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Economic competition and survival endurance: The efficiency losses of competition

Abstract:
The economic behaviors of competition and cooperation influence not only the transactions involving currency and valued items but virtually all the exchanges throughout the lives of individuals and organizations. When the results of the competition and cooperation patterns are compared for rationality, the advantages of the cooperation patterns are clear, both for immediate and for future outcomes. However, the dominant pattern of behavior that emerges in real exchange opportunities is not a pattern of cooperation but instead a pattern of competition. In this study the competition and cooperation patterns are observed empirically under a decision game, in which two teams are presented with a sequence of 10 exchange opportunities for which a decision must be reached. The experimental setting involves a component of decision under uncertainty since the scores can only be calculated after both teams reached their decisions. The analysis of the results of 80 full experimental trials of a decision game shows a clear dominance of competition, leading to efficiency losses when the rational possible results of the game are compared with the experimental results. The results are discussed and an explanation is proposed, arguing that the dominance of the competition pattern is favorable to the individual economic survival whilst cooperation protects the population economic survival endurance.

Keywords: decision games, dominant behavior patterns, economic competition, efficiency losses, survival endurance.

1 INTRODUCTION

"Any trading mechanism can be thought of as a bargaining game over the surplus generated from the exchange." (Croson, 1996:198)

Decisions under uncertainty are an important share of the decisions involved in economic exchanges. The minimal exchange setting involves two sides and, depending on the flexibility of the initial conditions and on the degree of communication and information exchange possible, the result will augment or diminish the initial economic assets of each side. As each side considers strategies for future action, a contrast between two options will emerge. A competition strategy or a cooperation strategy represent decision alternatives that shapes different results in economic exchanges. Risk is also an important factor as cooperative decisions would be catastrophic if the other side of the economic exchange reveals a competitive orientation. As the behavioral patterns consolidate towards competition or to-
wards cooperation and the uncertainty decreases, the risk factor is expected to decline with the rise of the number of successive exchanges completed by the two sides. As the exchange opportunities series increase the predictable limit results of cooperation are expected to be a consistent increase of the economic assets or the wealth of the two sides, whilst the predictable results of competition are expected to lead to the progressive decrease of the assets of the two sides. In especial conditions, as in restricted environments, extreme competition could end in the collapse of the population and the environment (Moreira, 2011, 2012a).

Hirshleifer (1985:54) summarizes the rationality approach considering that the "economic man is characterized by self-interested goals and rational choice of means". The question is that if in a series of economic exchanges both sides act under the rational pattern, the exchange pattern will reach stability in competition. Once the exchange pattern locks in competition, to reverse the pattern later towards cooperation will be very difficult. Under a competition pattern by the end of the series the economic value will be lower than the value that would have resulted from an irrational pattern of decisions towards cooperation. In limit cases of extreme competition the final economic value will even be lower than the initial economic value, as competition holds a destructive potential.

Of course it can be argued that if both sides opt for a cooperative strategy they are protecting their interests as the cooperation pattern will consistently generate more value as the series of exchanges increase. However, the first priority for each side should be to avoid the losses associated to the risk of deciding towards cooperation if the other side decision is competition.

According to the behavioral approach, the most important focus of study should not be the optimal rational decision, but the dominant patterns of decision that emerge in standard decision contexts.

So, is the dominant pattern a pattern of cooperation or a pattern of competition? And, considering the end economic results, which pattern is really the optimal pattern, with the higher possibilities of increasing the economic value?

The following section presents a review of the literature on the theme. The article continues with the presentation of the methodology details and the results of a set of 80 complete test trials of the decision game. In the final sections the results are analyzed and discussed and the research conclusions are presented. The most important findings of the research were the recurrence and the force of the competition tendency in the decision game and the efficiency costs of the dominant competition decision pattern.

2 THE EFFICIENCY LOSSES OF COMPETITION

"Our layered mind, with its unconscious lower strata, maps our long evolution from less deliberative organisms." Hodgson (2010:6)
"[...] One cannot read Darwin without getting a strong impression that there was a man who had a lively interest in the world around him and was a good observer of the state of society. Furthermore, his ecological theory, based upon individualistic competition, was a kind of natural economics." Ghiselin (2009:4)

Under economics primal principle that economic behavior is conditioned by self-interest (Smith, 1937, 1976, Edgeworth, 1881, referred by Hirshleifer, 1985), is it more coherent to self-interest to be competitive and receive a onetime high economic value sacrificing future exchange opportunities, or to be cooperative and receive a series of lower economic values investing on solid long term business relations with the potential for consistent value growth?

Although the optimal rational decision can be accurately calculated — even if most of the times only a posteriori — we might be more interested not so much on what people would decide if their behavior was rational but instead on what are the dominant patterns of their real economic behavior even if these patterns are not rational at all.

Economic decisions are ultimately "disciplined by competitive selection processes in the economy" (Hirshleifer, 1985:62) which means that, to an economic agent, a series of successive decision errors and at times even a single catastrophic decision error could be economically fatal.

Decisions are influenced by preferences, opportunities, and perceptions (Hirshleifer, 1985). Preferences are understood as stable patterns of behavior dominant for specific decision situations. Opportunities are related to the possibility of increasing assets or economic value. Perceptions influence decisions through the situation analysis and the initial information processing processes including the expectations about the behavior of the other side.

A possible argument in defense of the ascendancy of competition is the argument that competition generates efficiency as the resources will be under the control of the economic agents which have more competence to manage them (Hirshleifer, 1985). The contrast argument, the thesis that market economic exchanges are fundamentally moral and not only determined by raw competition has also been defended, while conceding that "market competition is necessary to drive efficiencies and productivity gains" (Zak, 2011:230).


As a fundamental aspect of economic exchanges, the study of human decision patterns of competition offers insights on the possible dominant behaviors and the consequences of
those dominant behaviors to the survival and the future of the economic agents and to the evolution of the environments that support their existence. Closer to the deep structure of human nature, "principles like scarcity and opportunity cost, and the universal bio-economic processes of competition and selection, will always remain valid for analyzing and predicting the course of human behavior and social organization" (Hirshleifer, 1985:66).

Tzafestas (1995:2) reveals a glance of the potential of the studies on competition and cooperation to social sciences, economics and organizational theory, with the hypothesis that "higher-order organizations emerge as a result of cooperation between lower-level entities, and this process is irreversible". If we accept that organizations are now more complex than ever, either the hypothesis although appears to be logical is not correct, or then explanations must be found to the dominant patterns of competition that are recurrently observed in research settings.

A possible explanation to the dominance of competition patterns is decision error. Experimental studies lead to the conclusion that, even with the tragedy of the commons effect neutralized by the experimental design, there is always a decision error towards overexploitation (Moxnes, 1998).

Another possible explanation to the evidence of dominant competition patterns could be the influence of ancestral primal behavioral tendencies that are still in force and coexisting with the more sophisticated behaviors that result of judgment and decision, as "even in open societies, there remains a part of each individual that reacts as a primary man, as a savage" (Hayek, 1977, referred by Marciano 2009:56).

One alternative explanation to competition patterns is imitation. The importance of discussing the influence of imitation is that imitation could be significant in the evolution of long sequences of economic exchanges to stabilize on competition or cooperation patterns. In decision games decision imitation is a behavior strategy that reduces decision costs and provides adaptation to complex environments (Vignolo, 2010). In the real world decision imitation is an adaptive decision strategy when there are restrictions in information access or information processing deficits. In the red and black game it is impossible to assess if the subjects decide by imitation (either imitating the previous decision of the other side or a previous decision of their own side) to reduce decision costs and information processing effort or any other possible reason. It could be argued however that the trials with a high percentage of equal decisions in sequence could to some extent be explained by imitation.

3 METHOD

The data was collected in Macau SAR, PR China, from 2006 to 2012. The teams were composed with a minimum of two and a maximum of six team members, and all the subjects were at the time first year college students in management majors.

The Red and Black decision game is played by two teams and requires a sequence of ten decisions, in which three of these allow previous communication between the teams. At
the initial briefing the participants were informed of the objective of the game, rules of the game, and score system:

Objective of the game: Each team should try to win the biggest amount of money represented by score points as possible.

Rules of the game: The game is played in ten moments, by two teams at a time. In three of the moments negotiations will be held between the teams’ delegates. These moments are the 3rd, the 5th, and the 8th play. Besides these three moments there is no communication between the teams during the game. Each play consists on a simple decision, between red and black. After both teams finished writing the decision on a paper, the decisions are confirmed, announced and the scores are written on a whiteboard including the scores for each play and the cumulative scores. The information in the whiteboard is always accessible to the teams during the game.

Scores: If team A chooses black and team B chooses red, team A loses 10 (scored as -10) and team B wins 140. If team A chooses red and team B chooses black, team A wins 140 and team B loses 10 (scored as -10). If both teams choose black, both teams win 100 each. If both teams choose red, both teams score 0 each.

The data series include 80 trials of the decision game.

4 RESULTS

In all the trials the maximum performance, the maximum possible total generated by the game, was never reached. The game total score of 2000 corresponding to players final scores of 1000 was not found through the trials. Scores equal or above 800 for each side were only 5, corresponding to 6 percent of the total trials (n=80).

The total scores lower than 1000 or 50 percent of the maximum of the game (maximum=2000) were 53, meaning that in 66 percent of the trials the performance was suboptimal comparing with the halfway reference threshold of a full cooperation result (n=80). Even assuming that in the first two plays without communication the competitive move is expected, the total scores lower than 800 or 50 percent of the corrected maximum (assumed the rational result of double competition decisions before the first communication opportunity, minus 200 for each team for the first two plays, corrected maximum=1600) were 47, or 59 percent of the trials (n=80), meaning that in 59 percent of the trials the performance was lower than 50 percent of the corrected maximum.

Limit competition (10 iterations of lose-lose or red-red; game total=0) was found in 2 trials, or 3 percent of the total of trials (n=80). Double cooperation plays were nonexistent on 37 trials, or 27 percent of the sample and 57 trials, or 71 percent revealed only two or less out of ten possible double cooperation plays. The mean of the competition indicator including
both competition and limit competition (win-lose or red-black plus lose-lose or red-red) was 8 out of the possible 10, with a median of 9, showing the force of the competition pattern.

When all the play combinations were analyzed the “lose-lose red-red” combination was found in 353 (44 percent, n=800), the “win-win black-black” combination in 157 (20 percent, n=800), and the “win-lose red-black” combination in 290 (36 percent, n=800). The descriptive statistics in Table 1 show the efficiency of the game and the efficiency of the winner well below 50 percent of the maximum limit of the game. The efficiency losses of the dominant competition decision pattern were of 59 percent for the efficiency of the game and 66 percent for the efficiency of the winner.

Table 1: Variables descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Valid n</th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower final score</td>
<td>80</td>
<td>343</td>
<td>-10</td>
<td>930217</td>
<td></td>
</tr>
<tr>
<td>Higher final score</td>
<td>80</td>
<td>480</td>
<td>0</td>
<td>1100276</td>
<td></td>
</tr>
<tr>
<td>Score difference</td>
<td>80</td>
<td>137</td>
<td>0</td>
<td>750187</td>
<td></td>
</tr>
<tr>
<td>Total generated by the game</td>
<td>80</td>
<td>822</td>
<td>0</td>
<td>1860460</td>
<td></td>
</tr>
<tr>
<td>Difference limit</td>
<td>80</td>
<td>1178</td>
<td>140</td>
<td>2000460</td>
<td></td>
</tr>
<tr>
<td>Efficiency of the game (percentage ratio)</td>
<td>80</td>
<td>41</td>
<td>0</td>
<td>93 23</td>
<td></td>
</tr>
<tr>
<td>Efficiency of the winner (percentage ratio)</td>
<td>80</td>
<td>34</td>
<td>0</td>
<td>79 20</td>
<td></td>
</tr>
<tr>
<td>Win-Win</td>
<td>80</td>
<td>2.0</td>
<td>0</td>
<td>9.23</td>
<td></td>
</tr>
<tr>
<td>Lose-Lose</td>
<td>80</td>
<td>4.4</td>
<td>0</td>
<td>10.27</td>
<td></td>
</tr>
<tr>
<td>Win-Lose</td>
<td>80</td>
<td>3.6</td>
<td>0</td>
<td>8.21</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Low cooperation versus high cooperation variables comparison

<table>
<thead>
<tr>
<th>Low cooperation versus high cooperation</th>
<th>Low</th>
<th>High</th>
<th>Low</th>
<th>High</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid n Mean</td>
<td>Mean</td>
<td>SD</td>
<td>Valid n Mean</td>
<td>Mean</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Lower final score</td>
<td>57</td>
<td>23</td>
<td>244</td>
<td>588</td>
<td>135</td>
<td>187</td>
</tr>
<tr>
<td>Higher final score</td>
<td>57</td>
<td>23</td>
<td>352</td>
<td>797</td>
<td>197</td>
<td>166</td>
</tr>
<tr>
<td>Score difference</td>
<td>57</td>
<td>23</td>
<td>108</td>
<td>209</td>
<td>152</td>
<td>243</td>
</tr>
<tr>
<td>Difference limit</td>
<td>57</td>
<td>23</td>
<td>1404</td>
<td>616</td>
<td>302</td>
<td>257</td>
</tr>
<tr>
<td>Total generated by the game</td>
<td>57</td>
<td>23</td>
<td>596</td>
<td>1384</td>
<td>302</td>
<td>257</td>
</tr>
<tr>
<td>Efficiency of the game (percentage ratio)</td>
<td>57</td>
<td>23</td>
<td>30</td>
<td>69</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>Efficiency of the winner (percentage ratio)</td>
<td>57</td>
<td>23</td>
<td>25</td>
<td>57</td>
<td>14</td>
<td>12</td>
</tr>
</tbody>
</table>

The t-test for dependent samples confirmed that the frequencies mean of lose-lose (red-red, mean=4.4) was significantly higher when compared to the frequencies mean of win-win (black-black, mean=2.0). Therefore, the limit competition pattern was dominant when
compared to the cooperation pattern (t(79,1)=4.9, p<.01). In fact, the limit competition lose-lose frequencies presented the overall highest mean of occurrences, also above the mean of the competition win-lose occurrences (lose-lose mean=4.4; win-lose mean=3.6) although the difference was not statistically significant.

The results presented in Table 1 show that the means of the lower and higher final scores are distant from the maximums recorded and from the game possible limits (lower final score limit=-100, higher final score limit=1400). The difference limit variable, calculated deducting the total generated by the game from 2000 (the best possible total game score), shows how far the mean is from the highest possible limit. The percentages calculated for the variables efficiency of the game, calculated with reference to the highest possible value generated by the game ((total generated by the game/2000)*100) and efficiency of the winner, calculated with reference to the competition win-lose limit score of the game ((higher final score/1400)*100) show that on average more than 60 percent of the wealth that is possible to generate is lost due to the competition tendency.

The comparison between the low cooperation and the high cooperation trials (the threshold considered was defined by the minimal number of cooperation episodes equal to the number of communication and negotiation opportunities, so less than three cooperation episodes for the low cooperation trials and three or more for the high cooperation trials) shows significant differences for all the variables (Table 2). The percentage ratios efficiency of the game and efficiency of the winner show significant differences between the low cooperation trials and the high cooperation trials, and beyond the significance, the magnitude of the differences is impressive. In the low cooperation trials the ratios for the efficiency of the game and the efficiency of the winner were respectively 30 percent and 25 percent, whilst on the high cooperation trials the efficiency of the game was 69 percent and the efficiency of the winner 57 percent.

5 DISCUSSION

The losses of efficiency of competition found are consistent with earlier research (Moreira, 2012b). Showing convergence under another decision game format, tested with the Iterated Prisoner's Dilemma, the behavior strategy final ranking of extreme competition was lower than the ranking of extreme cooperation (Tzafestas, 2000).

Considering uncertainty as "the phenomenon that produces overlapping distributions of potential outcomes" (Alchian, 1950:212), the Red and Black game includes an element of uncertainty. The Red and Black game demands that each decision is based not only on what each player knows already (the decision options and the rules of the game) but on the expectations that each player has about the other player behavior. A decision for black will correspond to an outcome of -10 or 100 and a decision for red will correspond to outcomes of 0 or 140. The higher risk decision, black (the one that involves a loss, -10), is the decision that produces more value to the overall outcome of the game, but depends on cooperation. The reason black is the higher risk decision is that if the other player decides towards competition...
by taking the lower risk option, red, this results in a loss of -10 to the player that decided black and a gain of 140 to the player that chose red. Red is still the lower risk option in case the other player also chooses red. In that case both players outcome is 0, but the possibility of the -10 loss is neutralized.

The following excerpt from Alchian (1950) transposes the specific comments made about the Red and Black decision game risks and results to the general framework of economic systems:

In an economic system the realization of profits is the criterion according to which successful and surviving firms are selected. [...] Realized positive profits, not maximum profits, are the mark of success and viability. [...] This is the criterion by which the economic system selects survivors: those who realize positive profits are the survivors; those who suffer losses disappear. (Alchian, 1950:213)

What about if we argue about the possibility that either the players did not understood the rules of the games or that their decisions were absolutely random? Alchian (1950) comments on the possibility of random behavior and models dominated by chance, referring to the chance model of the French mathematician Borel:

Suppose two million Parisians were paired off and set to tossing coins in a game of matching. Each pair plays until the winner on the first toss is again brought to equality with the other player. Assuming one toss per second per each eight-hour day, at the end of ten years there would still be, on the average, about a hundred-odd pairs; and if the players assign the game to their heirs, a dozen or so will still be playing at the end of a thousand years! (Alchian, 1950:215)

Anyway, randomness and chance can be considered omnipresent but otherwise irrelevant to the study of economic systems as inevitably some economic units will be favored and others not. Additionally, randomness and chance are by definition uncontrollable. Finally, it would be almost impossible even only to isolate the share of the outcomes variation exclusively attributable to randomness and chance.

For the above reasons and approaching uncertainty beyond randomness and chance, the study of the dominant patterns of behavior in specific economic exchanges is important, as these dominant patterns offer a value of predictability on the most probable decisions for different sets of decision conditions.

6 CONCLUSION

The results show clearly the force of the competition tendency and the wealth generation efficiency losses that arise from the competition dominant decision pattern found in the empirical trials.

Although successive extensions of the initial sample consistently confirmed the competition decision pattern and the efficiency losses, the limitations of the study at this stage
should be considered. Further work on a theoretic model and empirical trials with other decision game formats are planned to deepen the current research findings.

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