, and  $S = E(y|h, x)$  is “perceived status.” That is, we assume that the perceived status of an individual is given by the social belief about the individual’s expected income conditional on the individual’s level of human capital and conspicuous consumption, both of which we assume to be observable. Individuals’ consumption and the bequest they leave to their offspring are assumed to be unobservable.

There are two justifications for the assumption that the bequest is not observable. First, it is possible to interpret the bequest as the amount of resources that parents spend in order to educate their children. A lot of this spending, such as the effort that goes into instilling in children the value of learning or the number of hours that parents spend helping their children with their homework, is simply non observable. Second, the level of investment in a child’s education is only revealed after considerable delay. If, for instance, we interpret human capital as years of schooling, then investment in human capital is a continuous process. Consequently, not much can be learned from the fact that a child attends primary school, because it is not clear what will be the child’s final level of education.

The assumption that conspicuous consumption,  $x$ , does not generate any direct utility and that the consumption that does generate utility,  $c$ , is not observable, provides a simple expression for the notion that individuals may attempt to signal their wealth by shifting their expenditures towards more visible consumption goods. Such a shift would reduce individuals’ direct utility from consumption but would increase their utility from status.

The assumption that utility from status is defined by the social belief about the level of income, rather than by the social belief about the ranking in the income distribution greatly enhances the analytical tractability of the model, and in light of the one-to-one mapping from ranking to income is not implausible. In fact, as shown in Section 4 assuming that status is defined over ranking would have no effect on the equilibrium level of conspicuous consumption if individuals’ income is uniformly distributed. However, analyzing the model

under this alternative assumption prevents us from obtaining an analytical solution because the distribution of income is changing endogenously over time.

We restrict the model's parameters as follows:

$$\beta\gamma > 1;$$

and

$$(1 - \lambda)\beta\gamma < 1.$$

As will become apparent, the first restriction ensures that in dynasties where conspicuous consumption is a sufficiently small fraction of individuals' income, the expected level of human capital grows over time. The second restriction ensures that in dynasties where conspicuous consumption is close to a fraction  $\lambda$  of income, the expected level of human capital converges to a constant level.

Observe that the maximization of individuals' utility function (3) subject to their budget constraint (2) implies that for any level of expenditure on conspicuous consumption,  $x$ , the bequest that individuals leave to their offspring is

$$b = \beta(y - x), \tag{4}$$

and individuals' consumption is

$$c = (1 - \beta)(y - x). \tag{5}$$

We now turn to the analysis of the allocation of resources to conspicuous consumption,  $x$ . An equilibrium for this economy is defined as follows: Let  $x(h, y)$  denote individuals' expenditure on conspicuous consumption as a function of their human capital,  $h$ , and income,  $y = h + \pi$ , and  $y(h, x) \equiv E(y|h, x)$  denote the social belief about individuals' expected income as a function of their observable human capital and expenditure on conspicuous consumption,  $x$ .

**Definition.** A pair of expenditure on conspicuous consumption and social belief functions  $\langle x(h, y), y(h, x) \rangle$  is an equilibrium if:

1. individuals' expenditure on conspicuous consumption  $x(h, y)$  is optimal given the social beliefs  $y(h, x)$ ; and
2. the social belief  $y(h, x)$  is consistent with the expenditure function  $x(h, y)$ , or

$$y(h, x) = E[y : x(h, y) = x].$$

## 4 Equilibrium Analysis

In a standard signaling game, one player sends a message (signal) to which another player responds by taking an action that affects the former player's payoff. Thus, strictly speaking, because no one responds to individuals' choice of conspicuous consumption, the game that is described in this paper is not a standard signaling game. However, because individuals' levels of conspicuous consumption affect social beliefs, and these enter directly into individuals' utility, the game described here can be analyzed in much the same way as a standard signaling game.

Like any signalling game, the many different interpretations that can be given to different choices of off-equilibrium expenditures on conspicuous consumption give rise to many different equilibria. But, as shown in the appendix, plausible restrictions on off-equilibrium beliefs, and specifically, the restrictions imposed by a variant of the so called *intuitive criterion* (Cho and Kreps, 1987) imply that the equilibrium must be fully separating.<sup>20</sup>

Plugging equations (4) and (5) into the individuals' utility function (3) allows us to derive individuals' utility as a function of their income  $y$ , conspicuous consumption  $x$ , human capital  $h$ , and the social belief function  $y(h, x)$ , as follows:

$$u(y, x) = (y - x)^{1-\lambda} y(h, x)^\lambda. \tag{6}$$

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<sup>20</sup>A precise definition of the refinement we use and a formal proof are presented in the appendix (Proposition 3). Intuitively, the *intuitive criterion* requires that individuals who deviate from equilibrium and claim to be of a certain type should be believed if all the other types would not want to deviate in the same way, even if by deviating they would be believed to be of this claimed type.

An individual with human capital  $h$  and income  $y$  chooses the level of conspicuous consumption  $x(h, y)$  to maximize his utility (6). The implied first-order-condition is:

$$\frac{\lambda}{1-\lambda} \frac{y-x}{y(h, x)} = 1 \left/ \frac{dy(h, x)}{dx} \right. . \quad (7)$$

Note that the left-hand-side of this first-order-condition describes the marginal rate of substitution between the bundle of consumption and bequest,  $y-x$ , and status,  $y(h, x)$ , while the right-hand-side is the marginal cost of status (because the marginal cost of the consumption/bequest bundle is one). In equilibrium, these two marginal rates have to be equal.<sup>21</sup>

Noting that in the fully separating equilibrium  $y = y(h, x)$ , the solution  $y(h, x)$  of the differential equation (7) is (implicitly) given by the following equation:

$$y(h, x)^{1/(1-\lambda)} - \frac{x}{\lambda} y(h, x)^{\lambda/(1-\lambda)} = \underline{y}(h)^{1/(1-\lambda)} , \quad (8)$$

where  $\underline{y}(h) \equiv h + \underline{\pi}(h)$  denotes the smallest possible income that an individual who is endowed with human capital  $h$  can possibly have. Except for special cases (such as  $\lambda = 1/2$ ), it is impossible to obtain an explicit solution for the equilibrium social belief  $y(h, x)$ . But it is possible to invert the implicit solution for  $y(h, x)$  in equation (8) to obtain an explicit solution of the equilibrium level of conspicuous consumption  $x(h, y)$  as follows:

$$x(h, y) = \lambda \left( y - \frac{\underline{y}(h)^{1/(1-\lambda)}}{y^{\lambda/(1-\lambda)}} \right) . \quad (9)$$

This result is summarized in the following proposition.

**Proposition 1** *The signalling game has a unique fully separating equilibrium*

$$\langle x(h, y), y(h, x) \rangle .$$

*In this equilibrium, expenditure on conspicuous consumption  $x(h, y)$  is given by equation (9), and social beliefs  $y(h, x)$  satisfy equation (8).*

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<sup>21</sup>If status in the utility function were defined over the individual's ranking in the income distribution, then the first order condition would have been:  $\frac{\lambda}{1-\lambda} \frac{y-x}{F(y(h, x))} = 1 \left/ \left[ \frac{dF(y(h, x))}{dy} \frac{dy(h, x)}{dx} \right] \right.$ , where  $F$  is the distribution of income. If  $F$  is a uniform distribution with support  $[0, \bar{y}]$  then  $F(y) = y/\bar{y}$  and  $dF/dy = 1/\bar{y}$  for  $y \in [0, \bar{y}]$ , and so this first order condition is identical to the first order condition derived from a utility function in which status is defined by income, as in (7). Therefore, defining status by the ranking in the income distribution has no effect on the analysis provided that income is uniformly distributed over some interval  $[0, \bar{y}]$ .

The uniqueness of the fully separating equilibrium follows from the fact that the left-hand-side of the first-order-condition (7), namely the marginal rate of substitution between the bundle of consumption and bequest,  $y - x$ , and status,  $y(h, x)$ , is unique, and so determines a unique marginal cost of status. Hence any combination of consumption, bequest, and status, determines a unique expansion path of expenditure on conspicuous consumption that is increasing with the rise of the unobserved component of income,  $\pi$ . This path is pinned down by the fact that in a fully separating equilibrium, expenditure on conspicuous consumption is zero for an individual who has the lowest possible income  $\underline{y}(h)$ , and hence, accordingly, social beliefs are  $y(h, 0) = \underline{y}(h)$ . This has to be the case because in a fully separating equilibrium an individual's income is known. Hence, an individual who has the smallest possible income does not need to spend anything to signal this fact.

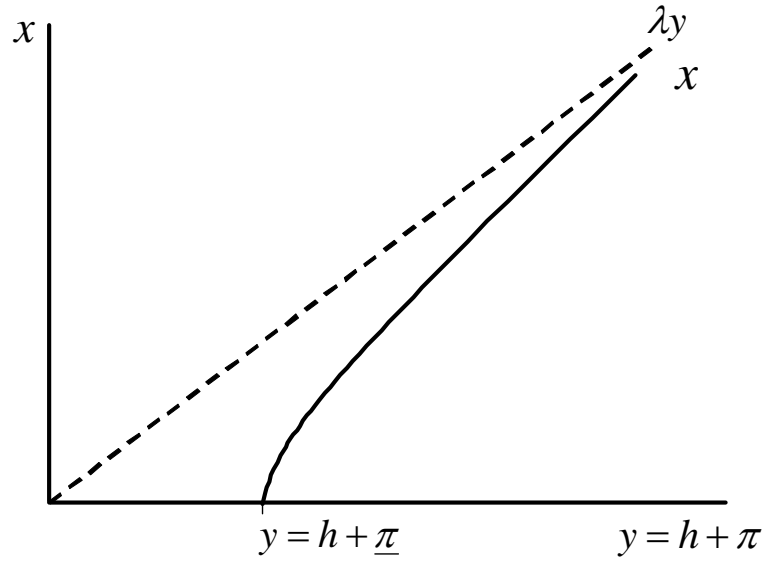


Figure 1: Equilibrium expenditure on conspicuous consumption,  $x(y, h)$ , as a function of  $y$ , holding  $h$  constant.

Equation (9) implies that the equilibrium expenditure on conspicuous consumption is  $x(h, y) = \lambda y$  if  $\underline{y}(h) = 0$  (that is, if  $\underline{\pi}(h) = -h$ ). Otherwise, if  $\underline{y}(h) > 0$  (that is, if  $\underline{\pi}(h) > -h$ ), then  $x(h, y)$  has the following notable properties as depicted in Figure 1:

1.  $x(h, \underline{y}(h)) = 0$ . An individual who is endowed with the worst possible unobserved component of income  $\pi = \underline{\pi}(h)$  does not spend any income on conspicuous consumption.
2. For any fixed level of human capital  $h$ , individuals' expenditure on conspicuous consumption is increasing in the unobserved component of income,  $\pi$ , and in their total income,  $y = h + \pi$ .
3. For any fixed level of human capital  $h$ , individuals' expenditure on conspicuous consumption is concave in their income  $y$ .
4. For any fixed level of human capital  $h$ , the slope of individuals' expenditure on conspicuous consumption as a function of their income increases to  $\lambda/(1 - \lambda)$  as individuals' income decreases to  $\underline{y}(h)$ .
5. For any fixed level of human capital  $h$ , the slope of individuals' expenditure on conspicuous consumption as a function of their income tends to  $\lambda$  as individuals' income increases.
6. Holding income constant, the larger is the unobserved element of an individual's income,  $\pi$ , or the smaller is the individual's (observable) human capital, the larger is the individual's expenditure on conspicuous consumption.

We now turn to study the behavior of the expected value of conspicuous consumption,  $x$ , as a function of human capital,  $h$ . First, we restrict the lower bound on the size of the unobserved component of income,  $\underline{\pi}(h)$ . In particular, we assume that the lowest possible income of an individual who is endowed with a level of human capital  $h$ , namely  $\underline{y}(h) \equiv h + \underline{\pi}(h) < h$ , is nondecreasing and convex in  $h$ .

Under these assumptions, expenditure on conspicuous consumption  $x(h, y)$  has two important properties that are summarized in the following proposition.

**Proposition 2** *If the lowest possible income of an individual who is endowed with human capital  $h$ ,  $\underline{y}(h)$ , is nondecreasing and convex in the individual's human capital and  $\underline{y}(0) = 0$ , then*

1. *the ratio of conspicuous consumption to human capital,  $x(y, h)/h$ , is nonincreasing with human capital for individuals who are endowed with an income  $y$  that is larger than or equal to their level of human capital  $h$ , or for whom  $\pi \geq 0$ , and*
2. *if, in addition, it is also the case that  $\underline{y}'(h) \leq 1$ , then conspicuous consumption,  $x(y, h)$ , is nondecreasing with human capital,  $h$ .*

The first part of the proposition that states that the ratio of conspicuous consumption to human capital,  $x(y, h)/h$ , is decreasing in human capital when  $y \geq h$ , is a key result of the model. It implies that the *expected fraction* of income allocated to investment in the human capital of the offspring is increasing in parental education, which allows for the emergence of a poverty trap.

Notably, this property is not necessarily true for values of  $y$  that are close to the minimum value  $\underline{y}(h)$  because individuals who suffer a negative and large in absolute value unobservable addition to their income cannot afford to spend a large fraction of their income on conspicuous consumption (however, inspection of the proof reveals that the statement holds true for values of  $y < h$  that are close to  $h$  provided that the function  $\underline{y}(h)$  is “convex enough”).

It is also not necessarily true that the share of expected conspicuous consumption out of total income,  $x(h, h)/y$ , is decreasing with income, despite the positive correlation between income  $y$  and human capital  $h$ . A large realized income could, in fact, imply a large positive random component  $\pi$ , and hence a high level of conspicuous consumption,  $x$ . Hence, the existence of a negative correlation between human capital and the share of conspicuous consumption doesn't rule out the existence of a positive correlation between income and the share of conspicuous consumption.

Moreover, a model that is designed to understand conspicuous consumption among the

rich (which is beyond the scope of this paper), would impose an upper limit on the accumulation of human capital, or at least decreasing returns to human capital. This would imply that the rich are wealthy due to a large unobserved component of income (which can also be thought of as family wealth in a non-human-capital form), and hence we would expect an increasing share of expected conspicuous consumption out of income above some level of income.

The second part of Proposition 2 is a result of the decreasing marginal rate of substitution between consumption and status, which imply that richer individuals are willing to spend more on conspicuous consumption in order to generate the same signal on unobserved income, and therefore, in equilibrium, they will spend more.

The assumption that  $\underline{y}(h)$  is nondecreasing and convex is consistent with the observation that a large negative unobserved component of income may cause an individual with low human capital to lose all his income, but that wealthier individuals can usually afford enough insurance to avoid becoming penniless even if the worst should occur. Moreover, it is also consistent with the findings of Gottshalk and Moffitt (1994) who found that the “transitory” component of inequality, compared to the “permanent” component, is much higher for uneducated workers (over the 1970s and 1980s in the USA). Their results show that inequality for educated workers is mainly increasing along predictable “permanent” dimensions such as ability, while uneducated workers are increasingly being tossed around in random ways. This randomness is associated with the higher unemployment rates experienced in the early 1970s that affected primarily the least educated workers. These findings suggest that changes in technology during the past few decades have been operating in different ways for educated and less educated workers, and consequently, the risk associated with being uneducated has increased over time. Gould, Moav and Weinberg (2001) demonstrate empirically that workers consider this type of risk when making their schooling decisions. They also survey the facts on the differential rise in residual inequality.

**Remark.** It should be noted that the existence of a poverty trap hinges crucially on the

fact that human capital is observable. If human capital is not observable, then the social beliefs  $y(x)$  cannot depend on the individuals' level of human capital, and individuals have no reason to condition their expenditure on conspicuous consumption  $x(y)$  on their level of human capital. In this case, the unique solution of the differential equation (7) that satisfies  $x(0) = 0$  yields the unique fully separating equilibrium level of conspicuous consumption:

$$x(y) = \lambda y.$$

That is, a constant fraction of income is allocated to conspicuous consumption and so the fully separating equilibrium cannot give rise to a poverty trap.

## 5 The Dynamics of Income

The fact that individuals' output is subject to a random unobserved component of income implies that the relationship between individuals' human capital, income, and bequest, and their offspring's human capital and income is stochastic. We describe this relationship for the case of a dynasty that begins with an individual who has human capital  $h \geq \theta$  and is subject to a random unobserved component of income to output  $\pi$  that is equal to its expected value,  $E[\pi] = 0$ , in every period.

We focus on the path where  $\pi = 0$  for the sake of simplicity. However, although our analysis provides only a partial view of the type of growth paths that may exist in the economy, the view that is afforded is representative of the whole. Moreover, it is possible to arbitrarily reduce the variance of the unobserved component of income,  $\pi$ , in such a way that it has no effect on the conspicuous consumption function  $x(y, h)$  (as long as the support of the distribution of  $\pi$  is unchanged and the density function is strictly positive on the entire support) such that almost all the realizations of the noise term  $\pi$  would be equal to, or in the neighborhood of the expected value of the noise term  $E[\pi] = 0$ .

Denote the human capital and output of an individual in a given dynasty at time  $t$  by  $h_t$  and  $y_t$ , respectively. As explained above, we examine a dynasty where  $h_0 \geq \theta$  and where

$y_t = h_t$  for every  $t \geq 1$ . We denote the mapping that governs the dynamics of human capital by  $\phi$  so that

$$h_{t+1} = \phi(h_t)$$

for every  $t \geq 0$ .

By (1), (4), and (9), noting that  $e_t = b_t$ ,

$$\phi(h_t) = \theta + \gamma\beta \left( (1 - \lambda) h_t + \lambda \left( \frac{y(h_t)^{1/(1-\lambda)}}{h_t^{\lambda/(1-\lambda)}} \right) \right).$$

For the purpose of illustration, we henceforth turn to the following example. Suppose that the lower bound on the noise term  $\underline{\pi}(h)$  is equal to  $-h$  for small values of  $h$  but is equal to some  $\underline{\pi} < 0$  for values of  $h$  that are larger than  $|\underline{\pi}|$ , that is,

$$\underline{\pi}(h) = \begin{cases} -h & \text{for } h < |\underline{\pi}|; \\ \underline{\pi} & \text{for } |\underline{\pi}| \leq h, \end{cases} \quad (10)$$

and so

$$\underline{y}(h) = \begin{cases} 0 & \text{for } h < |\underline{\pi}|; \\ h - |\underline{\pi}| & \text{for } |\underline{\pi}| \leq h. \end{cases} \quad (11)$$

In this case, it can be verified that the function  $\phi$  has the following properties:

1. If the lower bound on the noise term  $\pi$  is equal to the individual's level of human capital in absolute value,  $\underline{\pi}(h_t) = -h_t$ , then

$$\phi(h_{t+1}) = \theta + \gamma\beta(1 - \lambda)h_t.$$

In this case,  $h_{t+1}$  is a linear function of  $h_t$  that intersects the 45 degree line because of our assumption that  $(1 - \lambda)\gamma\beta < 1$ .

2. If the lower bound on the noise term is a constant,  $\underline{\pi}(h_t) = \underline{\pi} < 0$ , then for  $h_t \geq -\underline{\pi}$ ,  $\phi$  is increasing and convex, with a slope that increases from  $\gamma\beta(1 - \lambda)$  as  $h_t$  tends to  $-\underline{\pi}$  from above, to  $\gamma\beta$  as  $h_t$  tends to infinity.

So, if it is assumed that the lower bound on the noise term  $\underline{\pi}(h)$  is equal to  $-h$  for small values of  $h$  but is equal to some  $\underline{\pi} < 0$  for values of  $h$  that are larger than  $|\underline{\pi}|$  as in (10)

above, then it follows that the mapping  $\phi$  is increasing and (weakly) convex. If in addition  $\underline{\pi} < \theta / (\gamma\beta(1 - \lambda) - 1)$ , then under the assumption that  $(1 - \lambda)\beta\gamma < 1$  and  $\beta\gamma > 1$ , the mapping  $\phi$  intersects the 45 degree line twice as depicted in Figure 2.

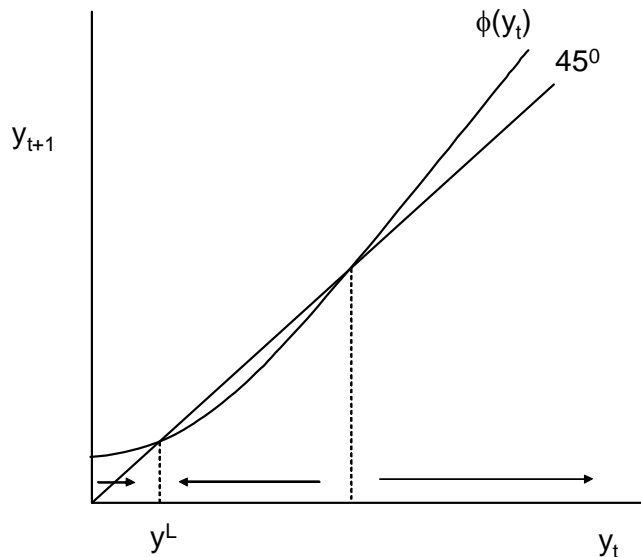


Figure 2: The mapping  $\phi$

It thus follows that a dynasty that begins with a low level of human capital will be trapped in poverty unless it experiences a series of large positive  $\pi$ 's, or large unobserved additions to income. In contrast, the output of a dynasty that begins with a high level of human capital will grow indefinitely (converging to a rate of growth of  $\beta\gamma - 1$ ), unless it experiences a series of large in absolute value and negative additions to income  $\pi$ .

It should be noted that the assumption we imposed on  $\underline{\pi}(h)$  through (10) is not necessary for this conclusion to hold. The same qualitative result would continue to hold as long as the share of expected conspicuous consumption out of human capital  $x(h, h)/h$  is decreasing, that is as long as the conclusions of Proposition 2 hold.

## 6 Concluding Remarks

This paper contributes to the literature about the significance and effect of conspicuous consumption by illustrating that if an individual's level of human capital provides a signal about the individual's income, then more educated individuals will spend relatively less on conspicuous consumption. We show that the implications of this insight can contribute to our understanding of the behavior of the poor and the persistence of poverty. Intuitively, dynasties that are on a track of human capital accumulation reduce the share of income devoted to conspicuous consumption, which supports and reinforces further accumulation of wealth and human capital in the dynasty and facilitates upward mobility. In contrast, individuals with low levels of human capital spend a relatively larger fraction of their income on conspicuous consumption, which prevents their dynasty from accumulating human capital.

Interestingly, if, as suggested by evolutionary considerations, females tend to worry less about their social status than males, then maternalistic societies in which women have more control over resources, may be characterized by less conspicuous consumption and a bigger potential for escaping poverty.

An extension of the model that incorporates differences across countries with respect to the transparency of human capital and individuals' investment in the human capital of their offspring, may offer an explanation for cross country differences in conspicuous consumption and the persistence of poverty. Such differences could, for instance, emerge from differences across countries in the prevalence of private versus public schools. Similarly, differences in the distribution of income across countries, captured in the model by differences in the lowest realization of the unobserved component of income,  $\underline{\pi}(h)$ , could have an impact on conspicuous consumption as a function of income or human capital. As explained above, if status is defined by ranking in the income distribution rather than by social beliefs about the level of income, then the entire shape of the income distribution could have an impact on the conspicuous consumption function.

These potential differences across countries could lead to, or may be interpreted as, differ-

ences in social norms or culture with respect to the “creation of a spectacle.” As illustrated in this paper, such differences can have serious implications with respect to the persistence of poverty.

## Appendix

**Proof of Proposition 1.** In a fully separating equilibrium the social belief  $y(h, x)$  must be monotone increasing for every  $h \geq \theta$ . As explained in Section 3, the social belief  $y(h, x)$  must satisfy the differential equation (7) for every  $h \geq \theta$ . This differential equation is homogenous and so can be transformed into a separable differential equation and then solved (Boyce and DiPrima, 1996, 90-91). The solution is given by (8) (the constant term must be equal to zero because  $y(h, 0)$  must be equal to zero for every  $h \geq \theta$  in equilibrium). Uniqueness of the equilibrium follows from uniqueness of the solution of (7), which follows from standard results about the uniqueness of solutions of differential equations, in addition to the fact that (7) has no singularity points in the relevant range. ■

### Proof of Proposition 2.

1. It follows from (9) that

$$\frac{x(h, y)}{h} = \frac{\lambda y}{h} \left( 1 - \left( \frac{y(h)}{h} \right)^{1/(1-\lambda)} \right).$$

The ratio  $y/h = (h + \pi)/h$  is nonincreasing in  $h$  for  $y \geq h$  and since  $\underline{y}(h)$  is nondecreasing, convex, and  $\underline{y}(0) = 0$ , it follows that  $\underline{y}(h)/h$  is nondecreasing, which in turn implies that  $x(h, y)/h$  is nonincreasing.

2. It follows from (9), noting that  $y = h + \pi$ , that:

$$\frac{dx(h, h + \pi)}{dh} = \lambda \left[ 1 - \frac{y'(h) - \lambda}{1 - \lambda} \left( \frac{y(h)}{y} \right)^{1/(1-\lambda)} \right].$$

Hence, noting that  $y \geq \underline{y}(h)$  and  $\underline{y}'(h) \leq 1$ , it follows that for  $y = \underline{y}(h)$  and  $\underline{y}'(h) = 1$ ,  $dx/dh = 0$ . Otherwise, for  $y > \underline{y}(h)$  or  $\underline{y}'(h) < 1$ ,  $dx/dh > 0$ . ■

**The fully separating equilibrium is the unique equilibrium that satisfies a plausible restriction on social beliefs**

As we show below, in equilibrium the social beliefs  $E[y|h, a]$  must be nondecreasing in  $x$ . Consider an equilibrium that is not fully separating. In such an equilibrium, individuals with different incomes all spend the same amount on conspicuous consumption. Since  $E[y|h, a]$  is nondecreasing it follows that there exists an interval of incomes such that every individual whose income belongs to this interval spends the same amount, say  $a$ , on conspicuous consumption.

Suppose that the individual with the highest income in this interval, denoted  $y_b$ , is indifferent between spending  $a$  on conspicuous consumption and being believed to have an average income of  $E[y|h, a]$ , and spending an additional sum of  $b - a$  on conspicuous consumption and being believed to have an average income of  $E[y|h, b] > E[y|h, a]$ .<sup>22</sup> It follows that for some small  $\varepsilon > 0$ , an individual with income  $y_b - \varepsilon$  who in equilibrium also spends  $a$  on conspicuous consumption should be indifferent between spending  $a$  on conspicuous consumption and being believed to have an average income of  $E[y|h, a]$ , and spending an additional sum of  $b - a - \delta_\varepsilon$  on conspicuous consumption and being believed to have an average income of  $E[y|h, b] - \Delta_\delta > E[y|h, a]$ . However, an individual with a lower income than  $y_b - \varepsilon$  who in equilibrium spends  $a$  on conspicuous consumption would strictly prefer to spend  $a$  than to spend  $b - \delta_\varepsilon$  on conspicuous consumption even if this implies that he would be believed to have the higher income  $E[y|h, b] - \Delta_\delta$ .

We consider the following variant of the intuitive criterion (see Cho and Kreps, 1987, Banks and Sobel, 1987, and Grossman and Perry, 1986, and the references therein). We say that an equilibrium satisfies a variant of the intuitive criterion if upon observation of out-of-equilibrium level of conspicuous consumption of  $b - \delta_\varepsilon$ , it is inferred that the individual who spent this amount has an income that is at least  $y_b - \varepsilon$ .

**Proposition 3.** An equilibrium  $\langle x(h, y), E[y|h, x] \rangle$  that satisfies the variant of the intuitive criterion described above is fully separating.

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<sup>22</sup>As should become apparent below, it does not matter if this individual actually spends  $a$  or  $b$  on conspicuous consumption. That is, it does not matter whether the interval of incomes is closed or open from the right.

**Proof.** The proof follows from the following five steps.

1. An equilibrium belief function  $E[y|h, x]$  is non-decreasing in  $x$ . If, to the contrary, for some  $h \geq 0$  and  $x' > x$ ,  $E[y|h, x] > E[y|h, x']$ , then an agent can spend less on conspicuous consumption and still be believed to have a higher expected income. A contradiction to the optimality of the conspicuous consumption function.
2. An equilibrium expenditure on conspicuous consumption,  $x(h, y)$ , is non-decreasing in  $y$ . Suppose to the contrary that an agent with human capital  $h$  and income  $y'$  spends  $x'$  on conspicuous consumption,  $c' = (1 - \beta)(y' - x')$  on consumption, and  $b' = \beta(y' - x')$  on bequest, and is believed to have an income  $\bar{y}'$ , while an agent with human capital  $h$  and income  $y < y'$  spends  $x > x'$  on conspicuous consumption,  $c = (1 - \beta)(y - x)$  on consumption, and  $b = \beta(y - x)$  on bequest, and is believed to have an income  $\bar{y} \geq \bar{y}'$ . Because the latter agent optimizes,

$$\begin{aligned} & ((1 - \beta)(y - x))^{(1-\beta)(1-\lambda)} (\beta(y - x))^{\beta(1-\lambda)} \bar{y}^\lambda \\ & \geq ((1 - \beta)(y - x'))^{(1-\beta)(1-\lambda)} (\beta(y - x'))^{\beta(1-\lambda)} (\bar{y}')^\lambda, \end{aligned}$$

or

$$\begin{aligned} & (y - x)^{(1-\beta)(1-\lambda)+\beta(1-\lambda)} (1 - \beta)^{(1-\beta)(1-\lambda)} \beta^{\beta(1-\lambda)} \bar{y}^\lambda \\ & \geq (y - x')^{(1-\beta)(1-\lambda)+\beta(1-\lambda)} (1 - \beta)^{(1-\beta)(1-\lambda)} \beta^{\beta(1-\lambda)} (\bar{y}')^\lambda, \end{aligned}$$

or, because  $\frac{y' - x}{y - x}$  is increasing in  $x$ ,

$$\begin{aligned} & \left( \frac{y' - x}{y - x} \right)^{(1-\beta)(1-\lambda)+\beta(1-\lambda)} (y - x)^{(1-\beta)(1-\lambda)+\beta(1-\lambda)} (1 - \beta)^{(1-\beta)(1-\lambda)} \beta^{\beta(1-\lambda)} \bar{y}^\lambda \\ & > \left( \frac{y' - x'}{y - x'} \right)^{(1-\beta)(1-\lambda)+\beta(1-\lambda)} (y - x')^{(1-\beta)(1-\lambda)+\beta(1-\lambda)} (1 - \beta)^{(1-\beta)(1-\lambda)} \beta^{\beta(1-\lambda)} (\bar{y}')^\lambda. \end{aligned}$$

But then

$$\begin{aligned} & ((1 - \beta)(y' - x))^{(1-\beta)(1-\lambda)} (\beta(y' - x))^{\beta(1-\lambda)} \bar{y}^\lambda \\ & > ((1 - \beta)(y' - x'))^{(1-\beta)(1-\lambda)} (\beta(y' - x'))^{\beta(1-\lambda)} (\bar{y}')^\lambda, \end{aligned}$$

which means that the agent with income  $y'$  cannot be optimizing.

3. If for some level of human capital  $h$  the belief function  $E[y|h, x]$  is constant (as a function of  $x$ ) on an interval, then it “jumps up” immediately to the right of this interval. That is, if for some fixed  $h$  the social belief  $E[y|h, x]$  is constant on an interval  $[a, b]$  or  $[a, b)$  and is such that  $E[y|h, x] > E[y|h, b]$  for  $x > b$  then  $\lim_{x \searrow b} E[y|h, x] > E[y|h, b]$  or  $E[y|h, b] > \lim_{x \nearrow b} E[y|h, x]$ , respectively. We prove this claim for the latter case. The proof for the former case is similar. Suppose to the contrary that two agents with the same  $h$  spend  $a$  and  $b$  on conspicuous consumption. If the two agents are believed to have the same expected income then the agent who spends  $b$  on conspicuous consumption cannot be optimizing.
  
4. If for some  $h$ ,  $E[y|h, x]$ , viewed as a function of  $x$  alone, is constant on an interval  $[a, b)$ , then the agent with the lowest income  $y_b$  who spends  $b$  on conspicuous consumption in equilibrium must be indifferent between spending  $b$  or  $a$  on conspicuous consumption. If no such agent exists, and an agent with income  $\inf\{y : x(h, y) = b\}$  spends  $a$  on conspicuous consumption, then this agent must be indifferent between spending  $a$  or  $b$  on conspicuous consumption. In the former case, it follows from the fact that agents with incomes  $y < y_b$  prefer to spend  $a$  on conspicuous consumption and continuity; in the latter case, it follows from the fact that agents with incomes  $y > \inf\{y : x(h, y) = b\}$  prefer to spend  $b$  on conspicuous consumption and continuity. The statement and proof in the case where  $E[y|h, x]$  is constant on an interval  $[a, b]$  is similar.
  
5. Fix an equilibrium  $\langle x(h, y), E[y|h, x] \rangle$ . If the belief function  $E[y|h, x]$  is (strictly) increasing, then we’re done. Suppose then that for some level of human capital  $h$ , the belief  $E[y|h, x]$  is constant on some interval  $[a, b)$ , and that it jumps up immediately thereafter as implied by step 3. Suppose that the equilibrium is such that an agent with income  $y_b$  spends  $b$  on conspicuous consumption, and that agents with lower

incomes spend no more than  $a$  on conspicuous consumption (the argument for the case where agents with incomes  $y > y_b$  spend at least  $b$  on conspicuous consumption, and an agent with income  $y_b$  spends  $a$  on conspicuous consumption is similar). Step 4 implies that an agent with income  $y_b$  is indifferent between spending  $a$  on conspicuous consumption if he is believed to have an average income of  $E[y|h, a]$ , and spending an additional sum of  $b - a$  on conspicuous consumption if he is believed to have an average income of  $E[y|h, b] > E[y|h, a]$ . Similarly, for some small  $\varepsilon > 0$ , an agent with income  $y_b - \varepsilon$  is indifferent between spending  $a$  on conspicuous consumption if he is believed to have an average income of  $E[y|h, a]$ , and spending an additional sum of  $b - a - \delta_\varepsilon$  on conspicuous consumption if this implied that he would be believed to have an average income of  $E[y|h, b] - \Delta_\delta > E[y|h, a]$ . In contrast, an agent with a lower income than  $y_b - \varepsilon$  strictly prefers to spend  $a$  than to spend  $b - \delta_\varepsilon$  even if this means that he would be believed to have the higher income  $E[y|h, b] - \Delta_\delta$ . So, an agent with income between  $y_b - \varepsilon$  and  $y_b$  would like to spend a little more if this meant that it were believed to have a higher income but this is not possible with the equilibrium beliefs  $E[y|h, x]$ . But, if such an agent deviates from equilibrium and spends an additional sum of  $b - a - \delta_\varepsilon$  on conspicuous consumption, then it should be believed that his income is at least  $y_b - \varepsilon$ , because, as explained above, it is not in the interest of an agent with a lower income to deviate in this way even if he were believed to have an income that is equal to  $y_b - \varepsilon$ . This argument implies that if  $E[y|h, x]$  is part of an equilibrium that satisfies the intuitive criterion, then it cannot be constant on any interval. It therefore follows that it must be part of a fully separating equilibrium. ■

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