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Rank as an Incentive

(Preliminary Draft)

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Abstract

Money is the prime incentive in economic models. Recent evidence makes it clear that people are also greatly concerned about how their incomes compare with those of others, suggesting that rank may be a strong motivator as well. Three experiments in Vietnam assessed whether students in real-world learning environments were concerned with their performance rankings. The results showed that concern with rank, even when rankings were not publicly revealed, strongly motivated performance on academic tests. Moreover, rank was able to outweigh money as a motivator.

Keywords: Rank, Incentive, Relative Position, Relative income, Performance rank, Grades.

JEL classification: D03, D83, I21, D01

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Introduction

Assume that you have a choice of living in one of the following two worlds. In the first, you earn \$50,000 a year and your peers earn half that. In the second, you earn \$100,000 a year and your peers earn more than double that. Assume that prices are the same in both situations. Which world would you prefer? If you are self-interested and do not care about the incomes of others, the choice is easy: the second world. The choice would be the same even if you are altruistic. However, when faced with this choice, the majority of the subjects in Solnick and Hemenway's 1998 experiment opted for the first world. This choice suggests a strong human desire for achieving high economic position relative to others. Yet this preference has received little attention in economics. Arguably, this preference emerged only in the context of a questionnaire. The experiments described here tested whether that preference would still be observed when real effort and real resources were at stake in achieving rank.

High rank often comes with tangible benefits. Students with higher rank on the SAT get admitted to better colleges; employees with higher rankings on performance get promoted faster; individuals ranked higher socially get more attention from the opposite sex. Therefore, it is not surprising that people prefer having high rank in such cases. But are individuals willing to sacrifice by effort or expenditure in order to achieve high rank even if there aren't such tangible benefits?

Biological research has shown that high rank is often associated with concentrations of serotonin, a neurotransmitter in the brain. Moderate concentrations of serotonin enhance feelings of well-being (Madsen 1994). This rewarding association, which could be the result of natural selection or of Pavlovian conditioning, hints at an inherent drive for high rank in

humans and in other social animals. If this is true, we should see people competing for rank even when rank does not bring tangible rewards.

In traditional economics, only an individual's own payoffs enter his utility function. Rank is not part of the standard neoclassical economic model. Indeed, rank is not even mentioned in most contemporary microeconomics texts. Yet, economists have long noted that the desire for rank, e.g., in wealth or status, is a major motivator.¹ There is a significant literature – Veblen's *The Theory of the Leisure Class* (1899) is perhaps the best known example – in which payoffs to others 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 This renewed interest was motivated partly by the growing empirical evidence in the literature of subjective well-being. Econometric analyses have consistently shown that the higher incomes of their peers lead people to report lower happiness (Luttmer, 2005). Despite these observational studies, many traditional economists still prefer to see direct behavioral evidence, especially from controlled experiments.

To date, the behavioral evidence for rank as an incentive has been sparse. Even though people may say that they prefer high rank, this preference is hard to demonstrate behaviorally in the lab or in the field for at least two reasons. First, it is difficult to separate the motivation of a high absolute payoff from that of a high rank, as a high payoff often leads to a high rank, and vice versa. Second, even when high rank is not connected to a high

¹ For examples, see Adam Smith (1759), Veblen (1899), Arthur Pigou (1920), Fred Hirsch (1976) and Duesenberry (1949).

² A few examples include Frank (1985, 1991, 2005 and 2007), Ng (1987), Congleton (1989), Ireland's (1994, 1998 and 2001), Pesendorfer's (1995), Bagwell and Bernheim's (1996), Piccione and Rubinstein's (2004), Heffetz, 2004, and Rayo and Becker (2007)

absolute payoff, it is difficult to show that people will sacrifice some absolute payoff in exchange for high rank in an experiment.

These difficulties leave untested three key hypotheses about rank incentive. They are:

Hypothesis 1: Rank motivates people to improve their performance in their customary activities;

Hypothesis 2: Rank motivates people even when it does not bring tangible benefits; and

Hypothesis 3: People are willing to sacrifice financial rewards to improve their rankings.

We present a series of experiments conducted in Vietnamese universities to test these three hypotheses. These experiments differed from most experiments in economics in the sense that they were embedded in a social context (such as a classroom) to allow performance rank to exhibit its actual power. We assessed how strongly subjects cared about their performance rank relative to that of others. We evaluated this strength by measuring the extent to which individuals improve their performance when rank was included as an additional consideration. This told us about the power of rank as an incentive.

Experiment 1 separated the rank incentive from any money incentive, and tested whether rankings motivate people to improve their performance (Hypothesis 1). We gave a class of college students some reading material to prepare for a test that would be given in ten days. Each student received a participation fee. We randomly assigned the students into one control group (with no extra incentive) and three treatment groups (one with rank incentive, one with financial incentive and one with both). We found that: (i) the group that knew that their rankings would be publicized outperformed the control group; (ii) the group that both earned cash for correct answers and knew that their rankings would be publicized

outperformed the group that merely earned cash for correct answers. This results support Hypothesis 1.

Experiment 2 was a field experiment designed to test whether rank motivates people even when not associated with tangible benefits (Hypothesis 2). We conducted biweekly tests for students who were enrolled in a regular 4-month English course. The students received their scores privately after each test. With respect to rankings on the tests, students were randomly divided into an unranked control group and two treatment groups that would be informed about their rankings either privately or 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 gave the students no tangible benefits but did motivate them to increase their performance from the 49.5th to the 59.5th percentile of all TOEIC-takers around the world. This impressive improvement strongly supports Hypothesis 2.

Experiment 3 aimed to test whether people care enough about rank that they will sacrifice significant financial rewards to achieve it (Hypothesis 3). We asked MBA students at a business school to participate in a business knowledge exercise. The exercise required each student to run a hypothetical firm, create revenue for that firm and earn an actual personal cash reward based on success. Students were informed that their rankings, as based on their firm's revenues, would be announced at the end of the exercise. Near the end of the exercise, the students were offered the opportunity to exchange confidentially their cash rewards for higher revenue rankings. As a result, 39 out of 43 students spent their own money to improve their publicized scores and thereby get higher rankings. On average, the students spent 65,800 Vietnamese dong, an amount that could have bought them 5-6

lunches. This amount was about 2/3 of the average cash reward. Ten students spent their entire reward.

The key feature in the design of these three experiments was that subjects knew one another socially, much as we know our neighbors or colleagues. This design simulated real life and allowed rank as an incentive to exhibit its large influence. All three experiments were conducted at universities in Vietnam. There, openly publicized grades are the standard way of informing students of their performance. This choice of location made it easy to recruit volunteer participants.³

Related Literatures

Evidence from the life sciences. Ranking, which leads to a dominance hierarchy, plays a critical role in the animal kingdom. It has been studied extensively. Dominant or high-ranked animals have been shown to have better access to food resources (Baker et al. 1981, Poysa 1988, Hogstad 1989) and to locations safer from predators (Schneider 1984, Hegner 1985, Hogstad 1989). Higher ranked animals also enjoy greater reproductive success than subordinates, who are less likely to win contests for mates (Hausfater 1975; Le Boeuf and Reiter 1988). In cooperatively breeding species, dominant individuals can monopolize reproduction almost completely (birds: Brown, 1987, mammals: Solomon and French, 1996, insects: Keller and Reeve, 1994).

Furthermore, the desire to have high rank may be driven not only by the pleasures from food or mating, but also by the intrinsic enjoyment of being high-ranked. Serotonin is a neurotransmitter that brings a feeling of well-being. One primate study showed that when a

³ The ratios of participants to invited students in Experiments 1, 2 and 3 were 91, 100 and 88%, respectively.

male monkey was experimentally made to be the dominant monkey in his pack his serotonin level rose, and vice versa when he was removed (Raleigh et al., 1991). Individuals that intrinsically enjoy high rank tend to work harder to achieve it than individuals that do not enjoy it. They also have a better chance of survival and of producing more offspring. The intrinsic pleasure associated with high rank may thus be a result of the natural selection process.

For humans, similar experimental data has not been available, and the relationship of serotonin to rank is less clearly established. However, elevated serotonin levels have been found in the leaders of college fraternities and of athletic teams.⁴ A positive correlation between serotonin level and social rank has also been found among male college students in general (Madsen 1994). The positive relationship between rank and the level of the sex hormone testosterone has also been observed (Mazur and Lamb 1980, Elias 1981, Mazur 1983). The causality of these relationships has not been established, because doing so would require unacceptable experiments on humans.

Primates living in complex dominance hierarchies tend to have greater neocortical development than other primates. In order to survive in hierarchy, an individual needs to develop the mental capacity to discriminate rankings and rules, and to decide when to engage in activities that might allow one to move up in rank. This mental ability might have left an indelible mark on the architecture of primate reasoning, climaxing in the human brain (Cummins 1996).

Theoretical works in economics. In the economics literature, the concern for relative position first received serious discussion by Thorstein Veblen in his 1899 classic *The Theory of*

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

the Leisure Class. He coined the term conspicuous consumption, regarding it as a wasteful spending of resources to demonstrate status over others. Veblen's work has long been noted, but it never became part of the economics canon, particularly since individualistic utility became a dominant concept in the field.⁵

Samuelson (2004) and Rayo and Becker (2007) argued for the evolutionary emergence of rank incentives. They proposed and formalized the argument that nature promotes the thriving and reproduction of individuals who strive to outrank their peers on the social scales of wealth and status, since higher rankings allows for greater reproductive success.

Empirical evidence from the happiness literature. Empirical studies on the effects of social rankings have been most fruitful in the area of subjective well-being. These studies have yielded several observations about the relationship between income and happiness. The first finding is consistent with the standard economics model: within a society at any point in time, richer people tend to report higher happiness than poor people. Easterlin (1995, 2001) and Blanchflower and Oswald (2000) showed this result for the United States. Di Tella, MacCulloch, and Oswald (2001) showed this same result for a number of Western European societies.

The second finding, however, seems inconsistent with the standard economics model: over the long term, the average happiness of a society does increase little despite large increases in average income. This observation was made early by Easterlin (1974) for

⁵ The "Veblen effect" is discussed further in the work of Duesenberry (1949), Leibenstein (1950), and Hirsch (1976), but it gets little attention in leading economics texts. The recent interest in conspicuous consumption was reignited by Frank (1985a and 1985b), then further advanced by Ng (1987), Congleton (1989), Braun and Wicklund (1989), Creedy and Slottie (1991), Pesendorfer (1995), Frank and Cook (1996), Bagwell and Bernheim (1996), Frank (1999), Piccione and Rubinsteins (2004) and Heffetz (2004).

the United States, and was recently supported by Blanchflower and Oswald (2000), Diener and Oishi (2000), Myers (2000), Kenny (1999) and Lane (1998) for other western countries.⁶

A general interpretation reconciles both findings: Income-related happiness depends primarily or exclusively on relative income (or consumption): as everybody's income increases, the average happiness will therefore not increase. Some empirical research supported this interpretation more directly. Using panel data from the United States, Luttmer (2005) rigorously showed a negative association between neighbors' income and the individuals' self-reported happiness (and other measures of well-being.) This association was stronger for people who socialized more with their neighbors, indicating that indeed relative income strongly affected happiness.

Behavioral evidence from the economics literature. Unfortunately, there is little direct behavioral evidence for rank as an incentive. However, some survey and experimental evidence indicates that concerns about rank affect behavior. Using survey data, Rizzo and Zeckhauser (2005) showed that young male physicians who thought that their incomes were below the "adequate income" in the profession secured greater income increases in the subsequent period than those who thought that their incomes were adequate or better.⁷ In experiments designed by Guth and Tietz (1990), Roth (1995) and Camerer and Thaler (1995), many subjects preferred receiving nothing to an inequitable outcome. Gneezy, Niederle and Rustichini (2003) showed that with ranks known in mixed-gender competition

⁶ Wolfers and Stevenson (2008) debated this observation and argued that there is a clear link between happiness and economic growth.

⁷ Interestingly, these authors do not find that female physicians responded to their reference income. They showed that the gender difference in setting the "adequate income" and responding to it accounted fully for the gender difference in income. Our Experiments 1 and 3, by contrast, which did find significant rank effects, were conducted with a predominantly female group of subjects.

men improved their performance but not women, and that in single-gender competition both men and women improved their performance.

Evidence from the psychological literature. Psychologists are more interested in how competition affects motivation than how it affect performance. They differentiate between intrinsic and extrinsic motivations.⁸ Competition for high rankings is categorized as an extrinsic motivation. A meta study by Rawsthorne and Elliot (1999), reviewing 23 psychological studies, found that extrinsic motivation tends to undermine students' intrinsic motivation. Having to compete for a performance goal such as a high class ranking actually lowers the interest in and pleasure from doing an activity. Among these 23 studies, only Butler and Nisan (1986) reported the effect of performance goals on performance. They showed that the students who expected a grade in doing an exercise performed better than the students who did not.

Lam, Yim, Law and Cheung (2004) ran a test for rank as an incentive in a typing course for Hong Kong students. The students were told that there would be a test at the end of the course and that each student would receive a certificate. Some students were told that they would receive the certificates with their class rankings; others without rankings. They found that the students who expected rankings performed significantly better on the easy items but not on the difficult items.⁹

Butler and Kedar (1990) asked 16 groups of fourth-grade Israeli students to do a word game. Among them, 8 groups were put in a separate room and told to compete with

⁸ Intrinsic motivation refers to internal stimuli such as the meanings, emotions or pleasure associated with an activity. Extrinsic motivation refers to external stimuli such as payments, acknowledgement, or punishment.

⁹ There was a design issue in this experiment because the students were told that they could choose the difficulty level of the final test.

each other to achieve the highest score. The competing groups performed 25% higher than non-competing groups. These findings indicate that students who expect to be ranked perform better.

Experiment 1 – Effects of the Incentives of Rank and Cash

Our first experiment sought to determine whether rankings motivate people to improve their performance (Hypothesis 1). To do so, we asked subjects to perform a task with and without a rank incentive, and with or without a cash incentive for each correct answer. The experiment was conducted with a second-year undergraduate class at the Faculty of Sociology, the National University for Social Sciences and Humanities in Hanoi. The students in this class knew each other well, as they had been taking courses together for almost two years and expected to continue doing so for two more years.

Design and conduct. 75 students (11 male and 64 female) were given a book with 100 IQ-style problems with answers. They were informed that in 10 days they would be given a test of 80 questions chosen from that list. Since the students had the answers in advance, they could improve their scores significantly by studying the book before the test. Students were randomly assigned to one of four groups and informed of their group’s score-announcing method and cash reward, as shown below:

Score informing method	Privately to only the student	Publicly in the class
Performance-based cash reward		
No	Group 1-BASE (18 students)	Group 1-PUBLIC (18 students)
500 dongs/ correct answer	Group 1-CASH (20 students)	Group 1-PUBLIC&CASH (19 students)

The expectation of public announcement of the scores made rankings salient and provided a rank incentive. The students were also informed that they would receive a fixed participation fee. The participation fee for each student in group 1-BASE and 1-PUBLIC was 60,000 dongs. The participation fee for each student in group 1-CASH and 1-PUBLIC&CASH was 40,000 dongs in order to make all the students' earnings roughly equal, as the two latter groups were expected to earn additional cash during the experiment.¹⁰

Results

The average scores of Group 1-BASE, 1-PUBLIC, 1-CASH and 1-PUBLIC&CASH were respectively 11.3, 18.1, 14.5 and 19.6 correct answers out of 80 questions (Figure 1).¹¹ Group 1-PUBLIC outperformed Group 1-BASE by 60%. Group 1-PUBLIC&CASH outperformed Group 1-CASH by 36% (The standard deviation among students was 10.3 correct answers.) These differences across groups were statistically significant, and demonstrated that the students were motivated to achieve high rankings. Table 2 provides the statistics of a non-parametric Wilcoxon sum-rank test for these results.

Regarding the cash incentive, Group 1-CASH outperformed Group 1-BASE by 28%. Group 1-PUBLIC&CASH outperformed Group 1-PUBLIC by 8%. These differences have the expected signs but neither is statistically significant (Table 2).

As an additional test of the above results, we ran two separate regressions on the test scores. The first regression was on forms of incentive; the second included the interaction term between the two forms of incentive. The students' gender, age and average grades in

¹⁰ 40,000 dongs was equivalent to 2.5 dollars, which could buy about 4 lunches in unsubsidized local eateries.

¹¹ The scores are low because answering 80 difficult questions within 45 minutes was too much for the students who had not studied the material beforehand. This was a specific design to separate out the students who had prepared for the test from those who had not.

the previous semester are used as controls. As shown in Table 3, gender and age did not seem to affect the scores.¹² The average grades did affect the scores in the expected way: students who had performed well in previous class exams also did well on this test. The effect of rankings was significant in all three regressions.

It was not clear from this analysis whether rank incentive had motivated these students to spend more effort preparing for or more effort taking the test, or both. In a post-experiment survey, we asked students about the time they had spent to prepare for the test. Indeed, Group 1-PUBLIC had spent more time than Group 1-BASE; and Group 1-PUBLIC&CASH had spent more time than Group 1-CASH. The median preparation times for each group are shown in Figure 2. The pattern in this figure suggests that the rank incentive motivated the students to spend more time preparing for the test. This result does not eliminate the possibly complementary effect that the rank incentive also motivated the students to work more effectively during this test.

The results of Experiment 1 are impressive given that open announcement was already the standard way of informing students their exam grades in this university, and throughout Vietnam. In fact, in one visit to the class, we witnessed the class-monitor announcing students' grades on a previous exam loudly to the whole class. These students had already had many other opportunities to signal their abilities to their classmates, but the rank incentive still significantly improved their performance in this experiment.

These results provide behavioral evidence that people try to achieve high rank when their rankings will be known by others. However, whether our response to the rank incentive is genetically encoded or educationally induced, is it possible that we enjoy high rank even

¹² One reason might be that there was limited gender and age variation in this class.

when our rankings are not known by others? This open question was addressed in the next experiment.

Experiment 2 –Rank as an Incentive in a Field Experiment

This second experiment extended the above results into a field experiment, and tested whether individuals would be motivated by rank even when rank brought no tangible benefits (Hypothesis 2). To do that, we incorporated our experiment into the English-teaching curriculum of Hanoi’s Foreign Trade University.

Design and conduct. Students enrolled in a regular English course at the university were invited to participate in an English-testing experiment in which they could receive free biweekly English tests, study materials, and coaching classes. Participating students were informed that they would be notified of their test scores privately by phone. Regarding individual rankings in the tests, students were randomly assigned into 3 groups: i) Group 1 would not be ranked; ii) Group 2 would be notified only privately by phone of their own rankings; iii) In addition to the private phone notification, the rankings of Group 3 would be made public on the university’s notice-board and website.

	Inform scores	Inform rankings	
	privately	privately	publicly
Group 2-BASE	√		
Group 2-PRIVATE	√	√	
Group 2-PUBLIC	√		√

At the start of the course, the participants took a baseline TOEIC-formatted test at an ETS-authorized testing center.¹³ During the one-semester-long course, they took eight biweekly tests. At the end of the course, participating students could choose to take an Official TOEIC at a subsidized fee. If they took this final test, they would receive Official TOEIC Certificates, which would be helpful to them in finding jobs after their graduation the following year.

In Vietnamese society today, English is a rewarding skill, as it provides access to high-paying jobs and overseas educations.¹⁴ 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. The students in Experiment 2 were already spending time to prepare for and to take this valuable test. We sought to determine whether a rank incentive would motivate them even further.

Given the marketable value of English skill 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. 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

¹³ Test of English for International Communication (TOEIC) is a test administered by the Educational Testing Service USA (ETS), which also administers the TOEFL.

¹⁴ 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 ratio 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 an overseas education.

experiment, for a personal reason. All the remaining 124 students chose to take the Official TOEIC at the end of the course.

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 2-BASE, 2-PRIVATE and 2-PUBLIC were 604, 656 and 680 points respectively (Figure 3). The group that knew that their rankings would be known to others - Group 2-PUBLIC - earned 76 points more than the control group - Group 2-BASE. The group that learned of their rankings privately - Group 2-PRIVATE - earned 52 points more than Group 2-BASE. These differences were statistically and practically significant.¹⁵ Expressed in different terms, starting from an equivalent base, the improvement gains were 81 points for Group 2-BASE, 133 for Group 2-PRIVATE, and 155 for Group 2-PUBLIC, thus 64% greater than Group 2-BASE for Group 2-PRIVATE, and 91% greater than Group 2-BASE for Group 2-PUBLIC.

Such disparities in improvement in TOEIC scores within four months are very substantial. Compared to scores of all TOEIC-takers around the world from 2005 to 2007, the Group 2-BASE students scored at the 49.5th percentile. By contrast, students receiving private notice of their rankings scored at 59.5th percentile, and those receiving publicized rankings scored at 64th percentile.

We ran a regression of the final TOEIC scores on group membership (Table 4). In all regression specifications, the rank incentive significantly bolstered test scores. In these

¹⁵ The difference between the privately and publicly ranked groups went in the expected direction, but was not significant.

regressions, we sequentially controlled for initial scores, gender, classroom effects, average grades in other courses. As expected, final test scores strongly correlated with initial test scores and average grades in other courses.¹⁶ 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. A one-unit increase in the student's average grade in other courses was associated with a 112.6-point increase in the final test score (this massive multiple arises because grades were on a 10-point scale, and the test scores were on a 990-point scale.) Gender showed an insignificant effect possibly because there were too few male participants in the sample. Two classes showed significant effects, probably due to the quality of their teachers.¹⁷

To see whether 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 to study English during the previous seven days. The average study times of Group 2-PRIVATE and 2-PUBLIC were the same (4 hours, 45 minutes). These values were significantly higher than that of Group 2-BASE (3 hours, 46 minutes). It appears that the rank incentives motivated these students to work longer (reported) hours.

These analyses confirm the key finding in this experiment: there is clear evidence that people try to achieve high rankings even when their rankings will not be known to others.

¹⁶ The effect of rank incentive is somewhat reduced after controlling for average grades. This indicates that by chance the ranked groups had higher average grades than the unranked group.

¹⁷ The experiment was conducted simultaneously in four classes, which had between 27 and 34 students each. The group randomization was conducted within each class.

Also, there is suggestive but not conclusive evidence that public knowledge of rankings provides additional motivation.¹⁸

Experiment 3 – Willingness to Pay for Rank

The previous two experiments demonstrated that the desire for a higher rank can induce people to perform better. But are people willing to spend money to achieve a higher rank? Experiment 3 addressed this third hypothesis.

Design and conduct. 43 (14 male and 29 female) MBA students at the Hanoi School of Business were invited to and participated in a business knowledge exercise in which they could win cash bonuses and letters confirming their participation.¹⁹ In this game, they were “hired” as an executive of a hypothetical trading firm whose revenues depended on their business knowledge. The students were informed that their rankings, as determined by their firms’ revenues, would be announced at the end of the exercise.

The exercise had two rounds:

Round 1: Without prior preparation, students had 30 minutes to respond to 100 multiple-choice questions about various aspects of business (management, finance, accounting and marketing).²⁰ Each student was informed that each correct answer increased

¹⁸ This “extrinsic rank incentive” created another 3.9% score improvement, which is significant in the one-tailed test at 86% confidence level.

¹⁹ Most invited students participated. Only 6 students in this MBA class did not participate because they were not available at the time of the experiment. Being in the same class, these students had known each other for at least one year.

²⁰ Responding to 100 difficult questions in 30 minutes was a very challenging task. This design had 2 purposes. First, it made the students suppose that whoever performed well in this game must have extensive business knowledge and judgment. Second, it reduced the ability difference between high- and low-performing groups as

the revenue of that student's firm by 1,000,000 dongs, and earned that student a personal cash bonus of 3,000 dongs.

Round 2: This round took place a few days after Round 1 and had two parts. In Part 2-a, the students were informed privately of their performance in Round 1, i.e., how many correct answers they had given, the current revenues of their firm, their personal cash bonus, and whether they currently belonged in the top, 2nd, 3rd or bottom quartile of the class rankings. The students were informed that only their rankings based on each firm's total revenues in the two rounds would be announced at the end of the exercise. All other information about the students' answers and choices in the two rounds, as well as, about their cash bonuses would be kept strictly private.

In Part 2-b, each student was asked to deal with a demanding client who was willing to purchase large amounts from the student's firm but at a deep discount. The students could not earn any personal cash bonuses in this round. Furthermore, if they wanted to sell to this client, they had to spend some of the cash bonuses they had already won during Round 1 to cover this client's discount. For every 3,000 dongs the students spent out of their cash bonuses, they could increase their firms' revenues by 1,000,000 dongs, and thus improve their own final class rank. The students were asked how much of their cash bonuses they were willing to spend in order to make such a deal with this client and thereby improve their firms' revenues and rankings. This was essentially a decision about whether to exchange their confidential cash bonuses for their publicized class rankings. If they did not care about rankings, they should not spend any money to achieve higher rankings.

the students had to guess at the answers to most questions. In fact, the mean score was 22/100 correct answers – close to random guessing. Many students score around this mean. (The coefficient of variation of the score distribution was 35.7%.)

Also, at the beginning of Round 2, we announced that a minimum cash bonus level of 99,000 dongs would be provided for Round 1. The 40 out of 43 students who earned less than 99,000 dongs thereby received an automatic raise to 99,000 dongs. This design made almost everyone start with the same budget when entering Round 2 despite their different scores in Round 1.

Results. In Round 2, 39 out of 43 students spent money to boost their rankings. 10 of them spent the entire cash bonuses that they had earned. The average spending was 65,800 dongs, which was about 2/3 of the average cash bonus from Round 1. (The t-statistic in the t-test is 13.5, indicating this spending is overwhelmingly statistically significant.) These students were willing to pay a very large amount to improve their rankings. The average expenditure was sufficient to have purchased 5 or 6 lunches for these students in unsubsidized local eateries. In reality, rank incentive is probably stronger than shown in this experiment, which merely involved a game with monetary rewards that everyone knew could be used to purchase a boost in rank.

Figure 4 shows the average spending of the 4 quartile groups according to their performance in Round 1. The 1st and 3rd quartile groups spent the most, although the differences among groups were not statistically significant. We speculate that the midpoint of the distribution is meaningful, i.e., that it is important to fare better than the average, and that being at the top is meaningful, which explains behavior of the 1st quartile. But further speculation about the specific importance of rank over various intervals goes beyond what our limited data can explain.

Conclusions

Our experiments show that rank incentives significantly enhanced students' efforts and performance in educational settings in Vietnam. We structured these experiments to conform to real life situations, in which people often work to earn income and status at the same time. In real life, people sometimes face a choice between money and status, as with decisions to spend money on status goods. These experiments separated these two normally entwined incentives, and Experiment 3 measured the tradeoffs between them.

There is a legitimate concern about whether these results would be found in other cultures. 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' performances in Vietnam. Thus, participants in these experiments had other ways to signal their ability. If these experiments had been conducted in another place where publicizing grades was not standard, the observed effect of rank incentive might have been even stronger. As mentioned in our literature review, rank incentives have been demonstrated to be strong motivators among Chinese and Israeli students. Future research should explore their impact across different cultures.

Narrowly speaking, the first and second experiments in this paper demonstrate that rank incentives can improve the performance of all: individuals work harder, gain more knowledge and collectively perform better. Whether such an outcome is net beneficial depends on the cost of the work, and the utility gained or lost by making rankings known.

The third experiment shows the rat-race, negative-sum potential of rank incentives. Students spent most of their significant cash earnings, but gained no real benefit equivalent

to the learning of English; and their rankings on average could not improve. Those who decry conspicuous consumption identify an equivalent process. People spend money on status goods to signal their wealth and ability, but if all do so, there is greater expenditure but no net gain in rank.²¹

Economists admire competition because it promotes efficiency and enables the market system to work efficiently. Rank incentives may be net beneficial in some circumstances, as they encourage all to perform better. They may be detrimental in others. But whatever the net report card, the record is clear. Humans care considerably about their rank, and economic models that seek descriptive relevance must attend to that incentive.²²

References

Bagwell, Laurie Simon and Bernheim, B. Douglas (1996) "Veblen Effects in a Theory of Conspicuous Consumption." *American Economic Review* 86(3) 349-373.

Baker, Myron Charles, Claudia S. Belcher, Linda C. Deutsch, Gregory L. Sherman and Daniel B. Thompson (1981) "Foraging success in junco flocks and the effects of social hierarchy," *Animal Behavior*, 29: 137-142.

Blanchflower, David G. and Andrew J. Oswald. (2001) "Preferences over Inflation and Unemployment: Evidence from Surveys of Happiness,." *American Economic Review* 91(1) 335-41.

²¹ Frank R.H. and P.J. Cook (1996) offered a rich discussion on rankings and the negative aspects of status competition.

²² 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.

Brown, Jerram L. (1987) *Helping and communal breeding in birds*. Princeton, New Jersey. Princeton University Press.

Butler, Ruth and Alina Kedar (1990) "Effects of Intergroup Competition and School Philosophy on Student Perceptions, Group Processes, and Performance." *Contemporary Educational Psychology*, 15(4) 301-18

Butler, Ruth, and Mordecai Nisan (1986) "Effects of no feedback, task-related comments, and grades on intrinsic motivation and performance." *Journal of Educational Psychology*, 78, 210-216.

Camerer, Colin, and Richard H. Thaler (1995) "Anomalies: Ultimatums, Dictators and Manners." *Journal of Economic Perspectives*, 9(2) 109-220.

Congleton, Roger D. (1989) "Efficient Status Seeking: Externalities, and the Evolution of Status Games." *Journal of Economic Behavior and Organization* 11, 175-190.

Cummins Denise Dellarosa (1996), *Dominance Hierarchies and the Evolution of Human Reasoning Minds and Machines*, 6 (4) 463-480(18)

Diener, Ed and Shigehiro Oishi. (2000) "Money and Happiness: Income and Subjective Well- Being Across Nations,." in *Culture and Subjective Well-Being* Diener and Eunkook M. Suh, eds. MIT Press, 185–218.

Duesenberry, James S., (1949) *Income, saving and the theory of consumer behavior*. Harvard University Press.

Easterlin, Richard A. (1974) "Does Economic Growth Improve the Human Lot? Some Empirical Evidence." in Nations and Households in Economic Growth: Essays in Honor of Moses Abramowitz. Paul A. David and Melvin W. Reder, eds. Academic Press, 89–125.

Easterlin, Richard A. (1995) "Will Raising the Incomes of All Increase the Happiness of All?" *Journal of Economic Behavior and Organization*. 27(1) 35–48.

Easterlin, Richard A. (2000) "The Worldwide Standard of Living Since 1800." *Journal of Economic Perspectives*. (14)1, 7–26.

Easterlin, Richard A. (2001) "Income and Happiness: Towards a Unified Theory." *Economic Journal*. 111, 473, 465–84.

Frank Robert H. and Philip J. Cook (1996) *The Winner-take-all Society: Why the Few at the Top Get So Much More Than the Rest of Us*, Penguin Books

Frank, Robert H. (1985a) "The Demand for Unobservable and Other Nonpositional Goods." *American Economic Review* 75(1) 101-116.

Frank, Robert H. (1985b) *Choosing the Right Pond*. Oxford University Press.

Frank, Robert H. (1999) *Luxury Fever*. Free Press.

General Statistics Office of Vietnam (<http://www.gso.gov.vn/> retrieved on August 15, 2007)

Guth, Werner and Reinhard Tietz, (1990) "Ultimatum bargaining behavior: a survey and comparison of experimental results." *Journal of Economic Psychology* 11 (3) 417–449.

Hausfater, Glenn (1975) "Dominance and reproduction in baboons (*Papio cynocephalus*): A Quantitative Analysis," *Contributions to Primatology*, Base: Karger, 7

Hegner, Robert E. (1985) "Dominance and anti-predator behavior in Blue Tits (*Parus caeruleus*). *Animal Behavior*. 33:762-768.

Hirsch, Fred (1976) *Social Limits to Growth*. Harvard University Press.

Hogstad, Olav (1989) "Social organization and dominance behavior in some" *Parus* species. *Wilson Bull*. 101:254-262.

Ireland, Norman J. (1994) "On limiting the market for status signals." *Journal of Public Economics* 53, 91-110.

Ireland, Norman J. (1998) "Status-seeking, income taxation and efficiency." *Journal of Public Economics* 70, 99-113.

Ireland, Norman J. (2001) "Optimal income tax in the presence of status effects." *Journal of Public Economics* 81, 193-212.

Keller Laurent, Reeve Hudson K. (1994) "Partitioning of reproduction in animal societies," *Trends in Ecology & Evolution*, 9(3), 98-102.

Lam, Shui-fong, Yim Pui-shan, Josephine S. F Law, and Rebecca W. Y Cheung, (2004) "The effects of competition on achievement motivation in Chinese classrooms." *British Journal of Educational Psychology*, 74(2) 281-296

Lane, Robert E. (1998) "The Joyless Market Economy,." in *Economics, Values, and Organization*. Avner Ben-Ner and Louis Putterman, eds. Cambridge: Cambridge U. Press, 461–88.

Le Boeuf, Burney J. and Joanna Reiter (1988) "Lifetime reproductive success in northern elephant seals," In: Clutton-Brock TH ed. *Reproductive success*. University of Chicago Press, Chicago, pp 344-362

Luttmer, Erzo. (2005) "Neighbors as Negatives: Relative Earnings and Well-Being." *Quarterly Journal of Economics*, 120(3) 963-1002

Madsen, Douglas (1994), *Serotonin and Social Rank Among Human Males*, in *The Neurotransmitter Revolution: Serotonin, Social Behavior, and the Law*, Roger Masters and Michael McGuire, eds., Carbondale, IL: Southern Illinois University Press, 146-158.

Myers, David G. (2000) "The Funds, Friends, and Faith of Happy People,." *American Psychologist* 55(1) 56–67.

Ng, Yew-Kwang (1987) "Diamonds are a Government's Best Friend: Burden-Free Taxes on Goods Valued for Their Values." *American Economic Review* 77(1) 186-191.

Pesendorfer, Wolfgang (1995) "Design Innovation and Fashion Cycles." *American Economic Review* 85(4) 771-792.

Piccione, Michele and Ariel Rubinstein (2008) "Luxury Prices: An Expository Note." *Japanese Economic Review*, 59(1), 127-132

Poysa, Hannu (1988) "Feeding consequences of the dominance status in Great Tit *Parus major* groups," *Ornis Fennica* 65:69-75.

Raleigh, Michael J., Michael T. McGuire Gary L. Brammer Deborah B. Pollack and Arthur Yuwiler (1991) "Serotonergic mechanisms promote dominance acquisition in adult male vervet monkeys," *Brain Research*. 559(2), 181-90

Rawsthorne, Laird J. and Andrew J. Elliot (1999) "Achievement Goals and Intrinsic Motivation: A Meta-Analytic Review." *Personality and Social Psychology Review*, 3(4) 326-344

Roth, Al E., (1996) "Bargaining experiments." In: Kagel, J.H., Roth, A.E. Eds., *The Handbook of Experimental Economics*. Princeton University Press, 253–348.

Schelling Thomas C. (1978), *Micromotives and Macrobehavior*, Norton

Schneider, Kirk J. (1984) "Dominance, predation and optimal foraging in White-throated Sparrow flocks". *Ecology*, 65:1820-1827.

Smith, Adam (1776) *An Inquiry into the Nature And Causes of the Wealth of Nations*. (<http://www.adamsmith.org/smith/won-b5-c2-article-4-ss2.htm>, August 2007)

Solomon Nancy G., French Jeffrey A. (1996) *Cooperative breeding in mammals*, Cambridge: Cambridge University Press.

Solnick Sara J. and David Hemenway (1998), "Is more always better?: A survey on positional concerns", *Journal of Economic Behavior & Organization*, 37(3), 373-383

Stevenson, Betsey and Justin Wolfer (2008) "Economic Growth and Subjective Well-Being: Reassessing the Easterlin Paradox," Prepared for Brookings Papers on Economic Activity

Veblen, Thorstein (1899) *The Theory of the Leisure Class*. Reprint 1965, MacMillan.

Appendices

Table 1. Three Experiments on Rank Incentive

Experiment	Hypothesis to be tested	Location	Subjects
Experiment 1	Rankings motivate people to improve their performance.	Hanoi National University	75 sociology undergraduates
Experiment 2	Rankings motivate people even when they do not bring tangible benefits.	Hanoi Foreign Trade University	124 foreign trade undergraduates
Experiment 3	People are willing to sacrifice meaningful financial rewards to improve their rank.	Hanoi School of Business	43 MBAs

Figure 1. Monetary and Rank Incentives in Experiment 1

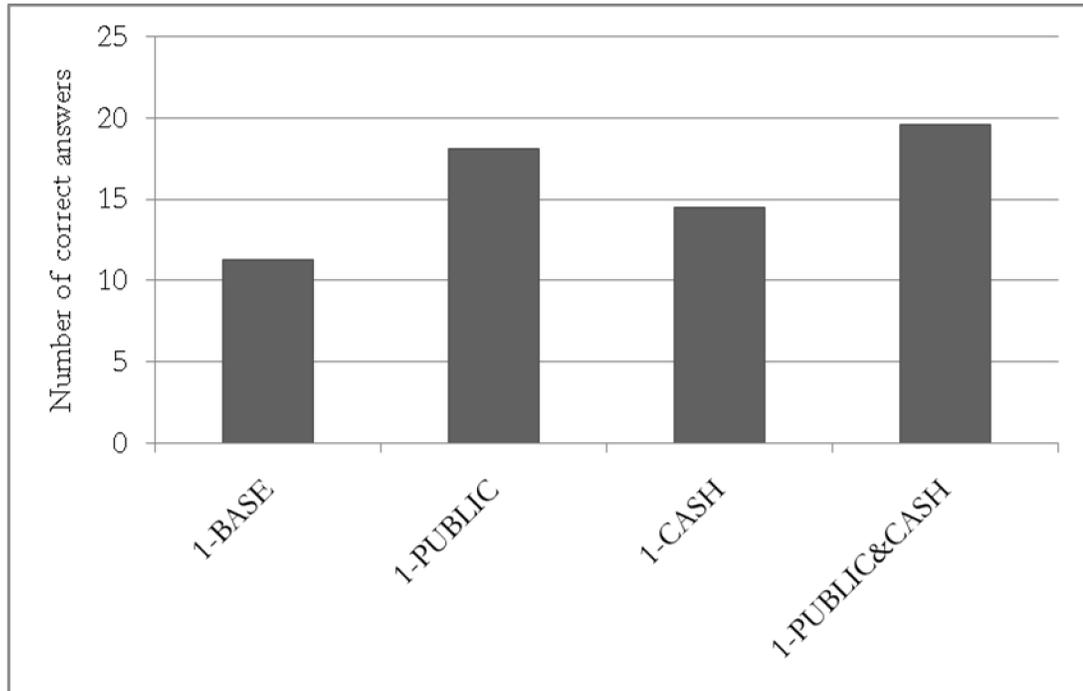


Table 2. Group performance comparison

Group Comparison	Ratio of increase in average grades	Wilcoxon rank-sum test
PUBLIC/BASE	1.60	Z = 2.06
PUBLIC&CASH/BASE	1.36	Z = 2.29
CASH/BASE	1.28	Z = 0.54
PUBLIC&CASH/PUBLIC	1.08	Z = 0.64

Note: The Wilcoxon rank-sum test compares the absolute test scores across groups.

Table 3: Test Scores, Incentives and Students' Characteristics in Experiment 1

Variable	(1)	(2)
Public	5.61** (2.27)	6.03* (3.30)
Cash incentive	2.24 (2.27)	2.63 (3.20)
Male	-1.61 (3.50)	-1.66 (3.54)
Age	0.45 (0.91)	0.44 (0.91)
Average grade	3.65** (1.57)	3.62** (1.59)
Cash x Public		-0.81 (4.57)

Note: * significant in a two-tailed test at 90% confidence level

** significant in a two-tailed test at 95% confidence level

- In Model (1), Group BASE is omitted.

- Public means that the student knew his/her score would be made public in class.

- Cash incentive means that the student knew s/he would receive a cash payment for each correct answer.

- Average grade is the student's average grade in the prior semester's exams.

- Standard errors are in brackets.

Figure 2. Preparation Time Differences among Groups in Experiment 1

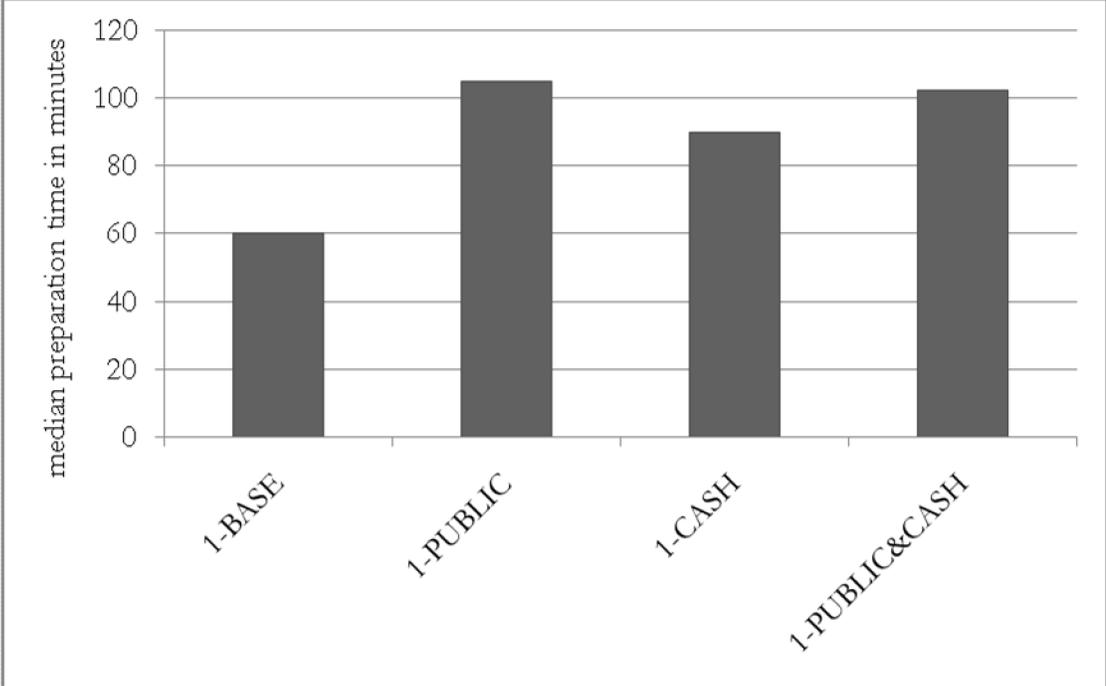


Figure 3. Group Average Scores in the First and Final Tests in Experiment 2

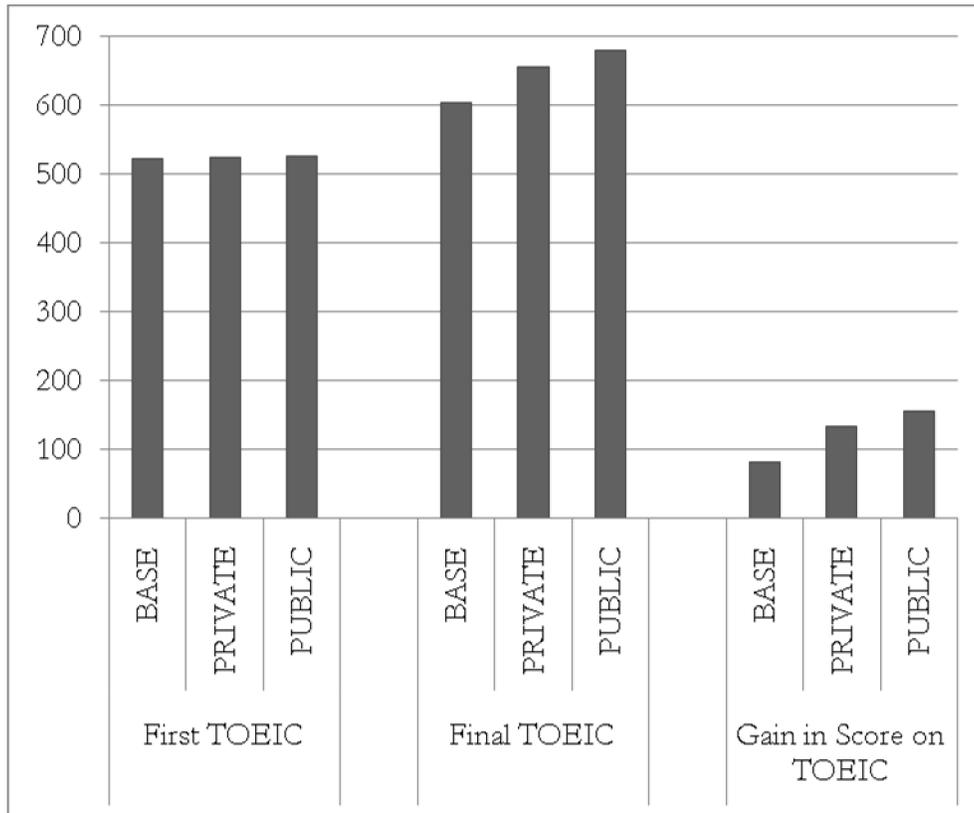


Table 4: The Effect of Group Membership on Test Scores in Experiment 2

	Dependent variable is score on the final TOEIC				
	(1)	(2)	(3)	(4)	(5)
Group 2-PRIVATE	52.36*	51.55***	49.88***	50.07***	24.65*
	(33.93)	(20.53)	(20.37)	(20.21)	(17.85)
Group 2-PUBLIC	76.19**	73.75***	72.47***	72.34***	46.08**
	(34.73)	(21.80)	(21.30)	(21.20)	(20.59)
Score on first TOEIC		1.038***	1.027***	1.031***	0.866***
		(0.0728)	(0.0738)	(0.0792)	(0.0756)
Male			-25.68	-26.73	16.22
			(22.11)	(22.87)	(22.27)
Class 1				31.60	50.39**
				(25.30)	(22.23)
Class 2				20.77	24.96
				(24.26)	(22.04)
Class 3				19.14	53.21***
				(21.61)	(18.73)
Average Grade					112.6***
					(22.68)
Constant	604.1***	61.50*	73.72**	54.41*	-776.0***
	(23.66)	(38.37)	(39.03)	(42.10)	(176.6)
Observations	124	124	124	124	124
R-squared	0.040	0.648	0.653	0.658	0.727

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.

- Average grade is the average grade of the student in other courses.

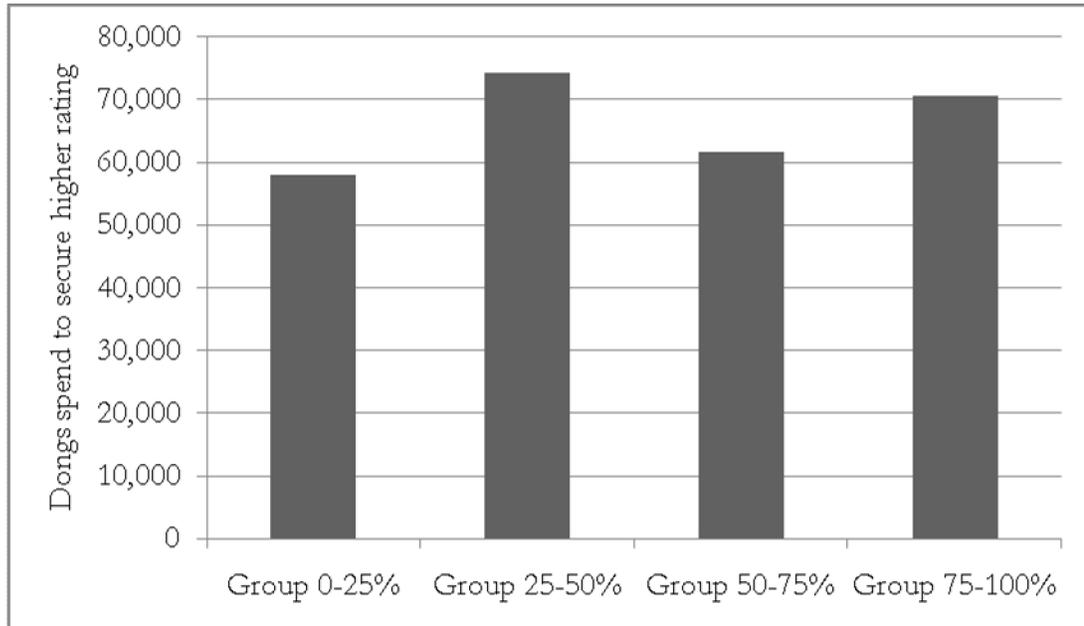
- Class # indicates to which of four classes the student belongs. Class 4 omitted.

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.

Figure 4. Amounts Spent to Improve Rankings



Note: The average bonus available to spend was 100,500 dongs.