Status Spending Races, Cooperative Consumption and Voluntary Public Income Disclosure

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Abstract

Scholars from Duesenberry to Frank have argued that the pursuit of a higher social status, although rational from the individual's viewpoint, might be wasteful to society. Status conscious individuals find it optimal to over-consume positional goods and thus exert a negative externality on their peers. This paper presents a classroom experiment to introduce students to the theories of relative income. The experiment illustrates the external effect of positional goods consumption and discusses social arrangements to alleviate this externality problem. Students learn that a social arrangement as simple as voluntary income disclosure can revert individual consumption back to socially optimal levels.

JEL classification: A22, C92, D11

1. Introduction

Scholars from Duesenberry (1949) to Frank (1985a) have shown that status concerns can have a profound impact on consumer behaviour. Status conscious individuals, led by self-interest, find it optimal to over-consume positional goods (i.e. goods that one purchases at least partly for the sake of status considerations) in order to attain a higher position in their local environment.

As an illustration of this problem, consider a pool of recent college graduates each of whom applies for the same job opening. Suppose that some applicants decide to purchase an expensive designer suit to impress the interviewers. This behaviour adversely affects the employment chances of the other applicants. As a result, all graduates find themselves in a prisoner's dilemma situation whereby they feel forced to match the expenditure in order to maintain their original prospect of landing the job.[1] Except for the expensive suits, not much in this job market situation has changed: each applicant's hiring chances remain the same.

Despite the empirical validity of the relative income hypothesis, Duesenberry's (1949) theory has been dominated by Friedman's permanent income hypothesis and the subsequent life-cycle models of consumption and savings. Indeed, most of economic theory posits that individuals are concerned only with their absolute level of consumption. The permanent income hypothesis states that individuals base consumption decisions on prices and upon their long-term expected income profile. The relative income hypothesis states, in essence, that consumer choice is a function of prices, income and

[1] This example was put forth by Robert Frank (2008).

community consumption standards. The last consideration, that community consumption influences a consumer's choice behaviour, rests upon the premise that individuals derive status from their consumption behaviours and that status, in turn, is determined within a community-specific context. The relative income hypothesis stands at odds with the permanent income hypothesis in that it treats individual preferences as interdependent – at least within a community setting.

In contrast to the dominant permanent income hypothesis, the recent empirical literature provides ample evidence that individuals evaluate their own consumption relative to that of others. Oswald (1997) conducts an excellent survey of the first wave of empirical studies on the relative income hypothesis, which lends support to the idea that individual utilities are *interdependent* and the optimal consumption choice of each individual is, at least to some extent, driven by the choices of others. Luttmer (2005) and Solnick and Hemenway (2005) offer more recent and definitive evidence of relative income considerations. While concluding that relative income has some role in determining individual well-being, Stevenson and Wolfers (2008) estimate a positive relationship between per capita income and subjective well-being in a country.

Kosicki (1987) develops a theoretical model that incorporates a relative standing component into a permanent income framework in which consumers divide their income between consumption and savings. Using the 1972 Consumer Expenditure Survey, he develops an empirical test to examine whether average propensity to save depends on income rank, while controlling for the absolute income level. The regression results indicate that income rank is an important determinant of the saving rate.

In light of these findings, Frank (2005b) writes,

'…his (Duesenberry's) theory of consumer behavior clearly outperforms the alternative theories that displaced it in the 1950's- a striking reversal of the usual pattern in which theories are displaced by alternatives that better explain the evidence. His disappearance from modern economics textbooks is an intriguing tale in the sociology of knowledge. But it also has important practical implications. Unless we understand what drives consumption, which makes up two-thirds of total economic activity, we cannot predict how people will respond to policy changes like tax cuts or Social Security privatization…Most economists, it appears, just never wanted to believe the relative-income hypothesis- perhaps because it suggests the possibility of wasteful spending races' (pp. 1, 2–3).

Clark and Oswald (1996) also address the policy importance of the relative income hypothesis,

'Despite what economics textbooks say, comparisons in the utility function seem to matter. This has a number of implications. In a world with comparisons, the case for growth as a way of increasing happiness is no longer so clear (see Easterlin, 1974 and Layard, 1980). Optimal tax policies are affected because there are negative externalities from high earners (see Oswald, 1983). In an analogous way, the wages offered by firms may have low variance if there are intra-firm comparison effects, and may rise over time if workers compare their current wage to their own previous wages (see Frank and Hutchens, 1993). Moreover, because preferences are intrinsically interdependent, the standard optimality results of the free market may fail to hold' (p. 375).

Evidently, there is a present gap between economics research and economics teaching on the topic of relative income concerns. Also, there is little current understanding, beyond Frank (1985a&b), as to the efficacy of arrangements to limit the scope of positional good spending races. Frank (1985a) constructs a novel theoretical model in which consumers allocate income between a positional and a non-positional good. He shows positional good spending races to be the result of non-cooperative consumption of positional goods, where the purchase of such goods is externally costly to the status of others. Frank further discusses several public programmes that apparently limit the scope and damage of positional goods spending races. These include forced retirement savings programmes, overtime

laws and various forms of safety regulation. Forced retirement savings programmes, for example, limit status spending races by constraining a portion of an individual's income toward the purchase of non-positional goods.

More recently, Frank's (1985a) model has been reexamined and extended in several directions by Hopkins and Kornienko (see Hopkins and Kornienko 2004, 2006 and 2009). Hopkins and Kornienko (2004) consider a game of status in which individuals are concerned with both their absolute and relative level of consumption. Within the status game, the authors examine how the optimal individual decisions depend on the distribution of income. In their model, each individual signals his or her position in the distribution of income by purchasing a positional good (similar to the setting presented here). In the symmetric Nash equilibrium of this status game, a person's status rank can be inferred from his or her revealed consumption behaviour. The analysis, which focuses on how exogenous changes in the distribution of income affect individual decisions, uncovers the so-called 'Red Queen' effect: an increase in average income (in the sense of a refinement of first order stochastic dominance of the income distribution function) leads to an increase in conspicuous consumption to such an extent that total welfare remains unchanged or even decreases. Hence, a more affluent society can have a lower utility at each income level. The reason is that individuals waste their entire increase in income on conspicuous consumption such that all individuals 'run in order to keep at the same place' in the social hierarchy.[2]

The purpose of the present paper is to develop pedagogical tools for instructors who wish to introduce their students to the theories of relative income. We design a classroom experiment and develop an exercise problem that can be used in introductory or higher-level courses in economics to present the effect of positional considerations on consumer choice and social welfare. The theoretical analysis is quite straightforward and does not require advanced mathematical skills. The experiment, which requires less than one hour of class time, can be naturally incorporated into an introductory economics course once the instructor has introduced the concepts of utility and consumer choice.[3] The experiment can also be embedded in a general discussion about externalities, market failures and various social arrangements intended to correct market failures.

In our hypothetical environment, students are asked to allocate their income across two goods: a partially positional and a purely non-positional good. Participants in the experiment vary by income. Half of the students are high income earners and the other half are low income earners. The experiment illustrates that high income earners have an incentive to signal their position by overspending on the positional good. We then discuss social arrangements that can alleviate this externality problem. In particular, students learn through the experiment that a social arrangement as simple as the voluntary disclosure of income can revert individual consumption back to socially optimal levels. Within the paper, the term 'voluntary income disclosure' suggests a policy in which an individual can allow a particular government agency, such as an income tax collecting body, to report his or her income in a public forum.

As in Frank's (1985a) model, participants in the experiment know the income distribution within their community in an anonymous manner. In other words, every individual knows the number of high and low income earners without knowing their identities. This partial knowledge creates incentives for individuals to non-cooperatively signal their income status through positional good spending. Such an

[2] The Red Queen is a character from Lewis Carroll's (1871) book *Through the Looking Glass*. The Red Queen explains to Alice that in her country it takes all the running you can do to keep in the same place after Alice observes that, although they run faster and faster they remain in the same spot.

[3] The authors ran the experiment in a survey of economics course using 10 minutes to outline the experiment, 10 minutes to conduct a practice run of the first treatment, and 30 minutes (with results tabulation) to conduct the actual experiment. The total course time used was approximately 50 minutes.

exercise is costly because high income individuals over-consume the positional good to an extent that dissuades lower income individuals from matching the status signal. If people were to disclose income publicly, however, positional goods spending would lose its value as a signal of income status and consumption would revert back to socially optimal levels.

The remainder of the paper is organised as follows. The next section explains how instructors can initiate a discussion of the concepts of positional goods and status spending races by using the standard consumer choice framework. We then go on to describe the classroom experiment and its equilibria. The fourth section presents the empirical results of the classroom experiment for two class sections, where students who participated in the experiment were assigned class bonus points based on their within-group utility ranking. Further, the fourth section tests to what degree the theoretical equilibria of the experiment predicted real behaviour. The final section contains the debriefing of the experiment and presents questions and ideas that instructors can use for further discussion or as a course assignment. Appendix A presents the instructions of the experiment, and Appendix B reports the choices that students made so as to encourage other instructors to replicate the classroom experiment. Appendix C presents an exercise for instructors who wish to discuss the topic using only a numerical problem. Lastly, Appendix D provides an alternative treatment of the exercise analysed presently. In the alternative treatment, a government policy is explored that forces individuals to spend at least 50 per cent of their personal income on a non-positional good. The welfare properties of such a policy are discussed.

2. Introducing the topic in the classroom

A discussion of the concepts of relative income and positional goods can be incorporated into the curriculum shortly after students are introduced to the concepts of utility and consumption choice. As a starting point for the classroom discussion, the instructor might project the standard two-goods consumer choice graph with the budget constraint and the system of indifference curves and ask students to list the factors that affect the optimal choice of the consumer. Once students identify that prices and consumer preferences play a role, the instructor can inquire whether the consumption choices of peers, co-workers, neighbours or relatives could affect the preferences of the consumer and eventually his or her consumption choice. Are there items that one wishes to possess mostly to demonstrate that he or she can afford them? Are there goods that people consume just to 'keep up with the Joneses'? The instructor can ask students to provide examples of goods that have a positional or demonstration element. Items that students frequently mention include cell phones, designer clothing, houses in rich neighbourhoods, swimming pools, expensive cars, etc. The instructor can then explain that status spending races will be the major topic of discussion and either distribute the experimental instructions (see Appendix A) or present the exercise (see Appendix C).

3. Experimental design and equilibria

Setting

In this section, we present a simple model that incorporates positional considerations into the standard textbook consumer choice problem. Within the model, there are two equally represented consumer types: high income individuals and low income individuals. The model illustrates that high income individuals have an incentive to signal their position by overspending on the positional good. The individual quest for status creates an externality that biases high income consumers' choices away from the social optimum. We posit that a mechanism as simple as the voluntary public disclosure of income can act as a cooperative mechanism so as to restore socially optimal consumption levels to a status-conscious community.

Consider a community of $N \geq 2$ individuals, where N is an even number. Half of the community members earn an individual income of \$6000 per month. We will refer to these people as 'high income earners'. The remaining half of community members earn an individual income of \$5000 per month and are referred to as 'low income earners'. Each community member decides how to split his income between two goods, *x* and *y*, where income can be allocated in multiples of \$1000. The first good, *x*, is purchased for its direct use only. Its consumption has no relation to the status an individual enjoys in the community. An example of such a good might be an insurance policy or toilet paper. The second good, *y*, is consumed partly for its direct use and partly for demonstration purposes. Other members of the community observe how much of this good is consumed by each individual, and this consumption choice determines the income status of each individual in the community (i.e. whether an individual is perceived as earning a high income or a lower income). One might think of home size as being a (partly) positional good. Additional home size can be useful (i.e. can give a person non-positional utility) but is, at the same time, considered a sign of status (i.e. can give a person positional or status utility).

Within the model, those who exceed the median expenditure on good *y* (i.e. the top half positional good spenders) are perceived as high earners and receive 3 units of status or positional utility. All other individuals are perceived as low earners and receive no status or positional utility. If there is a tie at the median spending level for good *y*, community members involved in the tie share the remaining community status utility equally. For example, if two members tie for the last position as a 'high' (top half) spender on good *y*, then they each receive (3/2) = 1.5 units of status utility. If three community members tie for the last two positions as a 'high' spender on good *y*, then they each receive (2*3)/3 = 2 units of utility. If all community members spend the same amount on good *y*, each member receives $\left(\frac{3N}{2N}\right)$ = 1.5 units of status utility. The unit price for each good is \$1000. Table I below states the non-positional marginal utility schedules for each good.

Table 1: Non-positional marginal utility schedules for each good

Units purchased	Marginal utility of good *x* (toilet paper)	Marginal utility of good *y* (home size)
1	45	45
2	40	40
3	30	30
4	15	15
5	10	10
6	5	5

4. Equilibrium analysis

In this section, we analyse how consumers allocate their income in the (Nash) equilibrium of this market setting. Our main result is captured in the following statement.

(Separating equilibrium). In the Nash equilibrium of this market game, high earners spend \$4000 on purchases of the partially positional good y *and \$2000 on purchases of the non-positional good* x*. Lower earners spend \$3000 on good* y *and \$2000 on good* x*.*

Proof. To show that these levels of spending form a Nash equilibrium, we must verify that no deviation can be profitable for any individual.

High income earners

According to the strategy profile above, high earners invest more in *y* than do lower earners. Hence, high earners are identified as such and receive 3 units of status utility. Their total utility is 6+5+4+3 (from the consumption of good *y*), plus 6+5 (from the consumption of good *x*), plus the additional 3 units of status utility. These values sum to 32 units of utility. The marginal utility of the 5th unit of good *y* is 2 units, and the marginal utility of the 2nd unit of good *x* is 5 units. It is therefore obvious that a high income earner has no incentive to increase his allocation of good *y* at the expense of consuming less of good *x*. Would it be profitable for a high income earner to purchase 3 units of each good? In such a case, the high income earner's non-positional utility would be (6+5+4) for each of the two goods. This sums to 30 units of non-positional utility. As the high income earner can no longer be differentiated from lower earners, he shares one unit of high income status with $\frac{N}{2}$ other individuals. The utility derived from this tie equals

$$\frac{2}{\frac{N}{2}+1}$$

which is less than 2. Hence, it is not profitable for a high income earner to split his budget equally across the two goods – a behaviour that would be optimal without status considerations.

Low income earners

Low income earners spend \$3000 on the consumption of good *y* and \$2000 on good *x*. This allocation of income is already optimal to low income earners without status consideration. The total utility attained from the income allocation is 6+5+4+6+5 = 26 units. We need only examine the deviations in which lower income earners invest more in status. Consider the situation in which one lower income earner imitates the behaviour of the high income earners. His non-positional utility is 6+5+4+3+6 = 24 units. Such a lower income earner ties with $\frac{N}{2}$ high income earners. His status utility is

$$\frac{2 \cdot \frac{N}{2}}{\frac{N}{2}+1} = \frac{2}{1+\frac{2}{N}} < 2$$

.

Hence, the total utility from the deviation is less than 26 units, and such a deviation is not profitable. The strategy profile described above is an equilibrium. It is interesting to consider whether there are other equilibria in this model. According to the strategy profile described above, lower income earners do not strive for status and invest according to the social optimum (3 units in good *y* and 2 units in good *x*). Some of them might find it equally rewarding to shift to a consumption of 2 units of good *y* and 3 units of good *x*. They will still be regarded as lower income and derive the same utility from this income allocation. Thus, there are equilibria in which some (but not all) of the lower income citizens buy 2 units of *y* and 3 units of *x*. If all lower income individuals behaved in this way, would such a behaviour still constitute an equilibrium? In this case, high income earners would enjoy a profitable deviation by buying 3 units of each good (which is socially optimal), as they would still be able to differentiate themselves from the lower income individuals. Thus, the only equilibrium possible is the separating equilibrium described above.

Voluntary disclosure of income

In this section, we explore the impact of a voluntary income disclosure mechanism. We maintain the assumption that income is private information but allow for a technology through which individuals may disclose their income. The act of disclosing income guarantees a high income (low income) status and 3 (0) additional units of status utility to individuals earning $6000 ($5000). Non-disclosing individuals, on the other hand, engage in a signalling contest amongst themselves. The total value of the signalling game is equal to 3 units multiplied by the number of high income earners who fail to disclose their income. In other words, community members can infer the aggregate amount of status that 'should be' assigned to non-disclosing individuals in that they know the aggregate income distribution for the community and thus for the sub-community of income disclosers. What incentives exist for high income earners to disclose their income level? The next statement describes the equilibrium profile of the voluntary income disclosure setting.

In the voluntary disclosure equilibrium, each high income earner discloses his income, invests $3000 in each of goods x *and* y *and attains a total utility of 33 units. The lower income individuals are indifferent between disclosing and not disclosing their income and attain a total level of 26 units of utility by investing either $3000 in good* x *and $2000 in good* y *or $2000 in good* x *and $3000 in good* y*.*

Observe that, by disclosing their income status, high income earners are able to secure their position in the income distribution. Disclosure by such a person is rewarded with an additional 3 units of utility. Thus, the incentive for a high income earner to signal status through 'additional' purchases of the positional good, and sacrifice non-positional utility in doing so, is eliminated. An income-disclosing, high income earner will obtain a utility of 2(6+5+4) = 30 units of utility from consumption and 3 additional units from status. These values sum to 33 units of total utility. If high income earners disclose their income, it is immaterial whether lower income earners disclose because their earnings can be inferred. Lower income earners maximise their utility either by purchasing 2 units of good x and 3 units of good y or by purchasing 3 units of good x and 2 units of good y. Either choice gives such an individual 26 units of utility. Voluntary disclosure of income restores the socially optimal level of consumption for the two goods. To obtain more details regarding the experimental design, please see the experimental instruction sheet in Appendix A.

5. Experimental results

The classroom experiment was conducted across two sections of an undergraduate Survey of Economics course at Nicholls State University in the Fall semester of 2009, shortly after students learned about utility and consumer choice. Each student received an experimental instruction sheet (see Appendix A) and was randomly assigned to an income group such that half of the students received an income of $6000 per month and the remaining students received an income of $5000 per month. The instruction sheet listed the marginal utility and status utility rules associated with consumption of the two goods. Each student fully allocated personal income between (integer quantities of) goods *x* and *y*, where each good carried a unit price of $1000. Students recorded their allocations on a sheet of paper and handed the paper to the professor. The professor recorded the allocations for each individual, ranked the students in terms of status good allocations and assigned status utility accordingly.

It is important to note that students were incentivised through the assignment of course extra credit points. In each of the two treatments, those who earned an overall utility level at or above the median overall utility level in their income group were given 3 points of extra credit. Those falling below the median utility level for their income group in a given treatment were given 1 extra credit point. Individual choices across the two sections are summarised in Tables IIa to IId below.

Table II a: Positional good allocation among high earners – treatment 1, section 1

Units of y	Frequency (n = 18)	Non-positional utility	Total utility
6	0	21	24
5	5	26	29
4	10	29	31.57
3	2	30	30
2	1	29	29
1	0	26	26
0	0	21	21

Table II b: Positional good allocation among lower earners – treatment 1, section 1

Units of y	Frequency (n = 18)	Non-positional utility	Total utility
5	0	20	23
4	3	24	26.57
3	11	26	26
2	2	26	26
1	2	24	24
0	0	20	20

Table II c: Positional good allocation among high earners – treatment 1, section 2

Units of y	Frequency (n = 19)	Non-positional utility	Total utility
6	2	21	24
5	7	26	29
4	8	29	30.85
3	2	30	30
2	0	29	29
1	0	26	26
0	0	21	21

Table II d: Positional good allocation among lower earners – treatment 1, section 2

Units of *y*	Frequency (*n* = 19)	Non-positional utility	Total utility
5	2	20	23
4	5	24	25.85
3	9	26	26
2	2	26	26
1	0	24	24
0	1	20	20

In Treatment 1, the case with no income disclosure option, the predicted choice for each group ($4000 spending on the positional good by high income individuals and $3000 by lower income individuals) was more frequently chosen than any other option for the group. This outcome was observed in each of the two sections. Further, average positional good allocations for the high income groups (4.06 and 4.47) and the low income groups (2.83 and 3.21) lie closest to the respective predicted equilibrium point. Lastly, those whose allocations matched the predicted equilibrium received the highest possible outcome given their status. In other words, participants interacted in such a way that the choices forming the predicted equilibrium were indeed optimal.

In Treatment 2, we introduced the option of income disclosure. That is to say, participants had the option to reveal their income before choosing allocations of the positional and non-positional good. The outcomes for this case are featured in Tables IIIa to IIId below.

Table III a: Positional good allocation among high earners – treatment 2, section 1

Units of *y*	Revealed	Frequency (*n* = 18)	Non-positional utility	Total utility
6	No	0	21	24
6	Yes	0	21	24
5	No	1	26	29
5	Yes	0	26	29
4	No	1	29	30
4	Yes	4	29	32
3	No	0	30	30
3	Yes	10	30	33
2	No	0	29	29
2	Yes	2	29	32
1	No	0	26	26
1	Yes	0	26	29
0	No	0	21	21
0	Yes	0	21	24

Table III b: Positional good allocation among lower earners – treatment 2, section 1

Units of *y*	Revealed	Frequency (*n* = 18)	Non-positional utility	Total utility
5	No	0	20	23
5	Yes	0	20	20
4	No	2	24	25
4	Yes	0	24	24
3	No	8	26	26
3	Yes	3	26	26
2	No	2	26	26
2	Yes	3	26	26
1	No	0	24	24
1	Yes	0	24	24
0	No	0	20	20
0	Yes	0	20	20

Table III c: Positional good allocation among high earners – treatment 2, section 2

Units of *y*	Revealed	Frequency (*n* = 19)	Non-positional utility	Total utility
6	No	0	21	24
6	Yes	0	21	24
5	No	3	26	29
5	Yes	0	26	29
4	No	2	29	29.6
4	Yes	3	29	32
3	No	0	30	30
3	Yes	9	30	33
2	No	0	29	29
2	Yes	1	29	32
1	No	0	26	26
1	Yes	1	26	29
0	No	0	21	21
0	Yes	0	21	24

Table III d: Positional good allocation among lower earners – treatment 2, section 2

Units of *y*	Revealed	Frequency (*n* = 19)	Non-positional utility	Total utility
5	No	1	20	23
5	Yes	0	20	20
4	No	3	24	24.6
4	Yes	0	24	24
3	No	8	26	26
3	Yes	3	26	26
2	No	2	26	26
2	Yes	2	26	26
1	No	0	24	24
1	Yes	0	24	24
0	No	0	20	20
0	Yes	0	20	20

Across the two sections, most high income earners revealed their income (16 of 18 and 14 of 19), whereas a minority of lower income earners reveal their income (6 of 18 and 5 of 19). Most high income earners understood the advantage of income disclosure over costly positional good signalling. We know that higher income earners used disclosure in lieu of the signal because the typical consumption (over-consumption) level for good *y* among this group fell drastically from Treatment 1 to Treatment 2. High income earners scaled back in average consumption of good *y* from 4.06 to 3.28 in class section 1 and from 4.47 to 3.63 in class section 2. This resulted in an increase of average utility in each section (from 30.54 to 32.28 and from 29.36 to 31.59 in the respective sections).

To test whether the typical high income earner experienced a statistically significant income gain from Treatment 1 to Treatment 2, we employ a paired samples t-test and a Wilcoxon signed rank sum test for each class section's high income group. The paired samples t-test indicates that high income earners consume less of good *y* (two-tailed p-values = 0.0063 and less than 0.0001, respectively) and consequently achieve higher levels of utility from consumption (two-tailed p-values for each section < 0.0001). The Wilcoxon signed rank sum test also suggests, at a reasonable confidence level, that consumption of good *y* fell (p-values = 0.0026 and 0.0002, respectively) and that high income earners consequently earned higher utility levels (p-values = 0.0002 and 0.0003, respectively). Students in the lower income group did not experience significant changes in their consumption or utility levels across treatments. Within each sample, utility levels rose by a statistically insignificant amount for lower income earners. The insignificance of this result follows the predicted experimental outcome. Lower income earners had no incentive to over-invest in the positional good in either case. They stood only to profit in the status signalling game if a sufficient number of high income earners deviated from their optimal choice for a given treatment. Such deviations among high income earners were equally plausible in either treatment.

6. Discussion after the experiment

A good means by which to initiate the debriefing of the experiment is to ask whether students made different choices in the two treatments. The instructor can count the number of students who spent more on the partially positional good in Treatment I (compared to Treatment II), the students who did not change their choice across the two treatments, and the students who spent less on the status good

in Treatment I. Then, the instructor can ask students which is the best consumption choice for high income individuals, and which is the best consumption choice for low income individuals. Typically, low income earners report that they tried to maximise their non-positional utility, while many high income earners share that they attempted to maximise the sum of their positional and non-positional utilities. As a next step, the instructor can ask whether students realised a difference in utility level across the two treatments and count hands again. The instructor can then ask what (experimental design) factor accounts for the change in utility level across treatment.

The instructor can further help students relate the exercise to realistic behaviour by asking them for examples of social scenarios in which they have observed individuals engaged in status spending races. What are the consequences of such races? The instructor can mention that the high rates of personal bankruptcy and real estate foreclosures, as well as the high proportion of individuals without health insurance in the United States, may partly result from status spending races. Finally, we lay out some additional questions that instructors can discuss at the end of the class session and list some observed student comments.

Potential questions for discussion:

1) What is the chief problem associated with status races according to the experiment?

2) In the first treatment of the experiment, income groups have already been established. Given this, is it optimal for a high income individual to avoid a status race altogether (given that other high income individuals will engage in the status race regardless)?

3) Can government policy change the extent to which individuals enter into a status race?

4) Which goods in reality do you believe to be highly positional (i.e. to be observed for the purposes of status comparison within a community)?

Observed student comments:

1) School uniforms in secondary school may act to restrict status signalling through fashion expenditures.

2) Some secondary schools disallow students from driving to school. Such schools may wish to keep (automobile-related) status spending at bay.

3) A good must be observable by one's peers to be an effective status signal.

4) Non-anonymous charitable donations may be a way to signal one's income status.

7. Conclusion

Recent advances in the empirical literature on the relative income hypothesis challenge the traditional assumption that individuals are concerned only with their absolute level of consumption. A departure from this assumption has significant implications for our understanding of the way markets coordinate the incentives of economic agents. When individuals are concerned with their relative social standing, free markets lead to spending races on positional goods and generally result in Pareto inferior allocations.

This paper presents a classroom experiment to introduce students to the relative income model and illustrate the effects of positional considerations on consumer choice. We develop a simplified version of Frank's (1985a) theoretical model of consumer choice, discuss its theoretical properties, and compare student behaviour during the experiment with the theoretical solution of the model. Our

analysis does not require the use of advanced mathematical techniques, yet the model illustrates how the incentives of individuals lead to overspending on the positional good.

The experiment features two income groups and a mechanism in which participants can disclose income. High income earners within the experiment are shown to over-invest in units of a positional good in the absence of a public income disclosure mechanism. However, this over-investment problem largely subsides when a public income disclosure mechanism becomes available. This is found to be true both within the predicted Nash equilibrium outcome and within experimental results. Consequently, high income earners achieve significantly higher levels of utility. Public income disclosure serves to discredit the signalling value of positional goods spending within the experiment.

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Appendix A (Instructions)

Experiment on Positional Goods
Student Instructions

You are a member of a community consisting of all students in the classroom. Half of the community members earn $6000 per month, and the other half earn $5000 per month. The instructor will privately tell you how much your monthly earnings are in this experiment (Without revealing the number to anyone, turn to the last page of your sheet for this information.) No one except you will know how much you earn, and you also will not know how much other individuals are earning. You can spend your income on two goods.

The first good, *x*, is purchased for its direct use only. It cannot influence how others feel about you (i.e. whether others believe you to belong to the high or the low earners). You might think of this good as an insurance policy or toilet paper.

The second good, *y*, is consumed partly for its direct use and partly for positional reasons. The second consumption motivation suggests that other members of the community observe how much of this good you consume, and this consumption choice determines your position in the community (i.e. whether you are perceived to be a high income or a low income person). You might think of a positional good as home size. Additional home size can be useful (i.e. can give you non-positional utility) but is, at the same time, observed as a sign of status (i.e. can give you positional or status utility).

Your non-positional marginal utility schedules for each good are as follows:

Table 1: Non-positional utility in consumption of *x* and *y*

Units purchased	Marginal utility of good *x* (toilet paper)	Marginal utility of good *y* (home size)
1	6	6
2	5	5
3	4	4
4	3	3
5	2	2
6	1	1

Treatment I

Your expenditures on good *y* are observed by other members of your community, and they determine how much utility you receive from status in addition to the direct utility received from y (as listed above). If you are in the top half of community members, in terms of quantity of good y consumed, you receive 3 units of status or positional utility. If you are in the bottom half, you receive 0 units of status utility. If there is a tie at the median spending level for good *y*, community members involved in the tie will share the remaining community status utility equally. For example, if two members tie for the last position as a 'high' (i.e. top half) spender on good *y*, then they each receive (3/2) = 1.5 units of status utility. If three community members tie for the last two positions as a 'high' spender on good *y*, then they each receive (2*3)/3 = 2 units of utility. If all community members spend the same amount on good *y*, each member receives 1.5 units of status utility. Each unit of good *x* costs $1000, as does each unit of good *y.* Please choose how you wish to spend your income with the objective of maximising your utility. Do so by checking your chosen box in the 'Choice' column. If you are a low income person, check only one box of the low income table. If you are a high income person, check only one box of the high income table.

Low income:

Choice	Good *x*	Good *y*
	$0	$5000
	$1000	$4000
	$2000	$3000
	$3000	$2000
	$4000	$1000
	$5000	$0

High income:

Choice	Good *x*	Good *y*
	$0	$6000
	$1000	$5000
	$2000	$4000
	$3000	$3000
	$4000	$2000
	$5000	$1000
	$6000	$0

Your income level is: (either '$5000' or '$6000' here, depending upon random draw).

Treatment II

Your income remains the same, but you can now voluntarily disclose your income level to all community members. If you are a high income person and disclose this information, you will receive additional 3 units of utility associated with your high income status. If you are a low income individual and disclose this information, you will receive no additional utility. After deciding whether to disclose income, you will decide how to split your income across the two goods. Your marginal utilities associated with the direct consumption of *x* and *y* are the same as in the first treatment (see Table 1).

The pool of students who do not reveal their income in Treatment II will receive status utility according to the following rules. The instructor will first calculate how many high income individuals did not disclose their income. This number will serve as the number of high status positions 'available' within the positional good status signalling game. Suppose that *m* high income individuals did not disclose their income. Of the students who did not disclose their income, whether they be high income or low income, the top *m* individuals in terms of consumption levels of good *y* receive 3 units of status utility. All other non-disclosing individuals receive 0 units of status utility. If there is a tie at the median spending level for good *y*, community members involved in the tie will share the remaining community status utility equally as in the sharing rule of Treatment I.

Given these rules do you wish to disclose your income to other students? Check one option.

_____Yes _____No

Now, decide how much of good *x* and how much of good *y* you wish to purchase with the objective of maximising utility (i.e. check one box in the appropriate table).

Low income:

Choice	Good *x*	Good *y*
	$0	$5000
	$1000	$4000
	$2000	$3000
	$3000	$2000
	$4000	$1000
	$5000	$0

High income:

Choice	Good *x*	Good *y*
	$0	$6000
	$1000	$5000
	$2000	$4000
	$3000	$3000
	$4000	$2000
	$5000	$1000
	$6000	$0

Appendix B (Tables)

Table I: Non-positional utility in consumption of *x* and *y*

Units purchased	Marginal utility of good *x* (toilet paper)	Marginal utility of good *y* (home size)
1	6	6
2	5	5
3	4	4
4	3	3
5	2	2
6	1	1

Table II a: Positional good allocation among high earners – treatment 1, section 1

Units of y	Frequency (*n* = 18)	Non-positional utility	Total utility
6	0	21	24
5	5	26	29
4	10	29	31.57
3	2	30	30
2	1	29	29
1	0	26	26
0	0	21	21

Table II b: Positional good allocation among lower earners – treatment 1, section 1

Units of *y*	Frequency (*n* = 18)	Non-positional utility	Total utility
5	0	20	23
4	3	24	26.57
3	11	26	26
2	2	26	26
1	2	24	24
0	0	20	20

Table II c: Positional good allocation among high earners – treatment 1, section 2

Units of *y*	Frequency (*n* = 19)	Non-positional utility	Total utility
6	2	21	24
5	7	26	29
4	8	29	30.85
3	2	30	30
2	0	29	29
1	0	26	26
0	0	21	21

Table II d: Positional good allocation among lower earners – treatment 1, section 2

Units of *y*	Frequency (*n* = 19)	Non-positional utility	Total utility
5	2	20	23
4	5	24	25.85
3	9	26	26
2	2	26	26
1	0	24	24
0	1	20	20

Table III a: Positional good allocation among high earners – treatment 2, section 1

Units of *y*	Revealed	Frequency (*n* = 18)	Non-positional utility	Total utility
6	No	0	21	24
6	Yes	0	21	24
5	No	1	26	29
5	Yes	0	26	29
4	No	1	29	30
4	Yes	4	29	32
3	No	0	30	30
3	Yes	10	30	33
2	No	0	29	29
2	Yes	2	29	32
1	No	0	26	26
1	Yes	0	26	29
0	No	0	21	21
0	Yes	0	21	24

Table III b: Positional good allocation among lower earners – treatment 2, section 1

Units of *y*	Revealed	Frequency (*n* = 18)	Non-positional utility	Total utility
5	No	0	20	23
5	Yes	0	20	20
4	No	2	24	25
4	Yes	0	24	24
3	No	8	26	26
3	Yes	3	26	26
2	No	2	26	26
2	Yes	3	26	26
1	No	0	24	24
1	Yes	0	24	24
0	No	0	20	20
0	Yes	0	20	20

Table III c: Positional good allocation among high earners – treatment 2, section 2

Units of *y*	Revealed	Frequency (*n* = 19)	Non-positional utility	Total utility
6	No	0	21	24
6	Yes	0	21	24
5	No	3	26	29
5	Yes	0	26	29
4	No	2	29	29.6
4	Yes	3	29	32
3	No	0	30	30
3	Yes	9	30	33
2	No	0	29	29
2	Yes	1	29	32
1	No	0	26	26
1	Yes	1	26	29
0	No	0	21	21
0	Yes	0	21	24

Table III d: Positional good allocation among lower earners – treatment 2, section 2

Units of *y*	Revealed	Frequency (*n* = 19)	Non-positional utility	Total utility
5	No	1	20	23
5	Yes	0	20	20
4	No	3	24	24.6
4	Yes	0	24	24
3	No	8	26	26
3	Yes	3	26	26
2	No	2	26	26
2	Yes	2	26	26
1	No	0	24	24
1	Yes	0	24	24
0	No	0	20	20
0	Yes	0	20	20

Appendix C (Alternative exercise)

You are a member of a small neighbourhood consisting of four individuals. Two of the individuals earn a monthly income of $6000 (we will refer to them as being high income earners or 'rich' individuals), and the other two earn $5000 per month (low income earners or 'poor' individuals). Each individual knows only his/her own income, but does not know who is 'rich' and who is 'poor' of his neighbours. Each individual divides his income across two goods, *x* and *y,* and we assume for simplicity that a unit of each good costs $1000.

The first good, *x*, is purchased for its direct use only. It cannot influence how you are perceived by your neighbours (i.e. whether they believe you to belong to the high or the low earners). You might think of this good as an insurance policy or toilet paper.

The second good, *y*, is consumed partly for its direct use and partly for positional reasons. The second consumption motivation suggests that other members of the community observe how much of this good you consume, and this consumption choice determines your position in the neighbourhood (i.e. whether you are perceived to be a high income or a low income person). You might think of a positional good as home size. Additional home size can be useful (i.e. can give you non-positional utility) but is, at the same time, perceived as a sign of status (i.e. can give you positional or status utility).

Your non-positional marginal utility schedules for each good are as follows:

Units purchased	**Marginal utility of good *x* (toilet paper)**	**Marginal utility of good *y* (home size)**
1	45	45
2	40	40
3	30	30
4	15	15
5	10	10
6	5	5

The amount of good *y* that you consume is observed by other members of your community, and you also observe how many units each of your neighbours consume from the status good. These consumption quantities determine how much utility you receive from status in addition to the direct utility received from *y* (as listed above). If you are in the top half of community members, in terms of quantity of good *y* consumed, you receive 30 units of status or positional utility. If you are in the bottom half, you receive 0 units of status utility. If there is a tie at the median spending level for good *y*, community members involved in the tie will share the remaining community status utility equally. For example, if two members tie for the last position as a 'high' (i.e. top half) spender on good *y*, then they each receive (30/2) = 15 units of status utility. If three community members tie for the last position as a 'high' spender on good *y*, then they each receive 30/3 = 10 units of utility.

a) Assume that you are a high income earner. Assume also that the other high income earner purchases 4 units of the positional good, and each of the two low income earners purchase 3 units of the positional good. Fill out the table below to determine the utility that you will receive for each of the budget allocations given in the rows. What is your optimal choice?

Solution:

Positional utility	Non-positional utility	Total utility	Good *x*	Good *y*
30	*145*	*175*	$0	$6000
30	*180*	*215*	$1000	$5000
30	*215*	*245*	$2000	$4000
10	***230***	***240***	$3000	$3000
0	*215*	*215*	$4000	$2000
0	*185*	*185*	$5000	$1000
0	*145*	*145*	$6000	$0

The optimal choice is to purchase 3 units of each good.

b) Assume that you are a low income earner. Assume also that the high income earners purchase 4 units of the positional good, and the other low income earner purchases 3 units of the positional good. Fill out the table below to determine the utility that you will receive for each of the budget allocations given in the rows. What is your optimal choice?

Solution:

Positional utility	Non-positional utility	Total utility	Good *x*	Good *y*
30	*140*	*170*	$0	$5000
20	*185*	*205*	$1000	$4000
0	***210***	***210***	$2000	$3000
0	***210***	***210***	$3000	$2000
0	*185*	*185*	$4000	$1000
0	*140*	*140*	$5000	$0

The optimal choice is to purchase either 2 or 3 units of the positional good.

c) Calculate the opportunity cost of purchasing the fourth unit of the positional good for rich and for poor individuals. Why does a rich individual find it worthwhile to consume the fourth unit and a poor individual does not?

Solution:

A rich individual who increases his consumption of the positional good from 3 to 4 gains 15 additional units of utility but loses 40 units of utility due to the reduction in consumption of the non-positional good from 3 to 2 units. So, the opportunity cost is 25. This is less than 30 units gained in positional utility. A poor individual gains 15 additional units but loses 40 units due to the reduction in consumption of the

non-positional good from 2 to 1. So, the opportunity cost is 35. This is more than the positional utility that can be gained.

d) What is the utility of 'rich' individuals and the utility of 'poor' individuals in equilibrium (rich individuals consume 4 units of the positional good and poor individuals consume 3 units of the positional good).

Solution:

The total utility of a rich individual is 240 and of a poor individual is 210.

e) Assume that rich individuals are able to voluntarily disclose and verify their income, so that they can attain their status utility without the need to signal their income through conspicuous consumption. Calculate the optimal budget allocation of the rich individuals. Were they able to increase their utility?

Solution:

It is optimal for a rich individual to consume 3 units of both goods. Total utility in this case is 260.

f) Discuss government policies aimed at reducing conspicuous consumption and status spending races.

Solution:

Students can discuss taxes on positional goods, forced retirement savings programmes, and mandates on purchasing health insurance – a measure that is incorporated in the recent US healthcare reform bill.

Appendix D (An alternative Treatment II; not analysed in this paper)

This treatment serves as an alternative to Treatment II of the original exercise. It does not invoke public income disclosure but, rather, another policy designed to alleviate the cost of a status spending race. In this treatment, your income remains the same as in Treatment I, as do prices and (non-positional and positional) utility levels. However, the government now forces each individual to spend at least 50 per cent of his or her (reported) income on units of the non-positional good.

Given this constraint, decide how much of good *x* and how much of good *y* you wish to purchase with the objective of maximising utility (i.e. check one box in the appropriate table).

Low income:

Choice	Good *x*	Good *y*
unavailable	$0	$5000
unavailable	$1000	$4000
unavailable	$2000	$3000
*	$3000	$2000
	$4000	$1000
	$5000	$0

High income:

Choice	Good *x*	Good *y*
unavailable	$0	$6000
unavailable	$1000	$5000
unavailable	$2000	$4000
*	$3000	$3000
	$4000	$2000
	$5000	$1000
	$6000	$0

The predicted choices for each income type are marked with an asterisk. As can be confirmed by the utility tables provided previously, such an outcome is Pareto optimal within the present stylised example (where there are no costs of enforcing the spending policy).

Authors Biography

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Shane Sanders is an assistant professor of economics at Western Illinois University. His research focuses on the welfare implications of resource contests (e.g., conflict or non-price allocative contests). Dr. Sanders lives in Macomb, IL (U.S.), a small community in which status spending races are relatively tame. He is further liberated from the ill effects of status spending races in that his salary is a matter of public record.

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