Well-Being and Affluence in the Presence of a Veblen Good[1]

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B. Curtis Eaton, The University of Calgary

Mukesh Eswaran, The University of British Columbia

Abstract

We develop a series of simple, general equilibrium models that incorporate a pure Veblen good. We examine the comparative statics of well-being, and the consumption of leisure, the Veblen good, a standard consumption good, a standard public good, and a good that we call community, with respect to exogenous increases in productivity. In all of our models, as productivity increases, the Veblen good eventually comes to dominate the economy in the sense that, by reducing leisure, more than all of any added productivity is dissipated in the production of the Veblen good. In fact, except for some knife edge cases, the Veblen good eventually crowds out all other economic activity. In particular, our findings show that, in the presence of a Veblen good, productivity increases contribute to the destruction of social capital.

Key Words: conspicuous consumption, Veblen, well-being, leisure, social capital

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1 Introduction

In this paper we develop a series of simple, competitive general equilibrium models in which there is a *pure* Veblen good, and therefore a *relative consumption externality*. The Veblen good is pure in the sense that it contributes to the welfare of any one individual only in so far as it affects that individual's relative consumption of the good; it provides no utility of its own accord. We use the models to explore the extent to which the Veblen good crowds out the consumption of other goods—leisure, a private consumption good, a public good, and a good that we call community. In each of our models, crowding out gets progressively worse as productivity increases and, in the limit, it comes to dominate them.

This paper derives its motivation from the new literature on happiness.[2] It has been observed that, in the developed countries, while economic growth has led to substantial increases in per capita real incomes, there have been no corresponding increases in average subjective well-being.[3] For example, in the United States, between the mid-seventies and the mid-nineties per capita real income increased by around 20%. Yet the increase in happiness ratings is hardly perceptible [Blanchflower and Oswald (2004)]. In fact, despite the fact that real income increased in all but one of the deciles, the average happiness ratings fell in eight of the ten deciles [Frey and Stutzer (2002)]. In Japan, despite the spectacular growth in income in the post-war era, there has been no perceptible change in average happiness [Easterlin (1995)]. Similar patterns have been observed in many European countries [Alesina, Di Tella, and MacCulloch (2001)]. Although the evidence is not as extensive in developeding countries,

[2] See Frey and Stutzer (2003) for a review. The evidence is also summarized in Layard (2005) and somewhat earlier in Frank (1999).

[3] The pioneering paper in this literature is that of Easterlin (1974). Subjective wellbeing is measured by responses to questions that inquire about how satisfied people are with their lives. Layard (2005, Ch. 2) summarizes the evidence from neurobiology that demonstrates subjective wellbeing represents objective feelings as measured by brain activity and can form the basis of objective interpersonal comparisons.

it lends support to the proposition that there per-capita income is positively correlated with average well-being [see Chapter 3 of Layard (2005)]. At a given point in time, however, within a country it is observed that people who are richer register higher levels of happiness than those who are poor, and the increase in subjective happiness with income is subject to diminishing returns. In summary: cross-sectional studies indicate that income correlates positively with happiness, but time series studies suggest that increases in average income in developed countries make people no better off subjectively. Helliwell (2003) found that differences in social capital, the quality of governance, and trust account for much of the variation in average well-being across countries. In a subsequent study, he found that the same variables also explain variations in suicide rates across countries [Helliwell (2004)], which strongly suggests that empirical findings on subjective measures of happiness need to be taken seriously by economists. Together, then, these "stylized facts" call for an explanation.[4]

In this paper, we pursue an explanation that dates back to Veblen (1899). He argued persuasively that people seek status through conspicuous consumption. This sort of consumption derives its value for people, not from the intrinsic worth of what is consumed, but from the fact that it permits people to attempt to set themselves apart from others by their consumption. This idea is also the basis of Duesenberry's (1967, Ch. III) relative income hypothesis and, more recently, Frank's (1985) theory of status or 'positional' goods in consumption.

Direct and compelling evidence for the Veblenian claim that individuals feel worse off when others in their neighborhood earn more comes very recently from Luttmer (2005), using the 1987-88 and 1992-93 waves of the National Survey of Families and Households in the U.S. He finds that after controlling for own income and a slew of other variables, an increase in the average earnings in the neighborhood makes individuals register lower levels of happiness. In fact, the effects of equal increases in own and average neighborhood incomes

[4] This is the point of departure of Layard's (2005) book.

are found to roughly cancel out. Heffetz (2004) recently provided evidence on the extent to which consumers devote expenditures to goods that are visible (and therefore serve a signaling purpose). He found that around 20% of the variation in the income elasticities of various aggregates in a cross-section of U.S. households can be explained by the visibility of the expenditures.[5]

Recently, Eaton and Eswaran (2003) demonstrated in an evolutionary setting that there are good reasons to believe that natural selection may have led humans to gauge their well-being in relative terms.[6] Humans are known to have evolved in relatively small groups ('bands'). In this setting, preferences that gauge a person's well-being in relative terms confer a selective advantage over standard egoistic preferences that consider only one's own consumption. It follows that nature may have hardwired humans to assess their personal well-being in relative terms. Preferences of this sort are, of course, consistent with the positive correlation of income and perceived well-being seen in cross sectional studies. However, as we show in this paper, such preferences can easily lead to a situation in which increases in the average level of income over time generate no benefit in terms of happiness.

This paper is not the first attempt to explain the paradox thrown up what has come to be known as happiness research. Indeed, Layard (2005, Ch. 4) suggests relative evaluation as one of the explanations for the paradox. Hopkins and Kornienko (2004) have provided a sophisticated model of status-seeking in a world where status depends on relative consumption. They show, among other things, that as society becomes richer people spend a greater proportion of their income on conspicuous consumption, and that utility at a given level of income declines.[7]

[5] The idea here is in line with that of Bagwell and Bernheim (1996), who model conspicuous consumption as a device for signaling wealth.

[6] There are many antecedents to this in the recent literature in evolutionary games. See, for example, Bester and Guth (1998), Bolle (2000), Possajennikov (2000), Kockesen and Ok (2000), Kockesen, Ok, and Sethi (2000), Hansen and Samuelson (1988), and Schaeffer (1989).

[7] Robson (1992) has investigated the role played by status in risk behavior. He has demonstrated that, even if the von Neumann utility function is strictly concave in wealth, a concern for status (as determined by one's ranking in the wealth distribution) may induce convex segments in the utility function. As a result, concern for status offers a compelling explanation for the pervasive observation that individuals simultaneously exhibit

In this paper, we construct a series of transparent general equilibrium models in which consumer preferences are defined over leisure, a Veblen good, a standard private good, and a standard public good. The general equilibrium models, simple as they are, enable us to identify how resources are allocated in the economy as a whole. Few papers have examined how relative income comparisons impinge on leisure. One exception is Neumark and Postlewaite (1998), which developed a theory in which relative income concerns lead to an increase in women's employment and present evidence that supports this prediction. Another is Bowles and Park (2003), which showed that, when the Veblen effects are important, work hours are increasing in the degree of inequality in the economy. A particular focus of ours in this paper is how leisure behaves with exogenous productivity increases in the presence of a Veblen good.

In the penultimate section, we add a good that we call *community*. This good captures, we hope, at least some of the important issues that have arisen in the literature on social capital [see especially, Putnam (2000) and Helliwell (2003)].[8] As we model it, community is a public good that is produced by voluntary contributions of time to community activities. It is valued by individuals both directly as a consumption good (or activity), and indirectly in that it enhances social capital.

Using these models, we offer a modest contribution to the literature along several dimensions. We examine the consumption of the Veblen good, leisure, the private and public goods, and community as productivity exogenously increases. We identify conditions under which leisure does not increase, or even decreases, in the face of rising productivity (or affluence). This is particularly relevant for countries like the United States where, in recent times, increasing affluence has not been accompanied by commensurate increases in leisure [Schor (1998)]. In addition, we identify conditions under which the Veblen good crowds out

risk-taking and risk-loving behavior (like buying insurance and participating in lotteries).

[8] Francois (2002) has argued that social capital is important to the process of economic development.

the consumption of the other goods by appropriating virtually the whole of an individual's budget. We find, in particular, that productivity increases in the presence of the Veblen good can lead to the destruction of social capital.

2 Pure Veblen Models

For clarity, we begin with a couple of ridiculously simple two-good general equilibrium models. In each the preferences and productivity of all individuals are identical, and there are just two goods, leisure and a Veblen good. The Veblen good is valued by individuals only in so far as it effects their own *relative* consumption of the good; it has no independent value and in this sense it is a *pure* Veblen good.

We denote by x_i the representative individual i's consumption of leisure, by v_i her consumption of the Veblen good, and by v the average consumption of the Veblen good in the economy. In the first pure Veblen model, utility from consumption of the Veblen good is dependent on $v_i - v$, and in the second it is dependent on on both $v_i - v$ and v_i/v.

Production of the Veblen good uses just one input, labor, and there are constant returns in production, and one unit of labor produces w units of the Veblen good. Both the labor market and the market for the Veblen good are competitive, and productivity is exogenous. Then, choosing the Veblen good as the numeraire, the prices of labor and the Veblen good in the competitive equilibrium are, respectively, w and 1.

This model could be that of an island economy where the essentials of life—food, clothing, shelter, and so on—are not scarce, and where the only productive activity involves the use of time and other non-scarce resources like flowers or sea shells to produce ornaments (the Veblen good) used to adorn one's body.

2.1 Pure Veblen 1

In Pure Veblen 1, the representative individual's utility function is

$$U(x_i, v_i) = F(x_i) + D(v_i - v). \tag{1}$$

The function F is differentiable, increasing, and strictly concave in leisure, x_i. Further we assume that leisure is essential, so in the limit as x_i approaches 0, F' is infinite. The function D is increasing and strictly concave in its argument, $v_i - v$, the amount by which the individual's consumption of the Veblen good exceeds the average consumption. We assume that $D'(0)$ is finite (and, of course, positive), so the Veblen good is not essential.

The representative individual has just 1 unit of time to allocate to leisure, x_i, and work. The individual's money budget constraint (which will hold with equality at the solution to the individual's maximization problem) is

$$v_i + wx_i = w. \tag{2}$$

We have then a simple, competitive general equilibrium model with a representative individual, one exogenous productivity parameter, w, and two endogenous variables, equilibrium quantities of leisure and the Veblen good, which we denote by $x^*$and v^*.

The representative individual's choice problem is

$$\max_{x_i, v_i} \quad F(x_i) + D(v_i - v) \;\; \text{st to } v_i + wx_i = w. \tag{3}$$

Assuming for the moment that the solution is interior, the first order conditions for this problem are

$$\frac{F'(x_i)}{w} = D'(v_i - v), \tag{4}$$

and

$$v_i + wx_i = w. \tag{5}$$

Since individuals are identically motivated and equally productive, in the general equilibrium $v_i = v = v^*$ and $x_i = x^*$. Using these facts, when the equilibrium is interior, it is completely characterized by two conditions:

$$\frac{F'(x^*)}{w} = D'(0), \tag{6}$$

and

$$v^* + wx^* = w. \tag{7}$$

Clearly, the equilibrium is not necessarily interior. Whether v^* is 0 or positive depends upon the magnitude of w relative to $\underline{w}$, where $\underline{w}$ is implicitly defined by the following condition: $F'(1)/\underline{w} = D'(0)$. If $w \leq \underline{w}$, then $x^* = 1$ and $v^* = 0$, and if $w > \underline{w}$, then $0 < x^* < 1$ and $v^* > 0$. That is, conspicuous consumption manifests itself only when productivity is sufficiently high. This is consistent with the evidence recently provided by Heffetz (2004), who finds that only the top half of the income distribution of American households exhibited conspicuous consumption.

The comparative statics of the interior equilibrium are of some interest. Differentiating condition (6), we see that

$$\frac{dx^*}{dw} = \frac{D'(0)}{F''(x^*)} < 0. \tag{8}$$

So, leisure consumed in equilibrium is a decreasing function of productivity, w. Further, it is apparent from equation (6) that, as w approaches infinity, x^* approaches 0. In this limit, all of the available resources are devoted to production of the Veblen good.

Given that $dx^*/dw < 0$, it is clear that

$$\frac{dv^*}{dw} = (1 - x^*) - w\frac{dx^*}{dw} > 1 - x^*. \tag{9}$$

As the productive potential of the economy increases, all of the added productivity is taken in added consumption of the Veblen good, and then some.

Since the representative individual's utility is decreasing in the average consumption of the Veblen good, v, there clearly is a negative externality at work in this model; we call it the *relative consumption externality.* To control the externality, a social planner would set $v = v_i$, and accordingly the planner's problem is

$$\max_{x_i, v_i} \quad F(x_i) + D(0) \quad \text{st} \quad v_i + wx_i = w. \tag{10}$$

Since the planner's objective function is independent of v_i, the solution is $\widetilde{x} = 1$ and $\widetilde{v} = 0$.

When $w \leq \underline{w}$, the equilibrium is coincident with the optimum, but when $w > \underline{w}$, the equilibrium is distorted relative to the optimum in the direction of too little of leisure and too much of the Veblen good: $1 = \widetilde{x} > x^*$, and $v^* > \widetilde{v} = 0$.

Since $\widetilde{x} = 1$, and since the representative individual's endowment of time is the only resource in this economy, the obvious index of *equilibrium efficiency* is

$$E \equiv x^* = 1 - v^*/w. \tag{11}$$

The efficiency index is bounded below by 0 and above by 1: $0 \leq E \leq 1$.

Holding w constant at a value greater than $\underline{w}$, from equation (6) it is apparent that E is inversely related to $D'(0)$, and that it can be arbitrarily close to 0. It is clear then that the distortion caused by the relative consumption externality can be far from insignificant.

Further, when $w > \underline{w}$, $dE/dw < 0$ (since $dx^*/dw < 0$), so efficiency is inversely related to productivity in this model, and since x^* goes to zero as w increases without bound, so too does E go to 0 in this limit.

The comparative statics of equilibrium utility mirror the comparative statics of equilibrium efficiency. Equilibrium utility is just $u^* = F(x^*)+D(0)$, and when $w > \underline{w}$, $u^*$is inversely related to w, and approaches a global minimum as w increases without bound.

2.2 Pure Veblen 2

In Pure Veblen 2, utility from consumption of the Veblen good is dependent on both $v_i - v$ and v_i/v, as indicated in the following utility function for the representative individual:

$$U(x_i, v_i) = F(x_i) + D(v_i - v) + R(\frac{v_i}{v}). \tag{12}$$

The function R is increasing and strictly concave in its argument, v_i/v.

When both v_i and v are scaled up by the same multiplicative factor, even though her relative consumption remains the same, the individual perceives herself to be better off if $v_i > v$, or worse off if $v_i < v$, because the absolute distance of her consumption from the average changes. When both v_i and v are scaled up by the same additive factor, even though the absolute distance of her consumption from the average remains the same, the individual perceives herself to be worse off if $v_i > v$, or better off if $v_i < v$, because her relative consumption changes.

The representative individual's choice problem is

$$\max_{x_i, v_i} \quad F(x_i) + D(v_i - v) + R(\frac{v_i}{v}) \quad \text{st} \quad v_i + wx_i = w, \tag{13}$$

and the first order conditions for this problem are

$$\frac{1}{w}F'(x_i) = D'(v_i - v) + \frac{1}{v}R'(\frac{v_i}{v}), \tag{14}$$

and

$$v_i + wx_i = w. \tag{15}$$

As in Pure Veblen 1, since all individual's have identical preferences and constraints, in equilibrium $v_i = v = v^*$ and $x_i = x^*$, so the general equilibrium of Pure Veblen 2 is characterized by two conditions:

$$\frac{F'(x^*)}{w} = D'(0) + \frac{R'(1)}{v^*}, \tag{16}$$

and

$$v^* + wx^* = w. \tag{17}$$

Since the right hand side of condition (16) approaches infinity as v^* approaches 0, it is always the case that $v^* > 0$. In this sense, the Veblen good is essential in Pure Veblen 2.

Using equation (17) to eliminate v^* in equation (16), we can characterize x^* by just one condition:

$$F'(x^*) = wD'(0) + \frac{R'(1)}{1 - x^*}. \tag{18}$$

Differentiating this condition, we obtain

$$\frac{dx^*}{dw} = D'(0) \,/\, \left[F''(x^*) - R'(1)/(1 - x^*)^2\right] < 0. \tag{19}$$

As in Pure Veblen 1, leisure is a decreasing function of productivity. Further, it is clear from condition (18) that as w increases without bound, x^* goes to 0. Notice that this outcome depends on preferences over the Veblen good being such that $D'(0) > 0$. In particular, if $D'(0) = 0$, the marginal utility per dollar from leisure and the Veblen good are both inversely proportional to productivity, and therefore the amount of leisure consumed is independent of productivity. But when $D'(0) > 0$, the marginal utility of the Veblen good falls less rapidly than that of leisure and an individual finds it in her self-interest to curtail leisure.

As in Pure Veblen 1, since $dx^*/dw < 0$,

$$\frac{dv^*}{dw} = (1 - x^*) - w\frac{dx^*}{dw} > 1 - x^*. \tag{20}$$

As w increases, it is once again the case that all of the added productivity is taken in added consumption of the Veblen good, and then some.

To control the relative consumption externality, a social planner would set $v = v_i$, and accordingly the planner's problem is

$$\max_{x_i, v_i} \quad F(x_i) + D(0) + R(1) \quad \text{st} \quad v_i + wx_i = w. \tag{21}$$

Clearly, the solution to the planner's problem is again $\widetilde{x} = 1$ and $\widetilde{v} = 0$. Hence the equilibrium is again distorted relative to the optimum: $1 = \widetilde{x} > x^*$, and $v^* > \widetilde{v} = 0$.

2.3 The Relative Consumption Trap

As productivity increases, both Pure Veblen models eventually get stuck in what might be called a *relative consumption trap.* Equilibrium efficiency, utility, and leisure all decrease, as expenditure on the Veblen good crowds out all other activity, eventually completely dominating the economy.

It is perhaps no surprise that the relative consumption externality looms large is these pure Veblen models, where the only produced good is a Veblen good. It is also clear that results for these models may tell us very little about any real economy. They do, however, raise some interesting questions and disturbing possibilities that we explore below in more complete models.

3 A Standard Veblen Model

Now let us define a model that we call Standard Veblen, by adding a standard, private consumption good to Pure Veblen 2. We may think of this good as a composite of all private goods — food, shelter, and clothing.

Let y_i denote the amount of the standard good consumed by the representative individual and $G(y_i)$ the utility derived from consumption of y_i, where the function G is increasing and concave in y_i. We assume that in the limit as y_i goes to 0, G' is infinite; and as y_i goes to ∞, G' goes to 0. In Standard Veblen, the representative individual's utility function is

$$U(x_i, y_i, v_i) = F(x_i) + G(y_i) + D(v_i - v) + R(\frac{v_i}{v}). \tag{22}$$

Notice that all three goods in Standard Veblen are essential.

The standard good is produced using just labor under constant returns in production, and units are chosen so that one unit of labour produces w units of the standard good. The markets for labour, the Veblen good and the standard good are perfectly competitive. Hence, the competitive equilibrium price of labour is again w, and the competitive equilibrium prices of the Veblen and standard goods are both unity.

3.1 The Optimum

As in the Pure Veblen models, a social planner would recognize that inevitably $v = v_i$, and therefore that the Veblen good ultimately contributes nothing to utility—that is, a planner would recognize that the optimal quantity of the Veblen good is 0, or that $\widetilde{v} = 0$. Given this, optimal quantities of leisure and the standard good are the solution to the following problem:

$$\max_{x_i, y_i} \quad F(x_i) + G(y_i) \quad \text{st} \quad y_i + w x_i = w. \tag{23}$$

The solution to this planning problem is characterized by

$$G'(\widetilde{y}) = \frac{F'(\widetilde{x})}{w}, \tag{24}$$

and

$$\widetilde{y} + w\widetilde{x} = w. \tag{25}$$

As will be apparent when we look at some simulation results, the comparative statics of the planner's solution with respect to productivity are of some interest. The comparative static for optimal consumption of the standard good is unambiguously positive:

$$\frac{d\widetilde{y}}{dw} = \left[-wG'(\widetilde{y}) + \frac{\widetilde{y}}{w}F''(\widetilde{x})\right] / \left[F''(\widetilde{x}) + w^2 G''(\widetilde{y})\right] > 0. \tag{26}$$

The inequality holds because both the denominator and the numerator in this expression are negative. Productivity improvements will invariably lead the planner to increase consumption of the standard good.

On the other hand, the comparative static for optimal consumption of leisure is ambiguous:

$$\frac{d\widetilde{x}}{dw} = \left[G'(\widetilde{y}) + \widetilde{y}G''(\widetilde{y})\right] / \left[F''(\widetilde{x}) + w^2 G''(\widetilde{y})\right].$$

Since the denominator is unambiguously negative, the sign of $d\widetilde{x}/dw$ hinges on the sign of the numerator.

The behavior of leisure in the face of productivity improvements depends crucially on the manner in which the marginal utility of the standard good changes with its consumption, that is, on the curvature of $G(y)$. A handy way of quantifying this is to invoke the concept of relative risk aversion, defined by the index $r(y) = -yG''(y)/G'(y)$. The sign of the comparative static expression above can be written:

$$Sgn\left(\frac{d\widetilde{x}}{dw}\right) = Sgn[r(\widetilde{y}) - 1]. \tag{27}$$

If $G(y)$ is $\log(y)$, the index of relative risk aversion is unity, and $d\widetilde{x}/dw = 0$. In this case, since the planner would have individuals consume the same amount of leisure as productivity increases, $\widetilde{y}$ is an increasing, linear function of w. If, however, the index of relative risk aversion is *everywhere* less than unity, then $d\widetilde{x}/dw < 0$ for all w. In essence, if the marginal utility of the standard good does not decline "too rapidly", the planner would have leisure decline in order to augment the consumption of the standard good more than proportionally to the productivity increase. Conversely, if the index of relative risk aversion is *everywhere* greater than unity, then $d\widetilde{x}/dw > 0$ for all w. If, that is, the marginal utility of the standard good declines "sufficiently rapidly", the planner would have leisure increase in the wake of a productivity increase even though this would entail a less-than-proportional increase in the consumption of the standard good. The dividing "knife-edge" case occurs when the index of relative risk aversion is precisely unity (that is $G(y)$ is the logarithm function), where the planner would not alter the time allocated to leisure when productivity increases.

3.2 The Equilibrium

In Standard Veblen, the representative individual's choice problem is

$$\max_{x_i, y_i, v_i} F(x_i) + G(y_i) + D(v_i - v) + R(\frac{v_i}{v}) \quad \text{st} \quad v_i + y_i + wx_i = w. \tag{28}$$

Since all three goods are essential, the equilibrium is always interior. The first order conditions for the choice problem are

$$D'(v_i - v) + \frac{1}{v}R'(\frac{v_i}{v}) = \frac{F'(x_i)}{w}, \tag{29}$$

$$D'(v_i - v) + \frac{1}{v}R'(\frac{v_i}{v}) = G'(y_i), \tag{30}$$

and

$$v_i + y_i + wx_i = w. \tag{31}$$

Of course, in equilibrium $v_i = v = v^*$, $x_i = x^*$, and $y_i = y^*$. Using these facts, the general equilibrium of Standard Veblen is characterized by three conditions:

$$D'(0) + \frac{1}{v^*}R'(1) = \frac{F'(x^*)}{w}, \tag{32}$$

$$D'(0) + \frac{1}{v^*}R'(1) = G'(y^*), \tag{33}$$

and

$$v^* + y^* + wx^* = w. \tag{34}$$

The comparative static results for consumption of the Veblen and standard goods are unambiguously signed, but the comparative static for leisure is ambiguous. In particular, $dv^*/dw > 0$, $dy^*/dw > 0$, and dx^*/dw has no determinate sign. To establish these results, assume first that $dv^*/dw = 0$. From conditions (33) and (34), we see that $dy^*/dw = 0$ and $dx^*/dw > 0$. But this implies that the right hand side of (32) decreases while the left hand side is constant, a contradiction. Hence, $dv^*/dw \neq 0$. Now assume that $dv^*/dw < 0$. Then, from condition (33), $dy^*/dw < 0$. So, $d(v^* + y^*)/dw < 0$, which implies that $dx^*/dw > 0$. But, then condition (32) could not hold, since the left side would increase and the right side would decrease as w increased, another contradiction. The two contradictions leave only one possibility: $dv^*/dw > 0$. Condition (33) then implies that $dy^*/dw > 0$. Below we will examine some simulations that confirm that the sign of dx^*/dw is ambiguous.

The limiting results are, we think, quite interesting. Define $\overline{y}$ to be the value of y such that $D'(0) = G'(\overline{y})$. As w increases without bound, x^* approaches 0, y^* approaches $\overline{y}$ (from below), and v^* approaches infinity. To establish these results, we again proceed by contradiction. Assume that in the limit as w increases without bound, x^* approaches $\underline{x} > 0$. Then, $v^* + y^* = w(1 - x^*)$ approaches infinity as w increases without bound. But, from condition (33), y^* cannot exceed $\overline{y}$, so v^* must approach infinity as w increases without bound. But then condition (32) will not be satisfied for w sufficiently large, since $D'(0) + R'(1)/(w(1 - \underline{x}) - \overline{y}) > F'(\underline{x})/w$ for sufficiently large w, a contradiction. So, as w increases without bound, x^*approaches 0. Given this result, it is then apparent that in the limit v^* approaches infinity and y^*approaches $\overline{y}$.

The implications for efficiency when w is large are very strong. Given v^*, the time not used to produce the Veblen good, $1 - v^*/w$, is optimally allocated to leisure and the standard good since conditions (32) and (33) imply that $F'(x^*)/w = G'(y^*)$. The time allocated to production of the Veblen good is, of course, simply squandered. Hence, as before,

$$E \equiv 1 - v^*/w \tag{35}$$

is an appropriate index of the efficiency of the equilibrium. In the limit as w increases without bound, v^* approaches $w - \overline{y}$, so v^*/w approaches 1, and E approaches 0. In other words, in Standard Veblen, when w is very large, virtually all of the productive potential of the model is dissipated by the relative consumption externality. Just as the Pure Veblen models did, when productivity is sufficiently large, Standard Veblen gets stuck in a relative consumption trap in which added productivity is simple squandered on increased production of the Veblen good with no benefit to anyone.

Simulations of the evolution of Standard Veblen as productivity increases illustrate a number of interesting and suggestive possibilities, depending on the functional form of G.

3.3 Simulations of Standard Veblen

In this section, we present some simulation results. We assume that:

$$F(x_i) = -\frac{10}{x_i}\ ;\ \ D'(0) = 1; \quad R'(1) = 1. \tag{36}$$

Notice that, to examine the equilibrium, we do not need to specify the full functional forms for $D(.)$ and $R(.)$; specifying their derivatives when $v_i = v$ suffices.

Since a crucial role is played by the utility, $G(y)$, derived from the standard good, we consider two possible variations of this function.

Relative Risk Aversion Greater Than Unity

We first consider a functional form for $G(y)$ that exhibits an index of relative risk aversion that exceeds unity ($r(y) > 1$ for all $y > 0$):

$$G(y_i) = -\frac{10}{y_i}. \tag{37}$$

Simulation results for this specification of Standard Veblen are presented in Figure 1.

In Figure 1.A, we plot the behavior of equilibrium utility (the lower curve) and optimal utility (the upper curve). Naturally, optimal utility is an increasing function of w, while equilibrium utility at first increases and subsequently decreases. Figure 1.B plots the behavior of equilibrium consumption of the Veblen good (optimal consumption is, of course, 0). Notice that this schedule increases at an increasing rate throughout. Figure 1.C plots the behavior of the equilibrium (the lower curve) and the optimum (the upper curve) consumption of the standard good. Both optimum and equilibrium consumption increase at a decreasing rates, equilibrium consumption asymptotically approaches a fixed value (referred to earlier as $\overline{y}$) from below, and the divergence of equilibrium from optimum consumption gets larger and larger.

Figure 1.D plots equilibrium (the lower curve) and optimal (the upper curve) consumption of leisure. Optimal consumption of leisure is an increasing function of w, while equilibrium consumption of leisure initially increases as w increases and subsequently decreases. Since $r(y) > 1$, the marginal utility of consumption from the standard good is levelling off rapidly and so the planner allocates more time to leisure when productivity increases. In the competitive equilibrium, however, when the benefit to consuming more of the standard good becomes negligible the productivity increase is channelled to fuel the self-defeating race for consumption of the Veblen good. This proceeds to the extent that, at some point, leisure actually decreases with productivity increases.

Figures 1.E, 1.F and 1.G give a detailed picture of the distortions driven by the relative consumption externality. Figure 1.E plots the behavior of dead weight loss, measured in units of labour: deadweight loss is equal to the amount of labour used to produce the Veblen good, v^*/w. Deadweight loss is an increasing function of w (recall that we established above that it approaches 1 as w increases without bound). Figures 1.F and 1.G separate the deadweight loss into two components: one associated with the divergence of equilibrium consumption of the standard good from optimal consumption (Figure 1.F), and the other associated with the divergence of equilibrium consumption of leisure from optimal consumption (Figure 1.G). As the figures reveal, when $r(y) > 1$, the divergence of equilibrium from optimal consumption of leisure accounts for the lion's share of the deadweight loss. This, as alluded to earlier, is due to the fact that the marginal gains to consuming the standard good are pretty much exhausted at high productivity levels and so its optimum consumption does not differ appreciably from the equilibrium value. In contrast, Veblen competition forces equilibrium leisure to markedly from optimum leisure.

Naturally, we have experimented with a variety of other functional forms and parameter values for the case in which $r(y) > 1$ for all $y > 0$. While the details of the behavior are different, the general picture in all of them is consistent with the features that we highlighted in our discussion of Figures 1.A through 1.G.

Relative Risk Aversion Less Than Unity

Now consider a functional form for $G(y)$ that exhibits an index of relative risk aversion that is less than unity ($r(y) < 1$ for all $y > 0$):

$$G(y_i) = 10y_i^{1/2} \ . \tag{38}$$

The simulation results are shown in Figure 2.

Similarities and Differences

Figures 2.A and 2.B are similar to 1.A and 1.B. As w increases, equilibrium utility at first increases and later decreases, and equilibrium consumption of the Veblen good increases at an increasing rate. There is one significant difference between Figure 2.C and 1.C: in Figure 2.C, optimum consumption of the standard good increases at and increasing rate, while it increases at a decreasing rate in Figure 1.C. This is because, when $r(y) < 1$ for all $y > 0$, the marginal utility of consumption of the standard good does not fall too rapidly and the planner utilizes productivity increases to augment the consumption of this good by curtailing leisure.

Figure 1.D is different from Figure 2.D in one important respect. In Figure 1.D, the optimum consumption of leisure is an increasing function of w and equilibrium consumption

initially increases and subsequently decreases, while in Figure 2.D the optimum (the upper curve) and equilibrium (the lower curve) consumptions of leisure are both decreasing functions of w throughout. We have seen above why optimum leisure declines with w when $r(y) < 1$ for all $y > 0$; equilibrium leisure declines for the additional reason that Veblen competition further absorbs labor.

Figures 2.E and 1.E tell the same story: deadweight loss is an increasing function of w, and it approaches 1, its maximum possible value, as w increases without bound. The differences that we saw in Figure 2.C versus Figure 1.C and in Figure 2.D versus 1.D show up again when we look at the distribution of deadweight loss in Figures 2.F and 2.G. From the latter two Figures, we see that the lion's share of the loss results from the divergence of optimum consumption of the standard good from equilibrium consumption, whereas in Figures 1.F and 1.G it results from the divergence of optimum consumption of leisure from equilibrium consumption. This difference arises because, in Figure 2 the marginal benefit from consuming the standard good are not exhausted rapidly, so diversion of leisure to Veblen competition in equilibrium induces substantial welfare loss from underconsumption of the standard good.

Here too we have experimented with a variety of other functional forms and parameter values. Once again, the details are different, but the general picture is the same.

Naturally, we have conducted simulations in which $r(y) = 1$ for all $y > 0$ (that is, when G is the logarithm function). In these simulations, the one notable difference is that the deadweight loss is attributable to significant divergences of optimal values from equilibrium values of both leisure and the standard good. This is understandable, since this is the 'knife-edge' case.

Neumark and Postlewaite (1998) have argued that relative consumption effects would affect labor force participation decisions. They argue this as one of the factors contributing to the rapid rise of married women in the labor force after the Second war. Using the National

Longitudinal Survey of Youth, they find that, in the United States, the relative income of sisters and sisters-in-law are important in explaining the labor force participation of women. Bowles and Park (2003) have argued that comparisons with the rich will impinge on the labor-leisure trade-off of people. They draw the implication that increasing inequality in an economy would lead to an increase in the number of hours worked. They then provide evidence for this, using data pertaining to workers in manufacturing in ten countries over the period 1963-1998.

4 A Public Good

By adding a public good and a planner to Standard Veblen, we can explore how the presence of a Veblen good impinges on the provision of a public good. Decisions with respect to provision of the public good are made by a planner who has access to a lump sum tax to finance provision of the public good. The planner recognizes and solves the standard free-riding problem associated with public goods. She is, however, blind to the misallocation of resources caused by Veblen competition. This last assumption rings true, for governments seem to routinely ignore the latter problem.

The representative individual's utility function is

$$F(x_i) + G(y_i) + D(v_i - v) + R(\frac{v_i}{v}) \; + \widetilde{P}(z_i, z), \tag{39}$$

where z_i is individual i's contribution to the public good, z is the (common) contribution of every other person, and $\widetilde{P}(z_i, z)$ is the utility that individual i derives from the public good. We assume that $\widetilde{P}(z_i, z)$ is increasing and strictly concave in both arguments.

Because she is blind to the relative consumption externality, the planner solves the second best problem in which she chooses the provision of the public good that maximizes utility of the representative individual, given the second best constraint that individuals continue to engage in Veblen competition. To characterize the solution to this second best problem, set $z_i = z$ for all i, and define $P(z) \equiv \widetilde{P}(z, z)$. We assume that P is strictly concave in its argument, and that the public good is essential (as z goes to zero $P'(z)$ goes to ∞). Then consider the following maximization problem

$$\max_{x_i, y_i, v_i, z} F(x_i) + G(y_i) + D(v_i - v) + R(\frac{v_i}{v}) + P(z) \quad \text{st} \quad v_i + y_i + wx_i + z = w. \tag{40}$$

The solution to the planner's second best problem, $(x^\dagger, y^\dagger, v^\dagger, z^\dagger)$, is characterized by the first order conditions for this maximization problem, evaluated at the symmetric outcome:

$$D'(0) + \frac{1}{v^\dagger} R'(1) = \frac{F'(x^\dagger)}{w}, \tag{41}$$

$$D'(0) + \frac{1}{v^\dagger} R'(1) = G'(y^\dagger), \tag{42}$$

$$D'(0) + \frac{1}{v^\dagger} R'(1) = P'(z^\dagger), \tag{43}$$

and

$$v^\dagger + y^\dagger + wx^\dagger + z^\dagger = w. \tag{44}$$

Conditions (41) and (42) embody the second best constraint – that individual's continue to engage in Veblen competition. Condition (43) guarantees that the quantity of the public good is optimal, given the second best constraint. Condition (44) ensures that the solution satisfies the resource constraint for the economy.

The planner imposes $z^\dagger$ as a lump-sum tax on all individuals in order to finance the public good. Individual i then solves

$$\max_{x_i, y_i, v_i} F(x_i) + G(y_i) + D(v_i - v) + R(\frac{v_i}{v}) + P(z^\dagger) \quad \text{st } v_i + y_i + wx_i = w - z^\dagger. \tag{45}$$

It is readily seen by writing down the first order conditions to the individual's problem in (45), and evaluating them at the point of symmetry, that the equilibrium of this economy coincides with the planner's second best solution. The public good provision in this second best is clearly lower than that in the first best where the planner accounts for Veblenian preferences, which is a point made by Ng (1987).

We can draw on results from the previous section to show that, in the limit as w increases without bound, the Veblen good crowds out the public good just as it crowds out the standard good. Consider the sub-problem in which the representative individual i decides how to optimally allocate a given amount of income, u_i, between the standard and the public goods, when all individuals contribute the same amount of the public good, that is, when $z_i = z$:

$$\max_{y_i, z} G(y_i) + P(z) \quad \text{st} \quad y_i + z = u_i. \tag{46}$$

Denote the maximized value of the objective function in this sub-problem by $H(u_i)$. This function is increasing and strictly concave in its argument, and its derivative $H'(u_i)$ goes to infinity as its argument goes to zero (the composite good u_i is essential).

Notice that the solution to the planner's second best problem is that of a typical individual, say i, solving

$$\max_{x_i, v_i, u_i} F(x_i) + H(u_i) + D(v_i - v) + R(\frac{v_i}{v}) \quad \text{st} \quad v_i + u_i + wx_i = w. \tag{47}$$

But the structure of (47) is the same as that of the Standard Veblen problem (28) in the absence of a public good, with u_i replacing y_i and $H(u_i)$ replacing $G(y_i)$. So as w increases without bound, we can infer from what we have already seen in the previous section that u_i will increase but reach a finite upper bound, $\overline{u}$. Also, in this limit, the share of expenditure on u_i will go to zero. Thus, the expenditure shares on both the standard and the public goods will go to zero in the limit. Furthermore, except in the knife-edge case, the representative individual's utility will decrease as w increases without bound.

What this demonstrates is that, if the planner ignores the Veblen competition between individuals, as productivity increases the share of expenditure on the public good will behave in the same manner as that of the standard good. Driven by Veblen competition, affluent societies will see both public and private goods dwindle relative to their optimum levels.

5 Community

The recent literatures on social capital and well-being suggest to us that we can develop additional insights concerning the ways in which the relative consumption externality distorts decision making in rich economies by adding a good that we call community to Standard Veblen. We distinguish between two sorts of leisure, *private leisure* and *social leisure*. The essential feature of social leisure is that it involves positive externalities among individuals. We have in mind a good that might best be called *community* that is valuable to all, and is produced by the voluntary choices of social leisure by different individuals.

If we assume that the production function for community is symmetric in the quantities of social leisure chosen by different individuals, the production function can be written as $M(s_i, s)$, where s_i is the social leisure of individual i and s is the common value of social leisure for all other individuals. We assume that M is increasing in both its arguments and is strictly concave. It is useful to have some notation for the marginal value of s_i to individual i when $s_i = s$. Accordingly, define $MV(s_i)$ as follows:

$$MV(s_i) \equiv M_1(s_i, s_i) \tag{48}$$

where M_1 is the partial derivative of M with respect to its first argument. For convenience, we assume that social leisure is essential (as s_i approaches 0, $MV(s_i)$ approaches ∞).

Community is, in effect, a public good produced by voluntary choices of social leisure. Therefore, even in the absence of a Veblen good, there will be too little of it . This distortion in not, however, our concern here. Instead, we are interested in the extent to which the relative consumption externality associated with a Veblen good distorts private incentives to choose social leisure. Accordingly, we compare two scenarios: in the first, there is a social planner who chooses quantity of the Veblen good optimally; in the second, there is no social planner. In neither is the public good problem that community raises resolved.

5.1 With a Social Planner

In this second best problem, the social planner will, obviously, choose to set quantity of the Veblen good equal to 0: $\widehat{v} = 0$. Given this, the representative individual's choice problem is

$$\max_{x_i, y_i, s_i} F(x_i) + G(y_i) + M(s_i, s) \quad \text{st} \quad y_i + w(x_i + s_i) = w. \tag{49}$$

The first order conditions for this choice problem, evaluated at the point of symmetry where $s_i = s$, yield the following characterization of the equilibrium of Community Veblen when there is a social planner who resolves the Veblen problem:

$$G'(\widehat{y}) = \frac{F'(\widehat{x})}{w}, \tag{50}$$

$$G'(\widehat{y}) = \frac{MV(\widehat{s})}{w}, \tag{51}$$

and

$$\widehat{y} + w(\widehat{x} + \widehat{s}) = w. \tag{52}$$

Equating the right hand sides of (50) and (51) and differentiating totally with respect to w, we obtain

$$MV'(\widehat{s})(d\widehat{s}/dw) = F''(\widehat{x})(d\widehat{x}/dw).$$

Diminishing returns to both social and private leisure ($MV' < 0$ and $F'' < 0$) imply that

$$Sgn\left(\frac{d\widehat{s}}{dw}\right) = Sgn\left(\frac{d\widehat{x}}{dw}\right). \tag{53}$$

Thus, as productivity increases, private and social leisure either increase together or decrease together. Under what conditions do they increase or decrease? The answer, demonstrated in the Appendix, turns out to be the same as when there was only private leisure:

$$Sgn\left(\frac{d\widehat{s}}{dw}\right) = Sgn\left(\frac{d\widehat{x}}{dw}\right) = Sgn[r(\widehat{y}) - 1]. \tag{54}$$

If the marginal utility of the standard good declines relatively slowly ($r(\widehat{y}) < 1$), private and social leisure decline with higher productivity; on the other hand, if this marginal utility declines relatively rapidly ($r(\widehat{y}) > 1$), private and social leisure rise with higher productivity.

5.2 Without a Social Planner

When there is no social planner, the representative individual's choice problem is

$$\max_{x_i, y_i, v_i, s_i} F(x_i) + G(y_i) + D(v_i - v) + R(\frac{v_i}{v}) + M(s_i, s) \ \text{ st } v_i + y_i + w(x_i + s_i) = w. \tag{55}$$

Evaluating the first order conditions for this problem at the symmetric point where $v_i = v$ and $s_i = s$, we get the following characterization of the equilibrium of Community Veblen when there is no planner to resolve the Veblen problem:

$$D'(0) + \frac{1}{v^*}R'(1) = \frac{MV(s^*)}{w}, \tag{56}$$

$$D'(0) + \frac{1}{v^*}R'(1) = \frac{F'(x^*)}{w}, \tag{57}$$

$$D'(0) + \frac{1}{v^*}R'(1) = G'(y^*), \tag{58}$$

and

$$v^* + y^* + w(x^* + s^*) = w. \tag{59}$$

We first show that

$$\frac{dv^*}{dw} > 0, \quad \frac{dy^*}{dw} > 0. \tag{60}$$

We prove this by contradiction. Suppose $dv^*/dw \leq 0$. Then (58) implies that $dy^*/dw \leq 0$, and (57) that $dx^*/dw < 0$, and (56) that $ds^*/dw < 0$ (since $G'' < 0$, $F'' < 0$, and $MV' < 0$). But this violates the budget constraint (59), which when rewritten as $y^* + v^* = w(1 - x^* - s^*)$ would see the left hand side decrease while the right hand side increases. This contradiction establishes that $dv^*/dw > 0$. Then (58) implies that $dy^*/dw > 0$.

In the limit when w becomes infinitely large, both x^* and s^* must go to zero. We demonstrate this by contradiction. Suppose that, in this limit, either x^* approaches from above some strictly positive lower limit $\underline{x}$ or s^* approaches from above some strictly positive lower limit $\underline{s}$. From (58) we see that $D'(0) < G'(y^*)$, so that $y^* < \overline{y}$, where (as before) $\overline{y}$ solves $D'(0) = G'(y^*)$. The budget constraint (59) indicates that, in this limit, we must have $v^* > w(1 - \underline{x} - \underline{s}) - \overline{y}$. Since, by assumption, either $\underline{x}$ or $\underline{s}$ are strictly bounded away from zero, this inequality implies that v^* must increase without bound when w does. But this violates (56) if $\underline{s} > 0$ or (57) if $\underline{x} > 0$, since the relevant right hand side will approach zero in this limit while the left hand side is bounded below by $D'(0) > 0$. This contradiction establishes that x^* and s^* must both go to zero when w becomes infinitely large.

The perverse role played by the Veblen good in dissipating social (and private) leisure now becomes apparent. When the marginal utility of the standard good declines relatively rapidly ($r(y) > 1$), we have seen that private and social leisure rise with higher productivity when the planner sets quantity of the Veblen good equal to 0. When there is no planner, however, both social and private leisure are crowded out by the Veblen good in the limit of very large productivity. Since in equilibrium the Veblen good contributes nothing to well-being, its presence is anathema to affluent societies.

5.3 Trust

In the model set out above, the decline in social leisure reduces each individual's utility because of the externalities associated with social leisure. All people suffer from reduced social interaction when an individual reduces her social leisure. In reality, however, social leisure has other externalities: in particular, it contributes to greater cohesiveness of society, and this would manifest itself in the degree of trust that people exhibit towards each other. In other words, we would expect social leisure to promote the building of social capital, as Putnam (2000) has argued. The decline in trust that occurs when Veblen goods drive out social leisure would lead, in general, to an increase in the cost of economic transactions, and lower productivity, among other deleterious outcomes (like an increase in crime). To capture this possibility, we suppose now that one unit of labor produces $q(s)w$ units of the standard or the Veblen good, with $q'(s) > 0$, $q''(s) < 0$, and $q(0) > 0$ – that is, a decline in social leisure lowers labor productivity. The price of leisure in terms of the standard and Veblen goods is now given by $q(s)w$.

An individual's optimization problem is:

$$\max_{x_i, y_i, v_i, s_i} F(x_i)+G(y_i)+D(v_i-v)+R(\frac{v_i}{v})+M(s_i, s) \quad \text{st} \quad p(s)(v_i+y_i)+w(x_i+s_i)=w, \tag{61}$$

where $p(s) \equiv 1/q(s)$. Given the assumptions on $q(s)$, $p(s)$ is declining and convex in s and $p(0)$ is finite.

The first order conditions, evaluated at the symmetric equilibrium where quantities are denoted by stars, are given by

$$D'(0)+\frac{1}{v^*}R'(1)=\frac{p(s^*)}{w}MV(s^*), \tag{62}$$

$$D'(0)+\frac{1}{v^*}R'(1)=\frac{p(s^*)}{w}F'(x^*), \tag{63}$$

$$D'(0)+\frac{1}{v^*}R'(1)=G'(y^*), \tag{64}$$

and

$$p(s^*)(v^*+y^*)+w(x^*+s^*)=w. \tag{65}$$

By equating the right hand sides of (62) and (63), as before we see that x^* and s^* move together as w increases. Condition (64) indicates that y^* and v^* move together, though now we cannot be sure that they always increase when w increases. However, we can determine their behavior in the limit when w increases without bound. In this limit, x^* and s^* both go to zero, y^* goes to $\overline{y}$, and v^* increases without bound.

To see this suppose that, when w increases without bound, x^* approaches from above some lower limit $\underline{x} \geq 0$ and s^* approaches from above some lower limit $\underline{s} \geq 0$. From the budget constraint, we have $v^* = w(1-x^*-s^*)/p(s^*)-y^*$. The right hand side approaches $w(1-\underline{x}-\underline{s})/p(\underline{s})-y^*$ when w increases without bound. Since $p(\underline{s}) < p(0)$, by condition (64), $y^* < \overline{y}$, it follows that, in the limit, $v^* > w(1-\underline{x}-\underline{s})/p(0)-\overline{y}$. Thus, as w increases without bound, so too must v^*. From condition (64), it follows that y^* goes to $\overline{y}$. Since the left hand sides of (62) and (63) approach $D'(0) > 0$ in this limit, it follows that x^* and s^* must both approach zero. Thus when productivity exogenously rises, the presence of the Veblen good, as before, magnifies the decline in utility through the direct externality built into the nature of social interactions. In addition now, there is a further reduction in well-being due to the increase in the cost of producing goods, which lowers private consumption of the standard good.

Putnam (2000) has persuasively argued that the decline in civic engagement by Americans—a symptom of which is the fact that they are increasingly bowling alone rather than in bowling leagues—is leading to a reduction in social capital in the United States. The inevitable decline in social trust as a result of the fall in associational membership (churches, parent-teacher organizations, unions, etc.) weakens the very fabric of society. One may well attribute at least part of the increase in the incidence of broken families and crime in the United States[9] in the post war era to the fact that social leisure is decreasing and, therefore, eroding the nation's social capital. To the extent that the availability of social leisure is conducive to the building of social capital, some of the decline in social capital that Putnam identifies may be attributable to the pursuit of Veblen goods.

6 Conclusions

This paper is motivated by a well-established paradox concerning the relationship between per capita income and perceived well-being in affluent societies: *over time, we get richer, but we don't get happier*. This result raises the disturbing possibility that, in affluent countries, we may be consuming resources and despoiling the environment for no good purpose. And it suggests that society's (and our profession's) emphasis on growth may be badly misplaced.

[9] See Layard (2005, Ch. 6) for a review of the evidence on this.

In this paper we have explored the hypothesis, suggested by Frank (1999), Layard (2005), and Hopkins and Korneinko (2004) among others, that the happiness paradox is driven by a relative consumption externality associated with Veblen goods, and our results suggest that the hypothesis must be taken seriously. In all the models we have presented, as productivity increases, affluent societies inevitably find themselves in a relative consumption trap in which productivity improvements are simply frittered away in the futile attempt by individuals to distinguish themselves by consuming more of the Veblen good than their fellows do. As productivity increases, the Veblen good progressively crowds out all of the goods and activities that promote well-being – non-Veblen goods (including public goods), private leisure, and community (or social leisure) – and, perversely, well-being is inversely related to productivity. In fact, in the limit as productivity increases without bound, virtually all productive resources are devoted to the production of the useless Veblen good.

Obviously, to say that the relative consumption externality *can* explain the happiness paradox does not mean that it *does*. Of course, there may be other forces at work. But, in the context of this paper, the key empirical question is this: is the relative consumption externality an important part of the explanation? On this question, evidence in the affirmative is mounting. See Layard (2005b), and especially Helliwell and Huang (2005)—the latter paper presents extensive evidence in support of the relative consumption hypothesis.

The quandary posed by Veblen goods, it must be noted, becomes important to people as they become affluent. Since there are many rich individuals (in absolute numbers) even in developing countries, the problems examined in this paper are not restricted to rich countries. Veblen competition characterizes *affluent people*, not just people who live in affluent countries. Thus one observes the rich in developing countries living in luxurious houses, driving expensive imported cars, conducting outrageously expensive weddings, and throwing obscenely lavish parties. All these can be justly considered conspicuous consumption.

There are many implications of preferences for relative consumption that remain to be explored. One that is currently on our agenda is the effect of such preferences on the rate at which exhaustible resources are depleted. It is commonplace that, if markets are competitive and there are no externalities, the price mechanism will ensure that the resources will be optimally exploited. Typically, the externalities that have been considered in the literature come from the production side. For Veblen goods, in contrast, the externalities are built into preferences. These could well have quantitatively far stronger implications for sustainable development because the self-defeating aspect of the relative consumption externality in equilibrium thwarts processes that might otherwise have induced satiation. The deleterious effects on the rate of depletion of the earth's resources and its attendant consequences for future generations derive from the same source as the effects that erode the well-being of the present generation: a reference point for one's consumption that lies outside oneself.

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APPENDIX

We demonstrate here that, in the absence of the Veblen good, the signs of the comparative static derivatives $d\widehat{s}/dw$ and $d\widehat{x}/dw$ are given by (53). Substituting $\widehat{y} = w(1 - \widehat{x} - \widehat{s})$ from the budget constraint, we can rewrite the first order conditions for x and s as:

$$G'(w(1 - \widehat{x} - \widehat{s})) = \frac{F'(\widehat{x})}{w}$$

and

$$G'(w(1 - \widehat{x} - \widehat{s})) = \frac{MV(\widehat{s})}{w}.$$

Taking the total differential of these two equations we obtain

$$(-wG'' - F''/w)d\widehat{x} - wG''d\widehat{s} = -[(1 - \widehat{x} - \widehat{s})G'' + F'/w^2]dw,$$

$$-wG''d\widehat{x} - (wG'' + MV'/w)d\widehat{s} = -[(1 - \widehat{x} - \widehat{s})G'' + MV'/w^2]dw,$$

where we have dropped the arguments for brevity. Using Cramer's rule and simplifying, we obtain

$$\Delta\left(\frac{d\widehat{x}}{dw}\right) = (1 - \widehat{x} - \widehat{s})G''MV'/w + (F'/w)G'' + (F'/w^2)(MV'/w) - (MV/w)G'',$$

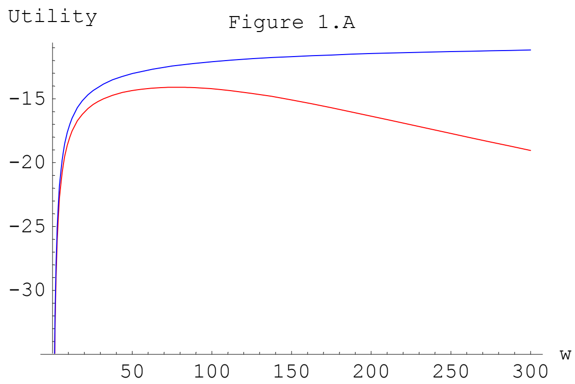
where

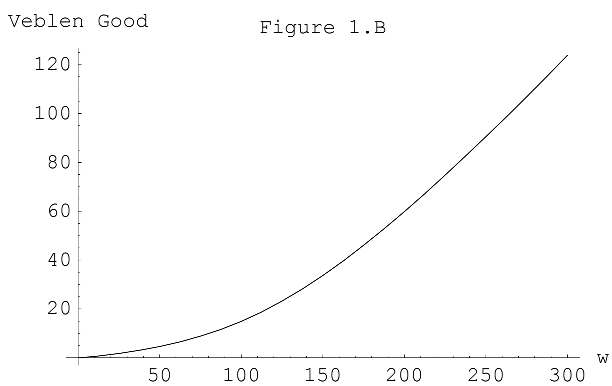
$$\begin{aligned}\Delta &\equiv (wG'' + F''/w)(wG'' + MV'/w) - (wG'')^2 \\ &= (wG'')(MV'/w) + (F''/w)(wG'') + (F''/w)(MV'/w) \\ &> 0.\end{aligned}$$

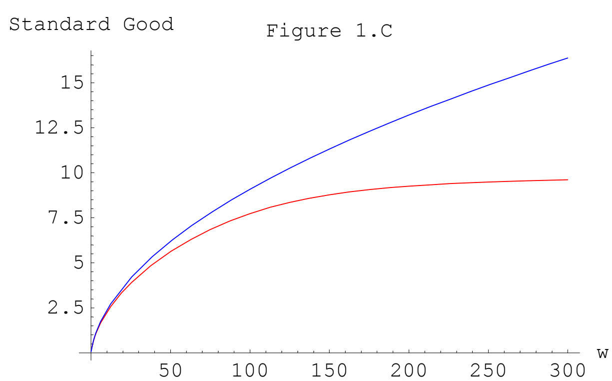
On using the first order conditions $F'/w = G' = MV/w$ and then the budget constraint, the above comparative static expression reduces to

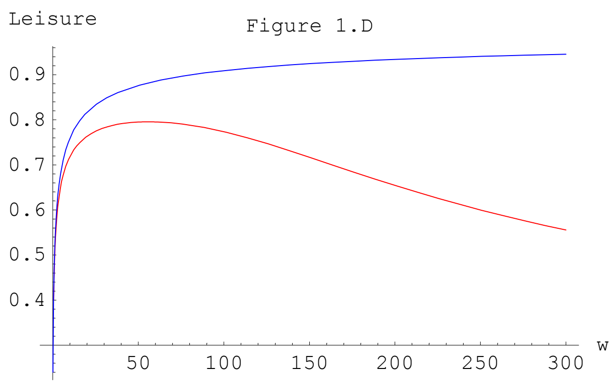
$\left(\frac{d\widehat{x}}{dw}\right) = (y^* G'' + G')MV'/\Delta.$

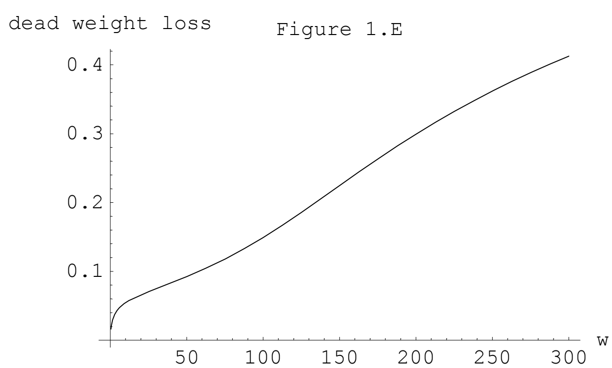
Using the definition of the index of relative risk aversion and the fact that $MV'' < 0$, we see that the sign of the right hand side of the above expression is $Sgn[r(\widehat{y}) - 1]$. From this and (52)—which holds also in the presence of the Veblen good—the result in (53) follows.

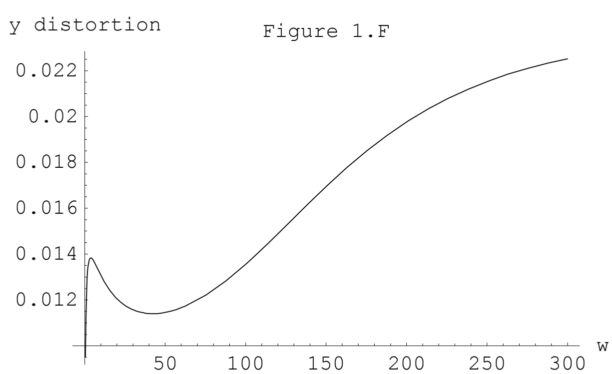

Utility
Figure 1.A
-15
-20
-25
-30
50
100
150
200
250
300
w

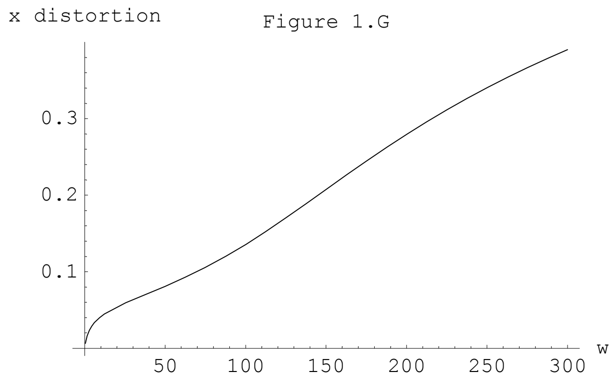

Veblen Good
Figure 1.B
120
100
80
60
40
20
50
100
150
200
250
300
w

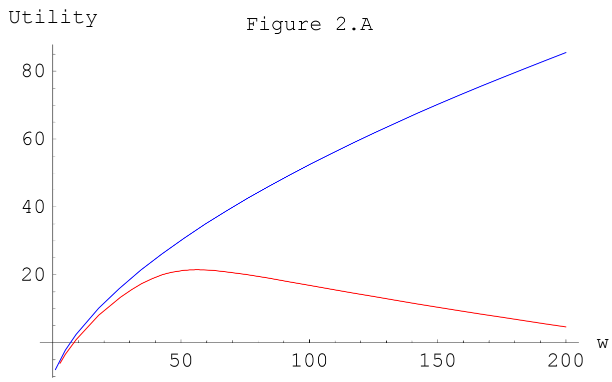

Standard Good
Figure 1.C
15
12.5
10
7.5
5
2.5
50
100
150
200
250
300
w


Leisure
Figure 1.D
0.9
0.8
0.7
0.6
0.5
0.4
w
50
100
150
200
250
300

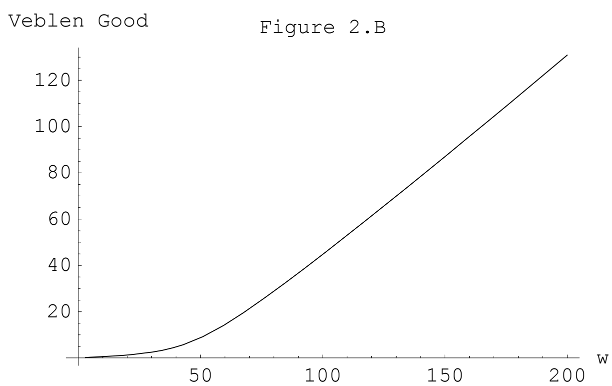

dead weight loss
Figure 1.E
0.4
0.3
0.2
0.1
w
50
100
150
200
250
300


y distortion
Figure 1.F
0.022
0.02
0.018
0.016
0.014
0.012
w
50
100
150
200
250
300

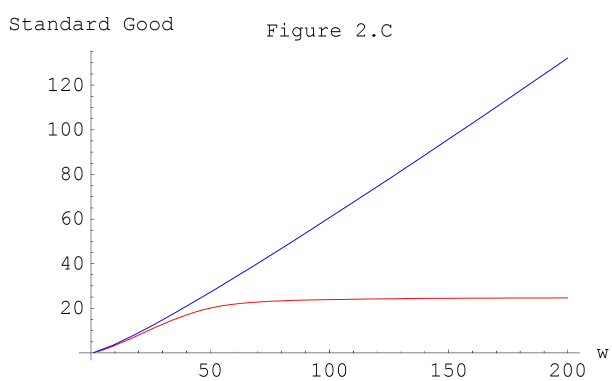

x distortion
Figure 1.G
0.3
0.2
0.1
50 100 150 200 250 300
w



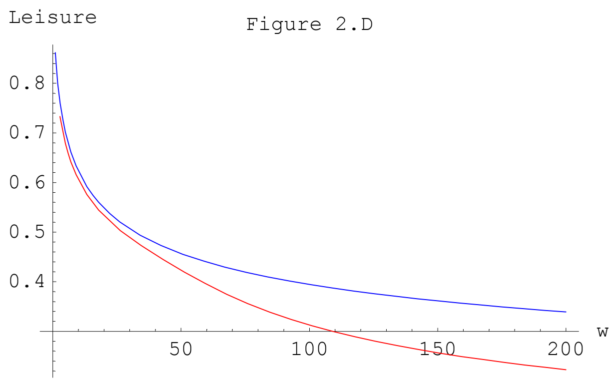
Utility
Figure 2.A
80
60
40
20
50
100
150
200
w

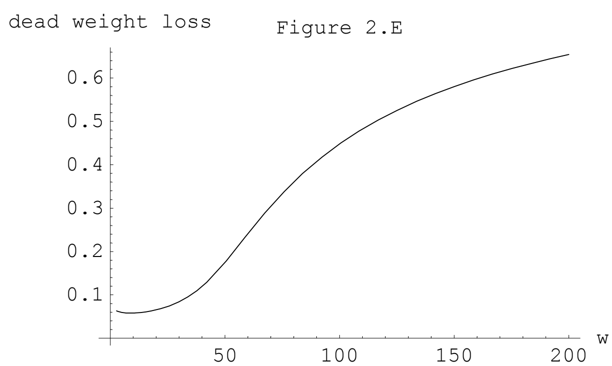


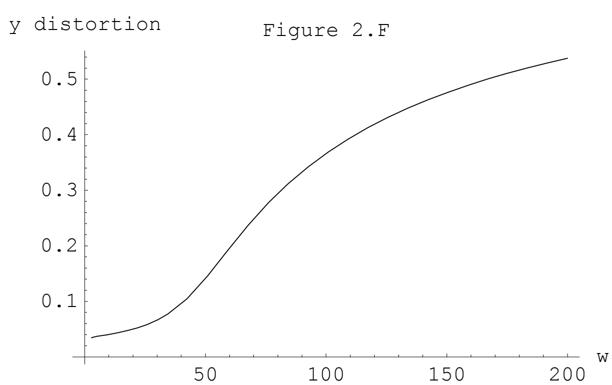
Veblen Good
Figure 2.B
120
100
80
60
40
20
50
100
150
200
w

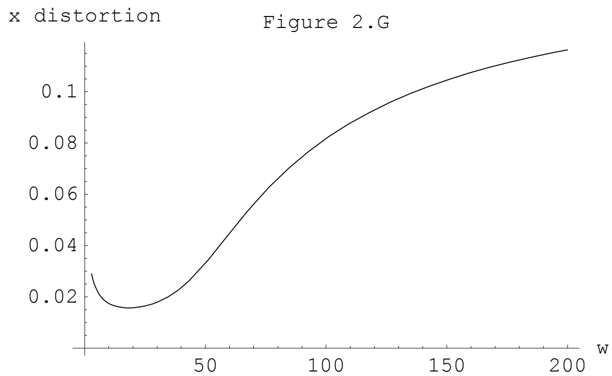


Standard Good
Figure 2.C
120
100
80
60
40
20
50
100
150
200
w


Leisure
Figure 2.D
0.8
0.7
0.6
0.5
0.4
50
100
150
200
w


dead weight loss
Figure 2.E
0.6
0.5
0.4
0.3
0.2
0.1
50
100
150
200
w


y distortion
Figure 2.F
0.5
0.4
0.3
0.2
0.1
50
100
150
200
w


x distortion
Figure 2.G
0.1
0.08
0.06
0.04
0.02
50
100
150
200
w