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The Importance of Social Status in a Rent-Seeking Society

Abstract

Status-seeking exists in all societies but different societies value status differently. How does the importance of social status affect the mode of status-seeking? I consider a game in which status can be achieved through productive effort that increases wealth or through a contest in which unproductive (rent-seeking) effort is used to redistribute wealth. Contestants are identical and there is a constraint on total effort. The number of contestants, the security of property rights, and the opportunity cost of unproductive activities in terms of productive activities (i.e., when the constraint binds or does not bind) determine whether an increase in the importance of status leads to an increase or decrease in productive effort (economic output). When the constraint on total effort does not bind, an increase in the importance of status leads to an increase in rent-seeking effort, regardless of the security of property rights. When the contestants differ by their taste for status, status-seeking can have far-reaching effects as a *few* people become *more* status-conscious and increase their status-seeking effort, this causes other relatively *less* status-conscious people to respond. When the contestants have different productive abilities, there exists an equilibrium in which rent-seeking effort is independent of productive ability.

JEL-Codes: C720, D720.

Keywords: contest, productive effort, property rights, rent-seeking, status-seeking.

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1. Introduction

Human beings care about their relative position in society. Social hierarchies, social classes, or social stratifications exist in every society. In some cases, these social stratifications or classes emerge through exogenous mechanisms (e.g., like being born into a royal family) or through endogenous mechanisms (i.e., status-seeking). In the latter case, striving for status as a fundamental human motivation has been established in a number of academic disciplines (e.g., economics, anthropology, evolutionary and social psychology, management, marketing, and sociology).

While status-seeking exists in every society, its importance differs in different societies.[1] Titles matter a lot more in some societies than in other societies. Politicians and other public officials who are PhD holders use the title of Dr or professor in some societies while they do not in others. An iPhone is a status good in some societies but not in others. There are announcements of a person's achievements by *his/her colleagues* (e.g., paid pages in newspapers announcing his/her promotion at work and publicly congratulating the person) and on giant billboards in some societies but not in others. In some societies, a person's profession is part of his title (e.g., lawyer Joe or engineer Bob). Thus, some societies suffer from what may be called status-obsession (or excessive class-consciousness).

When there is status-obsession or an excessive weight (premium) on status (e.g., a person is accorded respect regardless of the source of his wealth), corruption may be rife in that society.

[1]There are different groups in a society whose members play distinct and non-overlapping status-seeking games. Status-seeking games are usually localized games (see, for example, Ghiglino and Goyal, 2010). But it depends on the type of good. A person's house or wedding ceremony may be a status good in the eyes of his friends, neighbours, and people in his social circles. But his clothing or car may be status goods in the eyes of not only his friends and associates but to strangers as well. Clothing and cars are portable goods. A house is not. However, through a process dubbed "expenditure cascades" in Frank et al. (2014), different status groups may be linked. Expenditure cascades occur when the consumption by the wealthy triggers increased spending in the class directly below them, and the chain continues down to the bottom of the income ladder.

When corruption is rife, there is no shame from acquiring wealth or the means to the acquisition of wealth through corruption (cheating, extortion, fraud, etc) and hence people may enhance their status in the eyes of society, regardless of the source of their wealth. There is honor among thieves. Status acquisition through corruption or theft is more costly or less profitable in societies that frown on such status acquisition, have greater security of property rights, and there is severe punishment for corruption. Thus, in such societies, people focus on more legitimate means of status acquisition. [2]

Clearly, status-seeking exists in all societies. But different societies value status differently and status is acquired differently. Status-seeking is not necessarily bad. Awards like fellowships of prestigious professional societies, orders, medals, decorations, knighthoods, prizes, and titles can have positive incentive effects when such status is achieved through hard work and legitimate means.[3] But, as mentioned above, status can also be achieved through rent-seeking, fraud, cheating, theft, or corruption (e.g., the acquisition of fake PhDs as a means to higher positions that may be a means to wealth acquisition). In their experimental work, Charness et al. (2014) refer to the negative effects of status-seeking as the "the dark side of competition for status."

How does the importance of social status affect the mode of status-seeking? I consider a game in which status can be achieved either through productive effort which increases wealth and/or through a contest in which rent-seeking effort is used to redistribute wealth.[4] I examine

[2]In some cases, status is not sought. It is automatically conferred on a person or a group on the basis of gender, race, family background, ethnicity, etc (see, for example, Balkin, 1997; Ridgeway, 2019; Darity, 2022; Gonzalez-Jimenez, 2022).

[3]For example, Werner Sombart (1967) in his book "Luxury and Capitalism" claimed that the status-seeking behavior of individuals facilitated the development of capitalism and economic growth. He focused on the eighteenth century and used the quest for luxury goods as the indication of status-seeking behavior.

[4]The illegitimate acquisition of status implies cannot necessarily associate higher status with higher quality. Podolny (1993) defines market status as a signal of the underlying quality of a firm's product. This makes sense if it

the effect of an increase in the importance of status on rent-seeking effort and productive effort. It turns out the effect is ambiguous. But there are conditions under which an increase in the importance of status leads to an increase in unproductive (rent-seeking) effort. In some cases, this results in a decrease in productive effort or an increase in productive effort that is smaller than the increase in rent-seeking (unproductive) effort.

Contestants are identical and there is a constraint on total effort. When the marginal productivity of productive effort is sufficiently high, the constraint is binding (i.e., the opportunity cost of unproductive effort in terms of productive effort is positive). Under this condition, I find that when property rights are very insecure, and there are too many rent-seekers, an increase in the importance of status results in an increase in rent-seeking effort and a reduction in productive effort. Conversely, an increase in the importance of status leads to a fall in unproductive effort when property rights are very secure.

When the constraint is not binding (i.e., the opportunity cost of unproductive effort in terms of productive effort is zero), an increase in the importance of status leads to an increase in both rent-seeking effort and productive effort, *regardless of the security of property rights*. The response of rent-seeking effort to an increase in the importance of status is smaller when the marginal productivity of productive effort is sufficiently high. When status is very important, rent-seeking effort is more responsive than productive effort to an increase in the importance of status.

It turns out that an increase in the security of property rights increases productive effort (and thus output) but it could also increase rent-seeking effort. This is because an increase in the

is too costly for a firm to engage in fraudulent conduct by selling a shoddy or low-quality product as a high-quality product.

security of property rights reduces the proportion of output that is subject to rent-seeking but increases the amount of output that is subject to rent-seeking.

I extend the model to consider contestants who differ by their marginal productivity or by the importance they place on status. Status-seeking, being a zero-sum or negative-externality activity, can have far-reaching effects even if only a *few* people become more status-conscious. This is because as those who become *more* status-conscious intensify their status-seeking activity, this causes other relatively *less* status-conscious people to respond in order to at least maintain their status. When the players have different abilities in terms of productive effort, there exists an equilibrium in which a high-ability player exerts the same amount of rent-seeking effort as a low-ability player. Thus, rent-seeking effort is independent of productive ability.

1.1 Related Literature

Status-seeking is a zero-sum game and thus imposes a negative externality on others. It can lead to inefficiencies like overconsumption, misallocation of talent, *even if there is no rent-seeking (unproductive)* activity (e.g., Congleton, 1989; Fershtman et al., 1996; Frank, 2005). That is not the focus of this paper. As discussed above, this paper's focus is on how a change in the importance of status affects productive and unproductive activities.

That human beings care about status has been known for a long time, at least, since Smith (1759), Mill (1849), and Veblen (1899) and has found support in empirical work (e.g., Anderson et al., 2015; Clark et al., 2008; Luttmer, 2005; Bottan and Perez-Truglia, 2022; Ridgeway, 2019). Terms and expressions like "keeping up with the joneses", conspicuous consumption, expenditure cascades, the Easterlin paradox, relative consumption, etc are associated with status-seeking. Smith (1759) claimed that the utility from status matters more to people than the utility

from the direct consumption of goods. He opined that "It is not wealth that men desire, but the consideration and good opinion that wait upon riches."[5] Frank (2005) notes that the concern for status has neurological and evolutionary basis. According to Frank (2005):

"… *natural selection will favor individuals with the strongest concerns about relative resource holdings …. The hypothesis that concerns about local rank are part of the evolved circuitry of the human brain is supported by evidence of specific neurophysiological processes that respond to local relative position. For example, local rank appears to affect, and be affected by, concentrations of the neurotransmitter serotonin, which regulates moods and behavior*."

There is a theoretical literature on sabotage, cheating (e.g., doping, plagiarism), or redistribution of wealth in contests but, to the best of my knowledge, this literature has not been applied to contests for status[6] (e.g., Amegashie, 2015; Chowdhury and Gürtler, 2015; Grossman and Kim, 1995; Skaperdas, 1992; Gonzalez, 2005, 2007). In *experiments*, Gina and Pierce (2009) found that the presence of abundant wealth provoked feelings of envy toward wealthy others that, in turn, led to unethical behavior. Piff et al (2012) also found that individuals of a higher social class were more likely to engage in unethical behavior (see also, Charness et al., 2014; Galperin et al., 2011; Pettit et al., 2016). In Greece, Louridas and Spinellis (2021) found a behavior they referred to as "*conspicuous corruption*", where individuals break the law (i.e., the unlawful acquisition of distinguishing license plate numbers) and use their gains as status

[5]Mill (1848) also made the same point when he stated that "A great portion of the expenses of the higher and middle classes in most countries, and greatest in this, is not incurred for the sake of the pleasure afforded by the things on which the money is spent, but from regard to opinion, and an idea that certain expenses are expected from them, as an appendage of station."

[6]This was what Charness et al. (2014) meant by "The previous literature has assumed that unethical activities are motivated by the possibility of receiving higher earnings. However, one may reasonably argue that such unethical activities may also be driven at least in part by the pure intrinsic desire for having a higher rank. This could be the case for instance if individuals have a strong concern for status and if status seeking is related to the desire for dominance in competition."

symbols, knowing that the symbols suggest rule-breaking but they do not care because the unlawful practice cannot be incontestably established.

Corneo and Jeanne (2001) found that an increase in the importance of status unambiguously increases an economy's growth rate. This is because, in their model, there is no rent-seeking effort. The only effort is productive effort that results in the accumulation of wealth (which goes hand in hand with capital formation) and results in a higher status. Konrad and Lommerud (1993) found that an increase in the importance of status could increase risk-taking. In their model, consumers have an endowment that can be allocated between investment in a safe asset and a risky asset, none of which involves the redistribution of wealth. As in Corneo and Jeanne (2001), there is no rent-seeking in their model.[7] In one of three equilibria that Davis (2018) refers to as populist democracy, the social status of the pivotal voter, who is poor (because he has less than the average amount of capital), is increasing in the tax on capital income. So, as the taste for social status increases, the equilibrium tax on capital increases and this reduces economic growth.

Unlike the present paper, a person's status in Fershtman and Weiss (1993) has the characteristics of a public good and status cannot be achieved through the redistribution of wealth. In their paper, status is partly achieved through the acquisition of human capital (skills). Status is like a public good because, in their model, the members of an occupation enjoy the same status on the basis of the average wage and average skill of that occupation (see also Fershtman et al., 1996). Thus, a person's utility is increasing in his wage and the average skill of his occupation. As a result of compensating wage differentials, Fershtman and Weiss (1993)

[7]Moldovanu et al. (2007) study a contest in which the designer chooses the number of status categories and number of people in each category. Examples of status categories are charitable donations classified into platinum, gold, silver, and bronze categories or positions in an organization (CEO/president, categories of vice presidents, etc). They find that the optimal size of the highest status category is 1.

found that the occupation with the higher average skill of workers has the higher status and pays lower wages for a given level of skill. Wealthy individuals (i.e., individuals with a sufficiently high *non-wage* income) choose the high-status occupation (which has only highly skilled workers) and, on average, get lower wages. An increase in the importance of status implies that the low-status occupation (which has both low-skill and high-skill workers) would have to pay a higher wage to its workers. This results in a decrease in employment in the low-status occupation and thus a decrease in output. However, the increase in output (as a result of higher employment) in the high-status occupation is less than the decrease in output in the low-status occupation because the marginal productivity of the high-skill workers in the high-status occupation is smaller the marginal productivity of the high-skill workers in the low-status occupation. Therefore, an increase in the importance of status leads to a decrease in aggregate output. Fershtman and Weiss (1993) obtained this result in a model with non-identical agents (i.e., different endowments of non-wage income) and no rent-seeking. The requirement of non-identical agents is not necessary in my paper.

The three next sections present a model and an analysis of status-seeking. Section 5 discusses the results of the paper and section 6 concludes the paper.

2. A model of status-seeking with productive and rent-seeking effort

Consider a model of $N \geq 2$ identical and risk-neutral agents who each have the production function, $Y_i = g(L_i)$, which is increasing and strictly concave in productive effort, L_i, and $g(0) = 0$, $i = 1, \ldots, N$. Each person cares about status and material consumption, which can be achieved through productive effort and/or rent-seeking (socially unproductive) effort, x_i, where $x_i + L_i \leq T$. The cost of productive effort and rent-seeking effort are $c(L_i)$ and $b(x_i)$

respectively, both of which are increasing and convex functions. The players have costs of efforts up to a capacity constraint, $T > 0$. This is the same as models in which firms have a marginal cost of production up to a capacity constraint (e.g., Genc, 2017; Genc and Reynolds, 2011).[8]

A proportion, α, of output is secured and thus not subject to rent-seeking, $0 < \alpha < 1$. In a rent-seeking contest, player i's gets a proportion, $p_i = \frac{x_i}{x_i + \sum_{j \neq i} x_j}$, of total unsecured output. Thus, player i's wealth is given by:

$$W_i = \alpha Y_i + \frac{x_i}{x_i + \sum_{j \neq i} x_j} \sum_{i=1}^{N} (1 - \alpha) Y_i, \quad (1)$$

where, as in Skaperdas (1992) and other papers, $\sum_{i=1}^{N} (1 - \alpha) Y_i$ is the total output, a common pool, that is subject to rent-seeking. This could be taxes paid that could be embezzled by public officials, income that is subject to extortion by public officials or theft (including fraud) by private individuals, etc.[9] Thus, α is a measure of the security of property rights and could differ for different people. I assume that it is the same for everyone.

Player i's status is $s_i = f\left(W_i - \frac{\sum_{i=1}^{N} W_i}{N}\right)$ and his payoff from status is rs_i, where $r > 0$ is a parameter that captures the importance of social status and $f(.)$ is an increasing and concave function (e.g., Akerlof, 1997; Alpizar et al, 2005; Konrad and Lommerud, 1993; Ljungqvist and

[8]I shall later explain why I require cost functions of effort and a constraint on total effort, although the constraint, if it binds, implies a trade-off (cost) between productive effort and rent-seeking effort.

[9]In Skaperdas (1992), Gonzalez (2005), and other papers, player i's output, $(1 - \alpha)Y_i$, is included in the rent-seeking contest of which he is a participant. This can be interpreted as player i defending or protecting his own output from theft while also stealing the output of others. So, as in Skaperdas (1992) and Gonzalez (2005), his effort x_i plays the role of rent-seeking and rent-protection. The key point is that x_i is socially unproductive effort. Grossman and Kim (1995) and Gonzalez (2007) are examples of papers that make a distinction between rent-seeking effort and rent-protection effort. None of these papers focuses on contests for status. In some models, economic agents engage in production or predation (rent-seeking) but not both (see, for example, Amegashie, 2008).

Uhlig, 2000).[10] The parameter, r, depends on the importance that others attach to a person's status *and* the utility that the person derives from the social perception or importance of his status. A change in r could be caused by one of these factors or both. This distinction matters only when I consider the case of individuals with different valuations of social status.

The payoff of player i is:

$$U_i = W_i + rf\left(W_i - \frac{\sum_{i=1}^{N} W_i}{N}\right) - c(L_i) - b(x_i), \quad (2)$$

where the first term, W_i, is absolute consumption or material utility and the second term is, of course, relative consumption or the (psychological) utility from status. Note that if $r = 0$, the game is similar to the games in Skaperdas (1992), Grossman and Kim (1995), and Gonzalez (2005, 2007) in the sense that there is *no* status-seeking but the players invest in effort to produce valuable output and unproductive (rent-seeking) effort to defend their output or appropriate the output of others.

Player i solves:

$$Max_{L_i, x_i}\, U_i = W_i + rf\left(W_i - \frac{\sum_{i=1}^{N} W_i}{N}\right) - c(L_i) - b(x_i), \quad (3)$$

[10]Another formulation is $\frac{W_i}{\sum_{i=1}^{N} W_i}$ for player i's status (e.g., Bolton and Ockenfels, 2000). An alternative formulation is for a player to look at his wealth relative to each player's individual wealth, not the average wealth. In the literature, this is usually modelled as a person's status (rank) being equal to the cumulative distribution function, $F(.)$, of wealth. So, a player with wealth, w, has a status equal to some increasing function of $F(w)$. This formulation is more technically challenging because $F(.)$ is not an exogenous distribution. Given that the players choose their wealth, $F(.)$ is an endogenous distribution. In Hopkins and Kornienko (2004), a *continuum* of agents is endowed with wealth, z, with an exogenous distribution, $G(z)$. They showed that the equilibrium expenditure, x, on a status good is monotonically increasing in z (status is a normal good). Therefore, a person with a higher wealth will also have a higher x and therefore a higher status. Given this monotonicity, it follows that the endogenous distribution, $F(x)$, is equal to the exogenous distribution, $G(z)$.

subject to: $x_i + L_i \leq T$.[11]

2.1 Equilibrium Analysis

I look for a pure-strategy Nash equilibrium, $\{x_i^*, L_i^*\}_{i=1}^N$, of this game.

A useful observation is that a Nash equilibrium with no production (i.e., $L_i = 0$ for all i) does not exist. If there is no production, there will be no rent-seeking (i.e., $x_i = 0$ for all i). But then we have $x_i + L_i < T$. A player is better off by choosing $L_i > 0$.

There is no equilibrium with production but $x_i = 0$ for all i. In this candidate equilibrium, the total unsecured output of all players other than i is $\sum_{j\neq i}(1-\alpha)Y_j > 0$. Let player i's productive effort be $\hat{L} > 0$. If player i deviates to $x_i = \varepsilon$, he gets the unsecured output, $\sum_{j\neq i}(1-\alpha)Y_j$, of all players but only incurs a cost of $\left(g\left(\hat{L}\right) - g(\hat{L}-\varepsilon)\right) + \left(c\left(\hat{L}-\varepsilon\right) + b(\varepsilon) - c(\hat{L})\right)$, where ε is *very small* but positive. He is better off.

Setting up the Lagrangian function for the problem in (3) gives:

$$Max_{L_i, x_{i,\lambda}}\ Z_i = W_i + rf\left(W_i - \frac{\sum_{i=1}^N W_i}{N}\right) - c(L_i) - b(x_i) + \lambda(T - L_i - x_i), \qquad (4)$$

where λ is the Lagrangian multiplier.

I look for a Nash equilibrium with $L_i > 0$ and $x_i > 0$ for all i but in which the constraint may bind or not bind. Thus, the first-order conditions are:

[11]To see why I require the cost of efforts and also a constraint on total effort, suppose the cost functions, $c(L_i)$ and $b(x_i)$ were not in the model. Then the constraint will bind. We can write $L_i = T - x_i$ and substitute this into U_i. We get $\frac{\partial U_i}{\partial x_i} = \left(1 + r\frac{N-1}{N}f'(.)\right)\frac{\partial W_i}{\partial x_i} = 0$. This gives $\frac{\partial W_i}{\partial x_i} = 0$, which implies that the equilibrium x_i and L_i are not functions of r. I could get rid of the constraint on total effort but maintain $c(L_i)$ and $b(x_i)$. However, including the constraint allows me to study the cases in which the constraint is binding and when it is not binding.

$$\frac{\partial Z_i}{\partial L_i} = \left(1 + r\frac{N-1}{N}f'(.)\right)\left(\alpha g'(L_i) + (1-\alpha)\frac{x_i g'(L_i)}{x_i + \sum_{j\neq i} x_j}\right) - c'(L_i) - \lambda = 0, \quad (5)$$

$$\frac{\partial Z_i}{\partial x_i} = (1-\alpha)\left(1 + r\frac{N-1}{N}f'(.)\right)\sum_{i=1}^{N} g(L_i)\left(\frac{1}{x_i + \sum_{j\neq i} x_j} - \frac{x_i}{\left(x_i + \sum_{j\neq i} x_j\right)^2}\right) - b'(x_i) - \lambda = 0, \quad (6)$$

$$\frac{\partial Z_i}{\partial \lambda} = T - L_i - x_i \leq 0, \lambda\frac{\partial Z_i}{\partial \lambda} = 0, \lambda \geq 0, \quad (7)$$

for $i = 1, \ldots, N$.

2.1.1 When the constraint binds

Note that $\frac{\partial U_i}{\partial L_i} = \gamma g'(L_i) - c'(L_i)$, where $\gamma \equiv \left(1 + r\frac{N-1}{N}f'(.)\right)(\alpha + (1-\alpha)p_i)$.

Consider an equilibrium in which $x_i + L_i < T$ for player i. Noting that $\gamma > \alpha$ and $\alpha g(L_i) - c(L_i)$ is strictly concave in L_i, it follows that, if $\alpha g'(T) - c'(T) > 0$, then $\frac{\partial U_i}{\partial L_i} > 0$ for all $L_i \in [0, T]$. So, a sufficient condition for the constraint to bind is $\alpha g'(T) > c'(T)$.

If the constraint binds, then $\lambda > 0$. We can write $L_i = T - x_i$. In a symmetric Nash equilibrium, $L_i = L^*$ and $x_i = x^*$ for all $i = 1, \ldots, N$. Making these substitutions into (5) and (6) gives:

$$\left(1 + r\frac{N-1}{N}f'(0)\right)\left(\alpha + \frac{1-\alpha}{N}\right)g'(T - x^*) - c'(T - x^*) - \lambda = 0, \quad (8)$$

$$\frac{(1-\alpha)(N-1)}{N}\left(1 + r\frac{N-1}{N}f'(0)\right)\frac{g(T-x^*)}{x^*} - b'(x^*) - \lambda = 0. \quad (9)$$

Then (8) and (9) imply that:

$$\left(1 + r\frac{N-1}{N}f'(0)\right)\left(\alpha + \frac{1-\alpha}{N}\right)g'(T - x^*) - c'(T - x^*) = \frac{(1-\alpha)(N-1)}{N}\left(1 + r\frac{N-1}{N}f'(0)\right)\frac{g(T-x^*)}{x^*} - b'(x^*). \quad (10)$$

Taking the derivative of (10) with respect to r and simplifying gives:

$$\frac{\partial x^*}{\partial r} = \frac{\frac{N-1}{N}f\prime(0)\left(\left(\frac{(1-\alpha)(N-1)}{N}\right)\frac{g(T-x^*)}{x^*} - \left(\alpha+\frac{1-\alpha}{N}\right)g'(T-x^*)\right)}{H}, \tag{11}$$

where $H \equiv \left(\theta_1\theta_3\frac{g\prime(T-x^*)}{x^*} + \theta_1\theta_3\frac{g(T-x^*)}{(x^*)^2} - \theta_1\theta_2 g''(T-x^*) + b''(x^*) + c''(T-x^*)\right)$,

$\theta_1 \equiv 1 + rf'(0)\frac{N-1}{N}$, $\theta_2 \equiv \alpha + \frac{1-\alpha}{N}$, and $\theta_3 \equiv \frac{(1-\alpha)(N-1)}{N}$. Note that $H > 0$.

The of sign of $\frac{\partial x^*}{\partial r}$ is indeterminate. An increase in r is equivalent to an increase in the value or importance of status. In a standard rent-seeking game, an increase in the value of the prize increases rent-seeking effort. But not in this game because status can *also* be achieved through productive effort.

However, under some conditions, we can determine the sign of $\frac{\partial x^*}{\partial r}$. For example, $\lim_{\alpha \to 0,\, N\to\infty} \frac{\partial x^*}{\partial r} > 0$. Thus, we get the following proposition:

Proposition 1: *Suppose the marginal productivity of productive effort is high (i.e., the constraint on total effort is binding). Then when property rights are very insecure and there are too many rent-seekers, an increase in the importance of status results in an increase in rent-seeking effort and a decrease in productive effort.*

We also get $\lim_{\alpha\to 1} \frac{\partial x^*}{\partial r} < 0$. This gives:

Proposition 2: *Suppose the marginal productivity of productive effort is high (i.e., the constraint on total effort is binding). Then when property rights are sufficiently secure, an increase in the*

importance of status results in a decrease in rent-seeking effort and an increase in productive effort.

2.1.2 When the constraint does not bind

If the constraint does not bind, then $\lambda = 0$. In a symmetric Nash equilibrium, $L_i = L^{**}$ and $x_i = x^{**}$ for all $i = 1, \dots, N$. Making these substitutions into (5) and (6) gives:

$$\left(1 + r\frac{N-1}{N}f'(0)\right)\left(\alpha + \frac{1-\alpha}{N}\right)g'(L^{**}) - c'(L^{**}) = 0, \tag{12}$$

$$\frac{(1-\alpha)(N-1)}{N}\left(1 + r\frac{N-1}{N}f'(0)\right)\frac{g(L^{**})}{x^{**}} - b'(x^{**}) = 0. \tag{13}$$

Differentiating (12) and (13) with respect to r gives:

$$\frac{\partial L^{**}}{\partial r} = \frac{\theta_2\frac{N-1}{N}f'(0)g\prime(L)}{c''(L) - \theta_1\theta_2 g\prime\,(L)} > 0, \tag{14}$$

and

$$\frac{\partial x^{**}}{\partial r} = \frac{\theta_3\frac{N-1}{N}f'(0)\frac{g(L)}{x} + \theta_1\theta_3\frac{g\prime(L)}{x}\cdot\frac{\partial L^{**}}{\partial r}}{\theta_1\theta_3\frac{g\prime(L)}{x^2} + b''(x)} > 0. \tag{15}$$

This leads to the following proposition:

Proposition 3: *Suppose the constraint on effort is not binding. Then an increase in the importance of status results in an increase in both productive effort and rent-seeking effort.*

An interesting result is that $\frac{\partial L^{**}}{\partial \alpha} = \frac{\theta_1 \frac{N-1}{N} g\prime(L)}{c''(L) - \theta_1 \theta_2 g''(L)} > 0$ but

$\frac{\partial x^{**}}{\partial \alpha} = \frac{\theta_1 \theta_3 \frac{g\prime(L)}{x} \cdot \frac{\partial L^{**}}{\partial \alpha} - \theta_1 \frac{N-1}{N} \frac{g(L)}{x}}{\theta_1 \theta_3 \frac{g(L)}{x^2} + b''(x)}$ has an ambiguous sign. If $b''(x) > 0$, we get $\lim_{\alpha \to 1} \frac{\partial x^{**}}{\partial \alpha} < 0$.[12]

Otherwise, $\frac{\partial x^{**}}{\partial \alpha}$ could be positive. This is because when an increase in the security of property rights increases output, it has an ambiguous effect on the unsecured output (the prize), $(1-\alpha)\sum_{i=1}^{N} Y_i$, in the rent-seeking contest because $(1-\alpha)$ decreases but $\sum_{i=1}^{N} Y_i$ increases. As example, suppose $N = 2, Y_i = \sqrt{L_i}$, $f\left(W_i - \frac{\sum_{i=1}^{N} W_i}{N}\right) = W_i - \frac{\sum_{i=1}^{N} W_i}{N}$, $c(L_i) = 0.1L_i$, and $b(x_i) = 0.1x_i$. Then $x^{**} = 25 + 25\alpha - 50\alpha^2 > 0$ for all $\alpha \in [0,1)$. It follows that $\frac{\partial x^{**}}{\partial \alpha} > 0$ if $\alpha < 0.25$ but $\frac{\partial x^{**}}{\partial \alpha} < 0$ if $\alpha > 0.25$.

3.1 Comparing equilibria

In this section, I shall compare the response of rent-seeking effort and productive effort to an increase in the importance of status, when the constraint binds and when the constraint does not bind. This is an exercise in the spirit of the Le Chatelier principle which says that imposing additional constraints on an optimization problem will reduce the responsiveness of choice variables to exogenous variables (Milgrom and Roberts, 1996; Samuelson, 1960; Silberberg, 1971; Silberberg and Suen, 2000).

In particular, I focus on rent-seeking effort. As shown above, $\frac{\partial x^{**}}{\partial r} > 0$. But $\frac{\partial x^{*}}{\partial r}$ has an ambiguous sign. When $\frac{\partial x^{*}}{\partial r} \leq 0$, we can conclude that the response of rent-seeking effort to an

[12]Note that $\lim_{\alpha \to 1} \theta_3 = 0$, so $\frac{\partial x^{**}}{\partial \alpha}$ is undefined if $b''(x) = 0$.

increase in the importance of status is smaller when the constraint binds. I want to compare the magnitudes of $\frac{\partial x^{**}}{\partial r}$ and $\frac{\partial x^{*}}{\partial r}$ when they both have positive signs.

Starting from the symmetric Nash equilibrium, we can write $L^{**} = L^{**}(r)$ and $x^{**} = x^{**}(r)$ for the equilibrium values in the unconstrained case and write $L^{*} = L^{*}(r, T)$ and $x^{*} = x^{*}(r, T)$ in the constrained case. Then if $L^{**} + x^{**} = T$,[13] we can write

$$x^{**}(r) = x^{*}(r, L^{**} + x^{**}). \tag{16}$$

Taking the derivative of (16) with respect to r and rearranging terms gives:

$$\frac{\partial x^{**}}{\partial r} - \frac{\partial x^{*}}{\partial r} = \frac{\partial x^{*}}{\partial T}\left(\frac{\partial L^{**}}{\partial r} + \frac{\partial x^{**}}{\partial r}\right). \tag{17}$$

Given (14) and (15) and noting that $\frac{\partial x^{*}}{\partial T} > 0$,[14] (17) implies that $\frac{\partial x^{**}}{\partial r} > \frac{\partial x^{*}}{\partial r}$.

Recall that a sufficient condition for the constraint to bind is $\alpha g'(T) > c'(T)$. This holds if the marginal productivity of productive effort, $g'(L)$, is sufficiently high. This observation and $\frac{\partial x^{**}}{\partial r} > \frac{\partial x^{*}}{\partial r}$ give the following proposition:

Proposition 4: *Suppose an increase in the importance of status increases unproductive effort in both the constrained and unconstrained cases. The increase in unproductive effort is smaller in the constrained case (i.e., when the marginal productivity of productive effort is high or when the opportunity cost of unproductive effort in terms of productive effort is positive).*

[13]This is what Silberberg (1971) and Suen and Silberberg (2000) refer to as the constraint being "just binding" and, therefore, does not disturb the equilibrium in the unconstrained or less constrained case.
[14]Differentiating (10) with respect to T yields this result.

4. Nonidentical status-seekers

In this section, I consider non-identical players and focus on the unconstrained case.

Case 1: Players with different productive abilities

Let player i's production function be $\widehat{Y}_i = \beta_i g(L_i)$, $i = 1,2,..,N$. The players have different productive abilities but the same rent-seeking ability. A player's wealth is:

$$\widehat{W}_i = \alpha\beta_i g(L_i) + \frac{x_i}{x_1+x_2}\sum_{i=1}^{N}(1-\alpha)\beta_i g(L_i). \tag{18}$$

The i-th player's payoff is:

$$\widehat{U}_i = \widehat{W}_i + rf\left(\widehat{W}_i - \frac{\sum_i^N \widehat{W}_i}{N}\right) - c(L_i) - b(x_i). \tag{19}$$

A useful result is the players' equilibrium rent-seeking effort will be the same even though they are non-identical. To see this, note that the first-order condition for the i-th player's rent-seeking effort is:

$$\frac{\partial \widehat{U}_i}{\partial x_i} = (1-\alpha)\left(1 + r\frac{N-1}{N}f'(w_i)\right)\sum_{i=1}^{N}\beta_i g(L_i)\left(\frac{1}{x_i+\sum_{j\neq i}x_j} - \frac{x_i}{\left(x_i+\sum_{j\neq i}x_j\right)^2}\right) - b'(x_i) = 0, \tag{20}$$

$i = 1,2,\ldots,N$ and $w_i \equiv \widehat{W}_i - \frac{\sum_i^N \widehat{W}_i}{N}$.

If the marginal benefit of social status, $rf'(w_i) > 0$, is the same for all players, it easy to see that $x_i = x$ for all i satisfies $\frac{\partial \widehat{U}_i}{\partial x_i} = 0$. As shown in the example below with $f'(w_i) = 1$,[15] a high-ability player invests more in productive effort but has the *same* rent-seeking effort as a low-ability player. One would have thought that the high-ability player would exert a smaller rent-seeking effort and devote more of his effort to production. But this is not the case because part of his higher output is part of the prize in the rent-seeking game. Therefore, the high-ability

[15]This implies that the marginal benefit of social status, $rf'(w_i) > 0$, is the same for all players.

player has to protect his higher output and therefore invests the *same* amount of socially unproductive effort like the low-ability player. In the rent-seeking game the value of the prize, a component of a player's wealth, $\widehat{W}_i$, is increasing in $(1-\alpha)\sum_{i=1}^{N}\beta_i g(L_i)$, which is the same for all players. Therefore, all the players have identical valuations of the prize.

In general, an N-player contest with *several non-identical* players and a *noisy* or *imperfectly-discriminating* contest success function (e.g., the Tullock contest success function in this paper) is difficult to analyze (Fu and Wu, 2020). Therefore, to simplify the analysis, I focus on $N = 2$ players. Assuming that $f'(w_i)$ is the same for both players, we get that $x_i = x$ and thus $p_i = 0.5$. Then:

$$\frac{\partial \widehat{U}_i}{\partial L_i} = \left(\alpha + \frac{1-\alpha}{2}\right)\left(1 + \frac{r}{2}f'(w_i)\right)\beta_i g'(L_i) - c'(L_i) = 0, \tag{21}$$

for $i = 1,2$.

Given that $\beta_1 \neq \beta_2$ and $f'(w_i)$ is the same for both players, it is obvious that $L_1 = L_2$ cannot satisfy the pair of equations in (21). If $\beta_1 > \beta_2$, is easy to show that the Nash equilibrium has $L_1 > L_2 > 0$ and $x_1 = x_2 > 0$.

To get concrete results, I assume that $\hat{Y}_i = \beta_i\sqrt{L_i}$, $f\left(\widehat{W}_i - \frac{\widehat{W}_1+\widehat{W}_2}{2}\right) = \widehat{W}_i - \frac{\widehat{W}_1+\widehat{W}_2}{2}$,[16] $\alpha = 0.5$, $c(L_i) = 0.1L_i$, and $b(x_i) = 0.1x_i$. The player's payoffs are:

$$\widehat{U}_1 = \widehat{W}_1 + r\left(\widehat{W}_1 - \frac{\widehat{W}_1+\widehat{W}_2}{2}\right) - 0.1L_1 - 0.1x_1, \tag{22}$$

and

$$\widehat{U}_2 = \widehat{W}_2 + r\left(\widehat{W}_2 - \frac{\widehat{W}_1+\widehat{W}_2}{2}\right) - 0.1L_2 - 0.1x_2. \tag{23}$$

[16]Ghiglino and Goyal (2010) use the same linear function for status. I also use a linear cost function for rent-seeking effort. This is very common in the literature on contests. I use the same cost function for productive effort.

A Nash equilibrium $\left(\hat{L}_1, \hat{x}_1, \hat{L}_2, \hat{x}_2\right)$ is the solution to $\frac{\partial U_i}{\partial L_i} = 0$ and $\frac{\partial U_i}{\partial x_i} = 0$, $i = 1,2$.

This gives[17]:

$$\hat{L}_1 = 1.5625\beta_1^2(3+r)^2,\ \hat{L}_2 = 1.5625\beta_2^2(3+r)^2, \tag{24}$$

and

$$\hat{x}_1 = \hat{x}_2 = (\beta_1^2 + \beta_2^2)(1.5625r^2 + 6.25r + 4.6875).^{18} \tag{25}$$

In this example, $f'(w_i) = 1$ for $i = 1,2$.[19] If $\beta_1 > \beta_2$, we get $\hat{L}_1 > \hat{L}_2$. Also, as expected, $\hat{x}_1 = \hat{x}_2$. We also get $\frac{\partial \hat{x}_1}{\partial r} = \frac{\partial \hat{x}_2}{\partial r} > 0$, and $\frac{\partial \hat{L}_1}{\partial r} > \frac{\partial \hat{L}_2}{\partial r} > 0$. *More importantly*, we get $\frac{\partial \hat{x}_1}{\partial r} > \frac{\partial \hat{L}_1}{\partial r}$ if $(3.125r + 6.25)\beta_2^2 - 3.125\beta_1^2 > 0$. This result holds if β_1 and β_2 are sufficiently close. Numerous examples confirm that this is the case.[20] If $\beta_1 = \beta_2$, then $\frac{\partial \hat{x}_1}{\partial r} > \frac{\partial \hat{L}_1}{\partial r}$ for all $r \geq 0$. If the difference between β_1 and β_2 is big, then $\frac{\partial \hat{x}_1}{\partial r} > \frac{\partial \hat{L}_1}{\partial r}$ if r is sufficiently high. We state the following proposition:

Proposition 5: *Suppose that the marginal benefit of social status, $rf'(w_i)$, is the same for all players. There exists a Nash equilibrium in which (a) the high-ability individual exerts the* same *amount of rent-seeking effort as the low-ability individual, (b) the high-ability individual exerts a bigger productive effort, and (c) in some cases, rent-seeking effort is more responsive than productive effort to an increase in the importance of status, if the importance of social status is high.*

[17]For *each* player, I have checked, using several parameter values, that the second-order conditions for a maximum hold at the Nash equilibrium. The Hessian matrix is negative definite.
[18]Note that even if the players do not care about status (i.e., $r = 0$), there is still rent-seeking because that increases a player's wealth.
[19]In general, if $f'(w_i)$ is symmetric in the sense that $f'(w_1) = f'(-w_1) \equiv f'(w_2)$, then $\hat{x}_1 = \hat{x}_2$.
[20]To ensure that $\hat{U}_2 > 0$, r must be sufficiently small.

Case 2: Players with different valuations of social status

In this case, the players have the same productive abilities (i.e., $\beta_1 = \beta_2 = 1$) and the same rent-seeking ability. But they have different valuations of social status. In particular, $r_1 > r_2 > 0$. Therefore, player 1 has a higher valuation of social status. This *may* stem from different levels of confidence about how deserving their status is. So, one person may discount the value of his status while the other does not. I am agnostic about the source of the differences in the tastes for social status.[21]

Using the same parameter values and functional forms as above, the player's payoffs are:

$$\widetilde{U}_1 = \widehat{W}_1 + r_1\left(\widehat{W}_1 - \frac{\widehat{W}_1+\widehat{W}_2}{2}\right) - 0.1L_1 - 0.1x_1, \quad (26)$$

and

$$\widetilde{U}_2 = \widehat{W}_2 + r_2\left(\widehat{W}_2 - \frac{\widehat{W}_1+\widehat{W}_2}{2}\right) - 0.1L_2 - 0.1x_2. \quad (27)$$

A Nash equilibrium $\left(\tilde{L}_1, \tilde{x}_1, \tilde{L}_2, \tilde{x}_2\right)$ is the solution to $\frac{\partial \widetilde{U}_i}{\partial L_i} = 0$ and $\frac{\partial \widetilde{U}_i}{\partial x_i} = 0$, $i = 1,2$.

This gives:

$$\tilde{L}_1 = 6.25\left(\frac{r_1^2+3r_1+r_2+3}{r_1+r_2+2}\right)^2, \tilde{L}_2 = 6.25\left(\frac{r_2^2+3r_2+r_1+3}{r_1+r_2+2}\right)^2, \quad (28)$$

and

$$\tilde{x}_i = \frac{25(1+r_j)r_i^4+150(1+r_j)r_i^3+25\left(r_j^3+5r_j^2+19r_j+15\right)r_i^2+50\left(r_j^3+5r_j^2+12r_j+8\right)r_i+2\ \left(r_j^3+5r_j^2+10r_j+6\right)}{2r_i^3+6(r_j+2)r_i^2+6(r_j+2)^2r_i+2(r_j+2)^3}, \quad (29)$$

$i = 1,2$ and $i \neq j$.

[21]The taste for status may depend on wealth or income (Kahneman and Deaton, 2010; Clark et al., 2008).

Note that $\tilde{L}_1 > \tilde{L}_2$ because $r_1^2 + 3r_1 + r_2 > r_2^2 + 3r_2 + r_1 \Rightarrow r_1^2 - r_2^2 + 2(r_1 - r_2) > 0$, which holds because $r_1 > r_2$. We also get:

$$\frac{\partial \tilde{L}_i}{\partial r_i} = \frac{25(r_i^2+3r_i+r_j+3)(0.5r_i^2+r_ir_j+2r_i+r_j+1.5)}{(r_i+r_j+2)^3} > 0, \tag{30}$$

and

$$\frac{\partial \tilde{L}_i}{\partial r_j} = -\frac{12.5(r_i^2+r_i+3r_j+3)(r_j+2)^3}{(r_i+r_j+2)^3} < 0, \tag{31}$$

$i = 1,2$ and $i \neq j$.

The derivatives in (30) and (31) mean that when a player's valuation of status increases, he increases his productive effort but the productive effort of his opponent decreases. In contrast, when a player's valuation of status increases, he increases his rent-seeking effort and his opponent also increases his rent-seeking effort. Thus, $\frac{\partial \tilde{x}_i}{\partial r_i} > 0$ and $\frac{\partial \tilde{x}_j}{\partial r_i} > 0$ for $i = 1,2$ and $i \neq j$.[22] To illustrate these results, I fix $r_2 = 0.1$ and vary r_1. I present the results in table 1 (see the last page).

As table 1 shows, if the high-valuation player's valuation for status increases, the low-valuation player is worse off. This is because the low-valuation player reduces his productive effort and the proportion of unsecured output that he gets falls (i.e., as table 1 shows, the high-valuation player increases his rent-seeking effort by a bigger amount than the increase in the rent-seeking effort of the low-valuation player).

[22]The expressions for these derivatives are very lengthy, so I omit them from the paper and instead present the numerical examples in table 1. I obtained these derivatives and their signs by using the math software, Maple 2020.

I state the following proposition:

Proposition 6: *An increase in a player's valuation of status increases his productive effort but reduces the productive effort of his opponent's productive effort. But an increase in a player's valuation of status increases the rent-seeking efforts of both players*.

5. Discussion

The detrimental effects of an increase in the importance of status-seeking can be reinforcing in the sense that the poorer or more unequal is the society, the higher is the return to status and the stronger is the incentive to acquire status through unproductive (rent-seeking) or illegitimate means which, in turn, leads to more poverty, inequality, and an increase in the importance (social weight) of status. An implication is that r (the importance of status or the taste for status) may be endogenous. As mentioned previously, the taste for status may depend on wealth or income (Kahneman and Deaton, 2010; Clark et al., 2008; Davis and Wu, 2019).

The Easterlin paradox is the empirical finding that average happiness has remained constant over time despite sharp rises in per capita (absolute) income (see, for example, Clark et al, 2008). This has been attributed to the fact that relative income, which people also care about, has remained fairly constant. Defining a taste for status as the marginal rate of substitution of relative income for absolute income and using data for waves 2 – 6 of the World Values Survey from the years between 1990 and 2014, Davis and Wu (2019) found that as a country becomes more affluent, the importance of an individual's absolute income falls in comparison to the importance of relative income, a result that is consistent with the Easterlin paradox. Their econometric analysis showed that "A taste for status emerges in economies when their (per

capita) income level reaches ... $2163,[23] after which the relative income gradually increases in importance relative to absolute income until an (per capita) income level of ... $35,895. Beyond this level of economic development, the estimate predicts that only relative income matters." Parenthesis mine.

The takeaway is that wealth affects the importance of status. But the relationship could be bi-directional in the sense that the importance of status can also affect wealth or economic prosperity depending on whether a higher taste for status causes individuals to invest in productive activities or unproductive activities. Propositions 1, 2, 3, and 4 imply that the security of property rights and the opportunity cost of unproductive activities in terms of productive activities (i.e., when the constraint on total effort binds or does not bind) determine whether an increase in the importance of status (a higher taste for status) enhances economic prosperity or stifles economic prosperity. In particular, proposition 2 suggests that, in addition, to the co-existence of a high taste for relative income and high income as found in Davis and Wu (2019), we should also observe a high security of property rights and a high marginal productivity of productive labor because it is under these conditions that an increase in the taste for status leads to a decrease in unproductive activities.

Status, as a source of power and honor, can be a means to the acquisition of wealth or a means to finding a desirable partner for marriage. Thus, tomorrow's wealth may be a function of today's status and wealth-as-status may, in turn, be a means to achieving non-market goods (Cole et al., 1992). Another mechanism through which status affects wealth is that high-status individuals hold higher expectations (beliefs) about their ability which, in turn, boosts their

[23]Strictly speaking, this is only in relation to an income-based taste for status because the taste for status is also based on non-income measures. Status can be based on ethnicity, gender, membership of a royal family, age, height, occupation (e.g., being a judge, a member of the clergy, etc). Davis and Wu (2019) found that there is a fixed component of the taste for social status that is independent of income but rather linked to persistent cultural values.

economic performance. In contrast, individuals endowed with low status are unable to hold high beliefs about their ability and this negatively affects their economic performance (Gonzalez-Jimenez, 2022; Ridgeway, 2019).

An implication of proposition 6 is that status-seeking can have far-reaching effects even if only a *few* people become more status-conscious. As those who become *more* status-conscious people intensify their status-seeking activity, this causes other relatively *less* status-conscious people to respond in order to at least maintain their status. Another implication of proposition 6 is that a negative effect of low status on economic outcomes may be driven by the *non-strategic* effect in the non-game-theoretic model of Gonzalez-Jimenez (2022) and by the *strategic* effect in this paper (i.e., an increase in a player's valuation of status reduces the productive effort of his opponent).

Proposition 5 implies that, under some conditions, it is possible to have an equilibrium in which rent-seeking effort is independent of productive ability. Hence, high-ability people may be engaged in as much rent-seeking as low-ability people. We also found that an increase in the security of property rights results in a decrease in rent-seeking effort only if the security of property rights is sufficiently high. Otherwise, rent-seeking effort will increase. However, the increase in the security of property rights unambiguously leads to an increase in productive effort and thus to an increase in output.

In a standard two-player rent-seeking game with non-identical valuations, the effort of the high-valuation player is increasing his valuation but the effort of the low-valuation player is decreasing in the valuation of the high-valuation player (Nti, 1999). But, as shown in this game (i.e., proposition 6), the low-valuation player's (player 2) rent-seeking effort increases when the high-valuation player's (player 1) valuation increases (i.e., r_1 increases). This is because in a

standard rent-seeking game, the players' valuations are exogenous. In this game, the players' valuations are endogenous in the sense that relative wealth, which determines status, depends on productive and rent-seeking efforts. For example, an increase in $\widehat{W}_1$ increases player 1's valuation of status but it also increases player 2's valuation (or disutility from lower status) because it affects both players' relative wealth. Therefore if, in response to an increase in his valuation of status (i.e., r_1), the high-valuation player increases his rent-seeking effort in order to increase his relative wealth, a low-valuation player will also do the same.

6. Conclusion

This paper has shown that the response of rent-seeking activity to an increase in the importance of status depends on the security of property rights and the marginal productivity of productive effort. When property rights are sufficiently secure and when the marginal productivity of productive effort is high or when the opportunity cost of unproductive effort in terms of productive effort is positive (the constraint on total effort binds), the response of rent-seeking effort to an increase in the importance of status is weaker. In fact, when property rights are secure, an increase in the importance of status may not only decrease unproductive effort but will increase productive effort. But when the opportunity cost of unproductive effort in terms of productive effort is zero, an increase in the importance of status leads to an increase in unproductive effort, regardless of property rights.

An interesting and fundamental issue is why some societies put a much higher premium on status than other societies or why some societies seem to suffer from status-obsession? Is it driven by poverty or inequality? Does the predominant mode of status-acquisition differ across societies? The answer to the last question, as shown in this paper, partly depends on the

protection of property rights and the enforcement of laws against social deviance and the opportunity cost of unproductive activities in terms of productive activities.

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Table 1: values of productive effort and rent-seeking effort, given $N = 2, r_2 = 0.1$, $\widehat{Y}_i = \sqrt{L_i}$, $f\left(\widehat{W}_i - \frac{\widehat{W}_1+\widehat{W}_2}{2}\right) = \widehat{W}_i - \frac{\widehat{W}_1+\widehat{W}_2}{2}$, $\alpha = 0.5$, $c(L_i) = 0.1L_i$, and $b(x_i) = 0.1x_i$.

r_1	$\tilde{L}_1$	$\tilde{L}_2$	$\tilde{x}_1$	$\tilde{x}_2$	$\widetilde{U}_1$	$\widetilde{U}_2$
0.1	15.016	15.016	10.656	10.656	1.308	1.308
0.2	16.526	14.556	11.798	10.815	1.286	1.240
0.3	18.151	14.140	12.943	10.952	1.281	1.180
0.4	19.892	13.764	14.092	11.072	1.292	1.125
0.5	21.175	13.421	15.243	11.178	1.320	1.076
0.6	23.721	13.107	16.399	11.274	1.362	1.031
0.7	25.810	12.819	17.556	11.361	1.420	0.989
0.8	28.017	12.544	18.723	11.442	1.491	0.951
0.9	30.342	12.308	19.892	11.516	1.5770	0.915
1.0	32.785	12.081	21.065	11.586	1.676	0.881