RANK AS AN INCENTIVE: EVIDENCE FROM A FIELD EXPERIMENT

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ABSTRACT

Money is the prime incentive considered in economic models. However, evidence from other fields suggests that people are also greatly concerned about their social rankings. It is unclear whether this is because rank brings tangible benefits, or because people also have an intrinsic desire for high rank. This paper provides evidence for the latter. In our field experiment, Vietnamese students performed significantly better on an English test when they were told their rankings than when they were not. This result held even when this ranking information could not be communicated, and thus could not bring any tangible benefits.

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“…rank among our equals, is, perhaps, the strongest of all our desires.”

(Adam Smith 1759)

Introduction

Economists have long noted the merits of competition. In competition, competitors care about their rank more than about their absolute performance because it is rank that determines the winners and losers. Rank also lies at the core of the tournament theory, which explains much of the motivation in our world. People desire high rank because it often brings tangible benefits, such as income, protection, necessities, and conveniences. Yet, Adam Smith went further, in his Theory of Moral Sentiments, and argued that our desire for tangible benefits is small compared to our intrinsic desire for rank. He wrote:

“Though it is in order to supply the necessities and conveniences of the body, that the advantages of external fortune are originally recommended to us, yet we cannot live long in the world without perceiving that the respect of our equals, our credit and rank in the society we live in, depend very much upon the degree in which we possess, or are supposed to possess, those advantages. The desire of becoming the proper objects of this respect, of deserving and obtaining this credit and rank among our equals, is, perhaps, the strongest of all our desires, and our anxiety to obtain the advantages of fortune is accordingly much more excited and irritated by this desire, than by that of supplying all the necessities and conveniences of the body, which are always very easily supplied.”
In this paper, we will use the term *rank incentive* to refer to Smith’s notion of the intrinsic desire for rank (as apart from the desire for tangible benefits associated with high rank). We will present the results of a field experiment conducted to provide the empirical evidence for this rank incentive.

Early economists have seen that the desire for rank, for example, in wealth or status, is a major motivator.¹ There is a significant literature—Veblen’s *The Theory of the Leisure Class* (1899) being perhaps the best known example—showing that higher payoffs to others can depress one’s utility. Recently there have been serious efforts to extend economic modeling to account for status goods, relative positions, and the rank incentive.² It has been proposed that the rank incentive might have arisen as a direct result of competition and evolution. Individuals strive to outrank their peers on the social scales of wealth and status, since nature’s processes promote higher rankings as an avenue to greater reproductive success.³

Empirical evidence on the power of the rank incentive has also started emerging from experimental research. Neckermann and Frey (2008) and Neckermann and Kosfeld (forthcoming) show that giving non-material awards to top performers motivates individuals to work harder. Duffy and Kornienko (2010) find that letting people know their performance scores relative to others’ motivates them to higher achievements in the future. Kuhnen and Tymula (2009) show that subjects work harder when they are told that they will learn about their rankings. Exploiting a natural experiment in Basque country, Azmat and Iriberri (2010)

¹ Positional consumption and status have been discussed by Adam Smith (1759), Veblen (1899), Duesenberry (1949) and Fred Hirsch (1976).


³ Notable theoretical works in this area include Eaton and Eswaran (2003), Samuelson (2004), and Rayo and Becker (2007).
find that high school students perform better when they know their grades relative to the class average than when they do not. Bandiera, Larcinese, and Rasul (2009) show similar effects among college students in the UK. The importance of rank as an incentive is also evidenced by the money that people spend to achieve rank. Recently, Charles, Hurst and Roussanov (2009) showed that households in the U.S. use their ethnic community as the reference group and seek relative status in this group through conspicuous consumption.

Although we now know that rank motivates people, how it does so remains a matter of debate. One explanation is that high ranks or relative performance often bring tangible benefits, such as ability signals in job market (Spence 1973). High rank or status gives an advantage in market transactions (Ball, Eckel, Grossman and Zame 2001). Workers can use non-material awards to signal their abilities or characteristics to the job market. Students can use their grade rankings to impress their parents, friends, admissions committees, and potential employers, and thereby reap tangible gains. In the general economy and society, high rank is a valuable asset. The tangible benefits accompanying rank may be sufficient to explain why people seek high rank.

However, Adam Smith (1759) emphasized another explanation by arguing that the intrinsic desire for rank is even more important in motivating people than the desire for tangible benefits. Such intrinsic desire may be evolutionarily ingrained in our behavior, or environmentally conditioned, like the bell for Pavlov’s dogs. In other words, humans may be directly and psychologically rewarded by high rank, without the need for any connection to tangible benefits.

The life sciences indeed suggest such a link. Biological research has shown that high rank is often associated with high concentrations of serotonin, a neurotransmitter in the brain. Even moderate concentrations of serotonin enhance feelings of well-being (Madsen
1994). One primate study showed that, when a male monkey was experimentally caused to become the dominant monkey in his pack, his serotonin level rose, then fell when he was demoted (Raleigh et al., 1991). For humans, similar experimental data has not been available, and the relationship of serotonin to rank is not well established. However, elevated serotonin levels have been found in the leaders of college fraternities and of athletic teams. A positive correlation between serotonin level and social rank has also been found among male college students in general (Madsen 1994).

This paper presents a field experiment that distinguishes the tangible-benefit from the intrinsic-desire explanations for rank seeking. The subjects were students who were enrolled in a regular 4-month English course for undergraduates at a university in Hanoi, Vietnam. To investigate the behavior of rank seeking, we conducted a controlled experiment. The students were randomly divided into three groups: an unranked control group and two treatment groups. The students were tested every two weeks. Students in all three groups received their scores privately after each test. In addition, the two treatment groups were informed of their rankings, one group privately and the other group publicly. At the end of the English course, the students took the Official TOEIC Test. Both treatment groups outperformed the control group on this test. Divulging rank privately (by phone) gave the students no tangible benefits but did motivate them to increase their performance, on average from the 49.5 to the 59.5 percentile of all TOEIC-takers around the world. This impressive improvement strongly supports the hypothesis that rank motivates people even when it brings no tangible benefits.

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4 In communication between Frank and McGuire (Frank, 1999)

5 Test of English for International Communication (TOEIC) is a test administered by the Educational Testing Service USA (ETS), which also administers the TOEFL. {This belongs on page 5,}
One key feature in the design of this experiment was that subjects knew one another socially, much as we know our neighbors or colleagues. This design simulated real life. In Vietnam, students in a class generally know each other relatively well, and openly publicized grades are the standard way of informing students of their scores. This choice of venue allowed us to publicize the ranked scores of the subjects in the publicly informed treatment group.

**Experiment Design**

This experiment was designed to test whether people are motivated by the incentive even when their rankings cannot be convincingly communicated to others. The contrasting conditions were no rankings, or publicly posted rankings. In prior studies, subjects generally could communicate their ranks and thereby potentially gain tangible benefits. In a few prior studies, information about ranks was conveyed privately, but subjects still could communicate this information convincingly to others because it was in writing. Our experimental design prevents such credible communication, and thus makes any such claims unverifiable cheap talk.

Students enrolled in a regular English course at Hanoi's Foreign Trade University were invited to participate in an English-testing experiment in which they would receive free English tests every two weeks, study materials, and coach classes. Participating students were informed that they would be notified of their test scores privately by phone. Informing them by phone gave these students no way of credibly communicating their scores to others.
Regarding individual rankings in the tests, students were randomly divided into 3 groups: Group 1, BASE, would not be ranked; Group 2, PRIVATE, would be notified only privately by phone of their own rankings; and Group 3, PUBLIC, would be notified privately by phone of their rankings, as well as publicly, by postings on the university’s notice-board and website.

<table>
<thead>
<tr>
<th></th>
<th>Inform scores</th>
<th>Inform rankings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Privately</td>
<td>Privately</td>
</tr>
<tr>
<td>Group BASE</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Group PRIVATE</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Group PUBLIC</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

At the beginning of the course, the participants took a baseline TOEIC-formatted test at an ETS-authorized testing center. During the semester-long course, they took eight biweekly tests. At the end of the course, participating students took an Official TOEIC at a subsidized fee. Students who took this final test would receive Official TOEIC Certificates, which could be helpful to them in finding jobs after their graduation the following year, with the higher scores being the greater assets. The rankings in the biweekly tests and the final TOEIC would be revealed in the ways described above.

Given the different incentives acting on the three groups, our interpretation of the final TOEIC scores would be as follows. If Group PUBLIC outperformed Group BASE, it would indicate that the students had a preference for high rank when they knew that their rankings would be publicized. If Group PRIVATE outperformed Group BASE, it would indicate the students had a preference for high rank even when they knew their rank could

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6 The experiment was conducted simultaneously in four classes, which had from 27 to 34 students each. The group randomization was conducted within each class.

7 We did not make the final TOEIC test free to the students because we wanted them to pay for some of the cost and take it seriously.
not be communicated credibly to others. This would suggest an intrinsic preference for high rank.

In Vietnamese society today, English fluency is a rewarding skill, as it provides access to high-paying jobs and overseas educations.\(^8\) TOEIC is a popular test designed specifically to measure English communication skills; it is commonly used by businesses to evaluate the English language skills of job candidates. These students were already spending considerable time preparing for and taking this valuable test. We sought to determine whether a rank incentive would motivate them even further.

Given the marketable value of English skills and the demonstrated commitment of the students, the experiment’s participation and completion rates were extremely high, as expected. All 125 undergraduate students who enrolled in the English course volunteered to participate in the experiment, a remarkable 100% participation rate. These students had taken other courses together for the past three years and knew each other relatively well. Most of them were 21 years old. There were 98 female and 27 male participants, reflecting the predominance of female students at the university. The students were allowed to skip some of the eight biweekly tests, but the participation rate in these tests remained high (87%). Only one student dropped out of the experiment, for a personal reason. All the remaining 124 students chose to take the Official TOEIC at the end of the course.

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\(^8\) Vietnam’s economy for the past 20 years has integrated quickly with the world’s. According to the General Statistics Office of Vietnam, in 2005 the ratios of foreign direct investment, exports, and imports over GDP were 48%, 62%, and 70%, respectively. This integration has been creating many jobs that require English skills and quite a few that also require an overseas education.
Results

This experiment showed that the rank incentive exerted a large effect, whether rankings were made known publicly or only privately. On the initial test to establish a baseline, there were no significant differences among the three randomized groups. Four months later, on the final test, the average scores of groups BASE, PRIVATE, and PUBLIC were 604, 656, and 680 points, respectively (Figure 1). The group that knew that their rankings would be known to others--Group PUBLIC--earned 76 points more than the control group--Group BASE. The group that learned of their rankings privately--Group PRIVATE--earned 52 points more than Group BASE. These differences were statistically and practically significant. Expressed in different terms, starting from an equivalent base, the improvement gains were 81 points for Group BASE, 133 for Group PRIVATE, and 155 for Group PUBLIC, thus 64% greater than Group BASE for Group PRIVATE, and 91% greater than Group BASE for Group PUBLIC.

The difference between the privately and publicly ranked groups went in the expected direction. Group PUBLIC outperformed Group PRIVATE by 24 points, but this difference was not statistically significant. A replication of this experiment with a larger sample could determine whether the tangible benefits from making a high rank public (such as the ability to signal one's capability or effort) provide important additional motivation to students beyond merely informing them of their rank. The improvement in TOEIC scores of the privately ranked group over the control group within four months is very substantial. Compared to scores of all TOEIC-takers around the world from 2005 to 2007, the Group BASE students scored at the 49.5 percentile. By contrast, students receiving private notice
of their rankings scored at the 59.5 percentile, and those receiving publicized rankings scored at the 64th percentile.

We ran a regression of the final TOEIC scores on group membership (Table 1). In all regression specifications, the rank incentive significantly bolstered test scores. In these regressions, we sequentially controlled for initial scores, gender, classroom effects, and average grades in other courses. As expected, final test scores strongly correlated with initial test scores. A one-point increase in the initial test score of a student was associated with an approximately one-point increase in the final test score of that student. Gender showed an insignificant effect, possibly because there were too few male participants in the sample.

To see whether the rank incentive motivates more study efforts or better test-taking effectiveness, we asked the students midway through the course how much time they had spent studying English during the previous seven days. The average study times of Group PRIVATE and PUBLIC were the same (4 hours, 45 minutes). These values were significantly higher than that of Group BASE (3 hours, 46 minutes). It appears that the rank incentive motivated ranked students to work longer (reported) hours.

There might also be a concern about two potential biases of the results. First, information about their rankings might have helped Group PRIVATE’s subjects to optimize their efforts and perform better. This would have been true, for example, if these students had been competing for some tangible benefits that came only to those with very high rankings. However, in our context, the benefit from English proficiency would help students across the performance spectrum to find a better job after graduation. The job market was very large, and these students accounted for only a tiny fraction of the job seekers’ pool. The teachers in this course did not provide recommendations. Therefore, absolute performance, not relative performance, was what mattered in this context.
Second, all subjects in these two experiments observed the differential treatments across groups, and this observation might have caused them to behave differently. For example, Group PUBLIC’s subjects might have felt that they were being treated unfairly and therefore reduced their efforts. They might also have been less likely to help other students who were competing with them. Group BASE’s subjects in the control group might have imitated the high efforts of the treatment groups. While we do not rule out these effects, we believe that they do not diminish our results for two reasons. First, these effects would have tended to reduce the main effect, but we have found a very large main effect. Second, such behaviors would also have sprung from the rank incentive. These students would have exhibited such behaviors only if they cared about their rankings. Otherwise, they would only have focused on learning English as best they could.

These analyses confirm the key finding in this experiment: there is clear evidence that people try to achieve high rank even when their ranking will not be known to others. Also, there is suggestive, but not conclusive, evidence that public knowledge of one’s ranking provides additional motivation.9

**Conclusions**

Recently, economists have returned attention to rank incentive – a motivator that Adam Smith and classical economists emphasized a long time ago. This paper contributes a piece of empirical evidence to this important incentive. In our experiment, the students in the experiment were trying to improve their absolute levels of English skills (which would help them to find a good job in a large job market) and should not have cared about their

9 This “extrinsic rank incentive” created another 3.9% score improvement, which is significant in the one-tailed test at 86% confidence level.
rankings in their small classes. However, the results show that information about class ranks significantly enhanced the students’ efforts and results in the TOEIC test, even when class rankings brought no tangible benefit. This finding is consistent with the notion of the intrinsic desire for rank that Adam Smith proposed in his 1759 Theory of Moral Sentiments.

There is a legitimate concern about whether these results would be found in other cultures or subcultures. These three experiments were conducted in Vietnam, an Asian country where tradition emphasizes the avoidance of “losing face” in public, and where educational attainment is strongly valued. However, there is a countervailing factor. Publicized grades are the standard way of announcing students’ grades in Vietnam. Thus, participants in these experiments had other ways to signal their abilities to the same group of peers. If these experiments had been conducted in another place where publicizing grades was not standard, the observed effect of rank incentive might well have been even stronger. The incentive of rank has been demonstrated to be a strong motivator among American, Chinese, Israeli, Swiss, and Spanish subjects.

Socially speaking, the field experiment in this paper shows that the rank incentive can improve the performance of all: individuals work harder, gain more knowledge, and collectively perform better. The rank incentive can enhance the tournament theory’s argument for the popular use of incentives based on relative performance. However, whether such an outcome is net beneficial depends on the cost of the work, and the net utility gained or lost by making rankings known. We often admire competition because it

10 For example, high academic performance might be viewed as ‘acting white’ or betrayal of one’s own culture among some minority communities in the U.S.

11 Lam, et al. (2004); Butler and Kedar (1990); and Azmat and Iriberri (2009).
promotes efficiency and enables the market system to work efficiently.\textsuperscript{12} Rank incentives may be net beneficial in some circumstances, as they encourage all to perform better. They may be detrimental in others, for instance, if they lead to a rat race. But whatever the net report card, the record is clear. Humans care considerably about their rank, and any economic analysis that seeks descriptive relevance must attend to that incentive.\textsuperscript{13}

\section*{References}


\textsuperscript{12} An exception is rent-seeking, where competition can increase inefficiency. For a survey, see Congleton, Hillman, and Konrad (2008).

\textsuperscript{13} Schelling (1978) points out that when everyone stands up to see better at a critical moment during a football match, no one sees any better.


Appendices

Figure 1. Group Average Scores in the First and Final Tests
Table 1: The Effect of Notification of Rankings on Test Scores

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive ranks privately</td>
<td>52.36*</td>
<td>51.55***</td>
<td>49.88***</td>
<td>50.07***</td>
</tr>
<tr>
<td></td>
<td>(34.09)</td>
<td>(20.73)</td>
<td>(20.73)</td>
<td>(20.87)</td>
</tr>
<tr>
<td>Receive ranks publicly</td>
<td>23.83</td>
<td>22.20</td>
<td>22.60</td>
<td>22.27</td>
</tr>
<tr>
<td></td>
<td>(34.95)</td>
<td>(21.25)</td>
<td>(21.21)</td>
<td>(21.32)</td>
</tr>
<tr>
<td>Score on first TOEIC</td>
<td>1.038***</td>
<td>1.027***</td>
<td>1.031***</td>
<td>(0.0721)</td>
</tr>
<tr>
<td>Male</td>
<td>-25.68</td>
<td>-26.73</td>
<td>(20.95)</td>
<td>(21.23)</td>
</tr>
<tr>
<td>Class 1</td>
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<td></td>
<td></td>
<td>31.60</td>
</tr>
<tr>
<td>Class 2</td>
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<td></td>
<td></td>
<td>(23.71)</td>
</tr>
<tr>
<td>Class 3</td>
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<td></td>
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<td>20.77</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td>(23.89)</td>
</tr>
<tr>
<td>Constant</td>
<td>604.1***</td>
<td>61.50*</td>
<td>73.72**</td>
<td>54.41*</td>
</tr>
<tr>
<td></td>
<td>(23.96)</td>
<td>(40.41)</td>
<td>(41.53)</td>
<td>(44.30)</td>
</tr>
<tr>
<td>Observations</td>
<td>124</td>
<td>124</td>
<td>124</td>
<td>124</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.040</td>
<td>0.648</td>
<td>0.653</td>
<td>0.658</td>
</tr>
</tbody>
</table>

Note: * significant in the one-tailed test at 90% confidence level
** significant in the one-tailed test at 95% confidence level

- Average grade is the student’s average grade in the prior semester’s exams.
- Class # indicates to which of four classes the student belongs. Class 4 omitted.

Note that students in each class were randomly divided into 3 experimental groups.

- Score in the first test is the score in the baseline experiment before the experiment started.

- Standard errors are in brackets.