CAN AN INTERNATIONAL BUSINESS GAME WHERE PLAYERS START FROM DIFFERENT TRADE-POLICY POSITIONS BE FAIR?

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ABSTRACT

We examined for fairness the cumulative performance scores of 554 students and 24 ghost players in an international-business game wherein players are assigned at the start to nations with free-trade, strategic-trade, and export-promotion policies. The game was administered over four consecutive semesters; for 160 periods in the first three semesters and for 99 periods in the third semester. The different starting conditions had no statistically significant effect on the students' cumulative performance scores, so performance fairness is completely supported. The data is equivocal with respect to the cumulative performance scores of ghost players, so motivational fairness is partially supported. We conjecture that motivational fairness requires that the game be administered for 160 periods. That export promotion did not give rise to lower performance scores than free trade is a puzzle that should be resolved by more research.

INTRODUCTION

Games that are competitive usually start players from identical positions, to assure that every player has a fair chance of winning. Most business games also have heretofore been designed in the same way. The classical demand-dependent-across-teams business game, for example, assigns players to teams, each of which is tasked with managing a business that is characteristically identical to all the other businesses within the same industry. Teach (1990a) argues that this starting condition, in which "all firms are equal in assets, product lines, and market power … stifles both the design of the game and player's decisions" (p. 114).

Teach apparently assumes that if teams start from different positions, purely objective indices such as profit, market share, and the like would not fairly measure the performance of the teams. He therefore asserts that "what must be measured is the performance on a set of goals as defined by the participants" (Teach, 1990a, p. 114). He references the system of measurement proposed by Pray and Gold (1987), which accounts for the extent to which each team achieves its set of goals and the relative difficulty of the chosen goals. Elsewhere, Teach (1990b, 1993) proposes that forecasting accuracy be used as the measure of performance, even when teams start from identical positions.

The problem with Pray and Gold's (1987) goal-and-difficulty method is that the computations they suggest may be too complicated mathematically for players to understand, and the problem with Teach's (1990b, 1993) forecasting accuracy method is that forecasting ability may have little to do with performance ability, as Wolfe (1993a, 1993b) has argued. Moreover, any measure of performance that is not completely objective incentivizes subterfuge. So, if goal performance is the measure, players who submit easier goals advantage themselves over players who submit more difficult goals. Likewise, if forecasting accuracy is the measure of performance, players who submit easier-to-achieve forecasts advantage themselves over players who submit more difficult-to-achieve forecasts. Adjustments for goal and forecast difficulty can be made to compensate, but these adjustments make the computations harder to understand. Players who understand the computations will be incentivized to exploit their imperfections, and players who do not understand the computations will be either discouraged or improperly motivated.

We are interested in approaching the issue of fairness from a different direction. We ask if a business game can be designed and administered such that the game is fair to all players even when they start from different positions. We are not interested in studying differences that are obviously unfair, such as differences in initial company assets, financing, market share, and the like. We are interested in differences wherein the advantage of one condition over another is not clearly established. We see differences in national trade policy as fitting, because the suitability of one or another of these policies is much debated in the everyday world, because the spectrum policies adopted by everyday-world nations is broad, and because differences in such policies are essential for any

business game that would claim to have a strong international orientation.

In theory, a business game with an international orientation can start all players from identical positions simply by making every player citizens of the same nation at the start, together with giving players the choice of migrating to other nations. In practice, we have found this approach to be unsatisfactory, because few players choose to migrate, even when migrants bear no out-of-pocket cost. The reluctance of players to move from the position to which they are initially assigned is well-explained by prospect theory (Kahneman, 2011; Kahneman & Tversky, 1979; Tversky & Kahneman, 1974), which asserts that people evaluate their options (or prospects) from a reference point, with losses looming larger than gains. Thus, a player initially assigned to a nation takes that nation as her reference point. Given the option of migrating to another nation, the player assesses the possible losses against the possible gains. If both nations are poorly understood, as they would be at the start of the game, the player generally feels that the losses outweigh the gains, because whenever the gains and losses are objectively equivalent, the losses appear, subjectively, larger than the gains. So, the players are inclined to stay in place.

Thus, the ideal arrangement for such a business game is to assign players to different nations, each with its own distinctive trade policy, but this arrangement will be unworkable if the different assignments should convey an unfair advantage to some players over other players. The purpose of this study is to assess the fairness of the arrangement. The discussion that follows identifies trade policies of interest, expands on the concept of fairness, itemizes our hypotheses, describes our method of investigation, presents results, and draws conclusions.

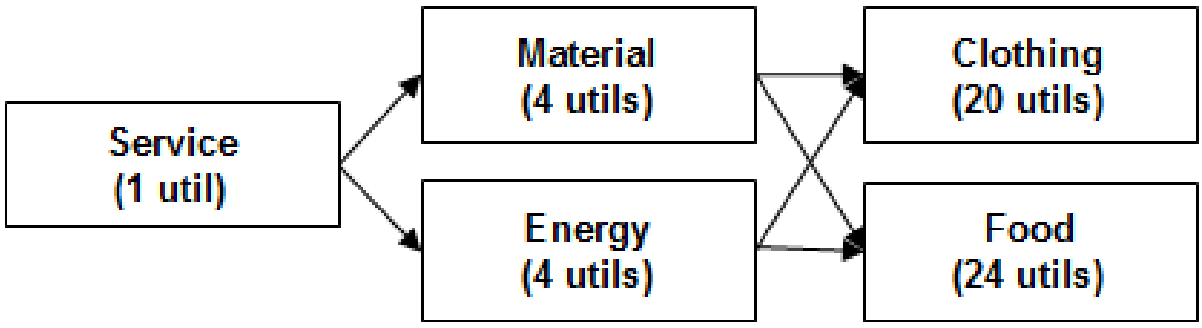
INTERNATIONAL TRADE POLICIES

Mechanisms for executing international trade policies include tariffs on imports, subsidies for exports, and regulations of various kinds. For convenience in exposition, we restrict our discussion to tariffs and subsidies, because every regulation that affects trade must either restrict imports or promote exports, so every regulation is equivalent to either a tariff on imports or a subsidy for exports.

Basic policies of international trade include free trade, strategic trade, export promotion, and import substitution. Free trade is a policy of governmental neutrality towards international trade. Tariffs are not imposed on imports, and subsidies are not given for exports. Strategic trade is a policy of government support of selected industries, where being first conveys a substantial competitive advantage. The support can include tariffs on importing and subsidies on exporting the products of the selected industry. Export promotion is a policy of subsidizing the exports of all industries, and import substitution is the policy of imposing tariffs on the imports of all industries. These policies are defined in an exemplary fashion that is possible to implement without compromise in a game. In the everyday world, politics give rise to compromises, so the actual trade policy of no country fits precisely into any basic category.

Free trade is supported by the classical economic theories of Adam Smith (1776/1909/1937) and David Ricardo (1817/2001), which give prominence to locational advantages. Strategic trade is supported by so-call "new-trade" or strategic-trade theories (Brander & Spencer, 1985; Krugman, 1981; Lancaster, 1980), which gives prominence to economies of scale and scope, learning curves, and other first-mover advantages. Export promotion and import substitution both have a common-sense appeal: the former because export promotion stimulates the economy and raises employment; the latter because import substitution enhances national security, protects infant industries, and maintains employment (Griffin & Pustay, 2013). Of these four policies, import substitution, which sets high tariffs on imports across many imported items, is in retreat because import substitution has apparently led to the long-term economic stagnation of many South American countries that have aggressively applied the

FIGURE 1
SUPPLY CHAIN OF PRODUCTS



policy. The remaining three policies continue to be debated (Engelmann & Normann, 2007; Örgün, 2012), because the logical arguments uses to make the case for a favored policy is invariably founded on some questionable assumptions and because real-world data that bolster the case for one policy over another is never free of confounding factors.

FAIRNESS

As Maier (1973) has explained, performance is a function of motivation and ability, so equal performance can be achieved by people of different abilities if those of lesser ability compensate with higher motivation. We therefore distinguish between performance fairness, which ignores motivation, and motivational fairness, which controls for motivation. Performance fairness across different starting positions can be assessed simply by comparing the average cumulative performance across different conditions. Motivational fairness, however, requires that the players' motivation levels be controlled, either with measurement of motivation and a statistical adjustment or with brute force. Taking the brute force approach, we include ghost players in the game and assess motivational fairness by comparing the average cumulative performance across different conditions of the ghost players, all of whom have identical "motivations," because their decisions are the outcome of the same algorithm. Our hypotheses therefore distinguish between real players and ghost players.

HYPOTHESES

Our first two hypotheses concern performance fairness, so they apply to real players. Our last two hypotheses concern motivational fairness, so they apply to ghost players.

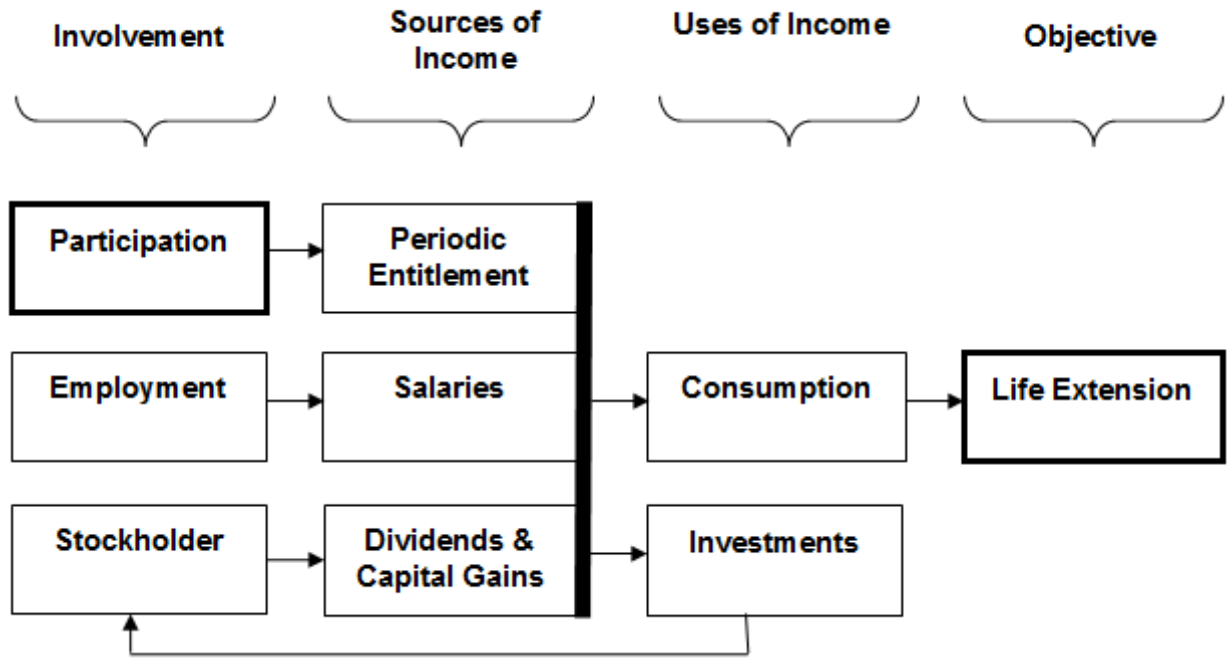
Inasmuch as the case for the relative merits of free trade versus strategic trade versus export promotion remains unsettled, we expect that real players assigned to a nation with any one of these three policies will not be substantially disadvantaged relative to real players assigned to the remaining two policies. If so, the relative performance of real players will not be affected by the national trade policy of their nation. This argument leads to our first testable hypothesis:

- Hypothesis 1 (H1): The relative performance of real players does not vary with the national trade policy of the nation to which the players are assigned.

Yet, H1 is problematic because a supportive finding can be a statistical artifact, especially when the numbers are small. The absences of statistically significant difference across conditions can be due to the power of the statistics, which increases with the number of cases observed. To assure that a supportive finding should not be due to a statistical artifact, we have a second hypothesis.

- Hypothesis 2 (H2): The relative performance standing

FIGURE 2
PERFORMANCE FLOW DIAGRAM



of real players with respect to the national trade policy of the nation to which the players are assigned does not remain the same across semesters.

The arguments for ghost players parallel those for real players, so the hypotheses for ghost players are essentially the same. They are as follows:

- Hypothesis 3 (H3): The relative performance of ghost players does not vary with the national trade policy of the nation to which the players are assigned.

- Hypothesis 4 (H4): The relative performance standing of ghost players with respect to the national trade policy of the nation to which the players are assigned does not remain the same across semesters.

METHOD

The game of this study is GEO, a multi-player, multi-industry, individually-scoring, consumption-oriented, and Internet-based international-business game. The game is multi-player, because each player's decisions affect the environment of other players; multi-industry, because players can found firms in any of five industries; individually scoring, because each player receives a score that depends on that player's personal decisions; consumption oriented, because scores are awarded for virtually consuming the virtual products produced by the virtual firms; and Internet based, because each player runs an installed program that accesses its data through the Internet. Of these attributes, the individually-scoring one may be especially noteworthy, because it avoids unequal team sizes, a source of unfairness in team-scoring games that is often necessitated by the size of the participating class. Thus, a class consisting of 19 students cannot be evenly divided either into teams of threes or teams of fours, so players in teams of fours may be unfairly advantaged, or disadvantaged, over players in teams of threes.

The supply chain of products produced by the five industries of the game is illustrated in Figure 1. As the figure shows, service products are required to produce material and energy products, which in turn are required to produce clothing and food products. The utility value (util) of each product denotes its consumption value to players, such that products higher in utils add more to each player's score than products lower in utils when the product is bought by the player for consumption.

The relationship between game objective and player involvement is illustrated in Figure 2. As this figure shows, players receive a periodic entitlement merely by participating in the game. Players also receive salaries when they are employed as executives of the firms they create, and they receive dividends and capital gains as a consequence of their investment decisions. Their consumption decisions both extend their lives, effectively raising their scores, for the cumulative number of periods

TABLE 1
TARIFF AND SUBSIDY RATES

	Free trade	Strategic trade	Export promotion	Import substitution
Import tariff				
Service	0%	0%	0%	50%
Material	0%	0%	0%	50%
Energy	0%	0%	0%	50%
Clothing	0%	100%	0%	50%
Food	0%	100%	0%	50%
Export subsidy				
Service	0%	0%	50%	0%
Material	0%	0%	50%	0%
Energy	0%	0%	50%	0%
Clothing	0%	100%	50%	0%
Food	0%	100%	50%	0%

that their lives are extended constitute their performance scores.

We configured the game to support nine nations with Greek-alphabet names (Alpha, Beta, Chi, and so forth). Of the nine nations, two were structured as free-trade nations; two, as strategic-trade nations; two, as export-promotion nations; and three, as import-substitution nations. The import tariff and export subsidy rates applied to the nations are shown in Table 1. Thus, free-trade nations neither impose import tariffs nor give export subsidies, strategic trade nations impose 100% import tariffs on clothing and food imports and give 100% export subsidies on exports of the same two items, export promotion nations give 50% export subsidies on all exported products, and import promotion nations impose 50% import tariffs on all imported products.

The game program assigns each participant to a nation at registration, rotating the assignment among free-trade, strategic-trade, and export-promotion nations. No player is assigned to the import-substitution nations, to avoid handicapping any player with a policy that is generally accepted to be inferior.

We administered the game to undergraduate and graduate students enrolled in international-business and strategic-management courses from two universities over four consecutive semesters. The game was administered over the entire semester, for 160 periods in the first, second, and third semesters and 99 periods in the third semester. The difference in number of periods across semesters is due to differences in instructor preference, as the instructor controls the pacing of the periods. As usual, instructors vary the pace, from slow (one period each week) at the beginning of the semester to fast (two periods a day) and very fast (5 periods a day) towards the end of the semester. Our dataset consists of the cumulative performance scores of 554 students and 24 ghost players who participated in the game for the entire duration of the exercise within each of the four semesters.

RESULTS

The results confirm our expectation that few players would avail themselves the option of migrating from the nation to which they were assigned. Across the four semesters of the study, only 6.5% of the players migrated,

TABLE 2
CUMULATIVE PERFORMANCE SCORES
AND MIGRATION PERCENTAGES OF REAL PLAYERS

		N	Mean	SD	Migration Percentage
Semester 1					
	Free trade	52	22.53	11.33	11.5%
	Strategic trade	56	21.34	9.53	3.6%
	Export promotion	57	24.89	12.18	10.5%
Semester 2					
	Free trade	70	13.18	8.38	4.3%
	Strategic trade	67	15.10	9.17	10.4%
	Export promotion	68	15.82	9.79	8.8%
Semester 3					
	Free trade	24	28.83	13.10	8.3%
	Strategic trade	25	23.26	10.41	8.0%
	Export promotion	27	31.56	16.13	3.7%
Semester 4					
	Free trade	37	8.70	5.16	0.0%
	Strategic trade	34	8.27	4.61	2.9%
	Export promotion	37	8.02	3.58	0.0%

Note: Semester 1, $F(2, 162) = 1.51$, $p = .224$; Semester 2, $F(2, 202) = 1.55$, $p = .215$; Semester 3, $F(2, 73) = 2.53$, $p = .087$; Semester 4, $F(2, 105) = 0.22$, $p = .804$; all semesters, $F(2, 551) = 2.48$, $p = .085$.

that is, they ended the semester in a nation different from the nation to which they had been assigned. As the last column of Table 2 shows, the migration percentage does not exceed 11.5% in any condition of any semester.

As Tables 2 also shows, differences in cumulative performance scores of real players across nation-assignment conditions are not statistically significant in any semester. Thus, the data support H1: The relative performance of real players does not vary with the national trade policy of the nation to which the players are assigned.

Moreover, Table 2 shows that the mean cumulative performance scores of real players are ordered differently across semesters. From highest to lowest, the order is as follows:

- Semester 1: export promotion, free trade, strategic trade
- Semester 2: export promotion, strategic trade, free trade
- Semester 3: export promotion, free trade, strategic trade
- Semester 4: free trade, strategic trade, export promotion

Thus, the real-player data support H2: The relative performance standing of real players with respect to the national trade policy of the nation to which the players are assigned does not remain the same across semesters.

Table 3 shows that differences in cumulative performance scores of ghost players across nation-assignment conditions are statistically significant only in the fourth semester, $p = .015$. Thus, the ghost-player data of three out of four semesters support H3: The relative performance of ghost players does not vary with the national trade policy of the nation to which the players are assigned.

Table 3 shows that the mean cumulative performance scores of ghost players are ordered the same between Semesters 1 and 3, but are ordered differently in Semester 4. From highest to lowest, the order is as follows:

- Semester 1: export promotion, free trade, strategic trade
- Semester 2: export promotion, free trade, strategic trade
- Semester 3: export promotion, free trade, strategic trade
- Semester 4: free trade, export promotion, strategic trade

TABLE 3
CUMULATIVE PERFORMANCE SCORES OF GHOST PLAYERS

	N	Mean	SD
Semester 1			
Free trade	2	35.41	0.27
Strategic trade	2	27.68	2.58
Export promotion	2	36.36	3.11
Semester 2			
Free trade	2	27.84	1.80
Strategic trade	2	26.54	3.31
Export promotion	2	28.79	3.91
Semester 3			
Free trade	2	35.52	6.66
Strategic trade	2	32.80	0.47
Export promotion	2	38.15	3.62
Semester 4			
Free trade	2	13.49_a	0.46
Strategic trade	2	11.04_b	0.28
Export promotion	2	12.83_a	0.37

Note: Semester 1, $F(2, 3) = 8.30$, $p = .060$; Semester 2, $F(2, 3) = 0.26$, $p = .788$; Semester 3, $F(2, 3) = 0.74$, $p = .546$; Semester 4, $F(2, 3) = 22.85$, $p = .015$; all semesters, $F(2, 21) = 0.46$, $p = .639$. Means that do not share the same subscript differ, $t(2) > 5.52$, $p < .05$.

Thus, the data partially supports H4: The relative performance standing of ghost players with respect to the national trade policy of the nation to which the players are assigned does not remain the same across semesters.

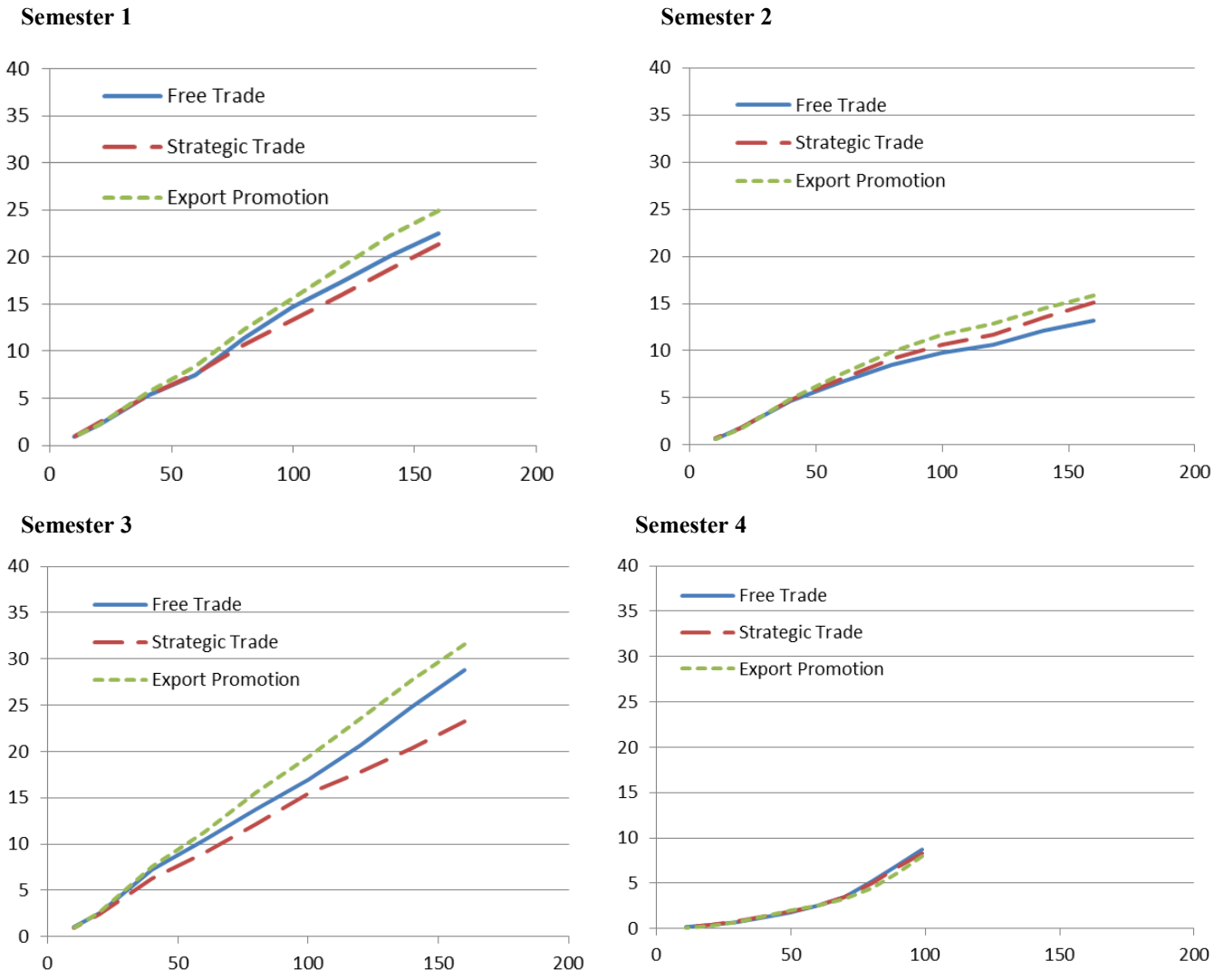
Graphs of cumulative performance over the duration of the exercise for real and ghost players across the four semesters are shown in Figures 3 and 4, respectively. Notably, the graphs of real and ghost players of Semester 4, besides being shorter because of the fewer number of periods that transpired, also are distinctly convex, which suggests that the players' experience in the fourth semester differs substantially from the players' experiences in the first three semesters.

CONCLUSION

The real-player results completely support the performance fairness of the game as administered, with different players assigned to different starting trade-policy positions. Ghost-player results partially support the motivational fairness of the game as likewise administered. We conjecture that the ghost-player results would have been completely supportive if the number of periods covered by the game in Semester 4 had been 160 rather than 99, considering that the game was administered for 160 periods in the two previous semesters. Each period brings with it new conditions that affect performance, so more periods should lessen the differentiating effects of initial conditions.

Yet, chaos theory demonstrates that under some

FIGURE 3
CUMULATIVE PERFORMANCE SCORES OF REAL PLAYERS IN FOUR SEMESTERS



conditions, the proverbial flapping of butterfly wings can cause a hurricane, so more periods may magnify the effects of initial conditions rather than diminish it. Accordingly, our results call for more research.

Research into how export promotion affects the game's economy may be especially worth pursuing, because the results do show that export promotion is the most advantageous trade policy in three out of the four semesters, even if the differences are not statistically significant. Export promotion lowers prices for foreigners, who import the product, and raises prices for residents, because local producers sell preferentially to foreigners, so export promotion should be disadvantageous to residents. Accordingly, the fact that export promotion clearly did not give rise to lower performance scores than free trade is a puzzle that remains to be resolved.

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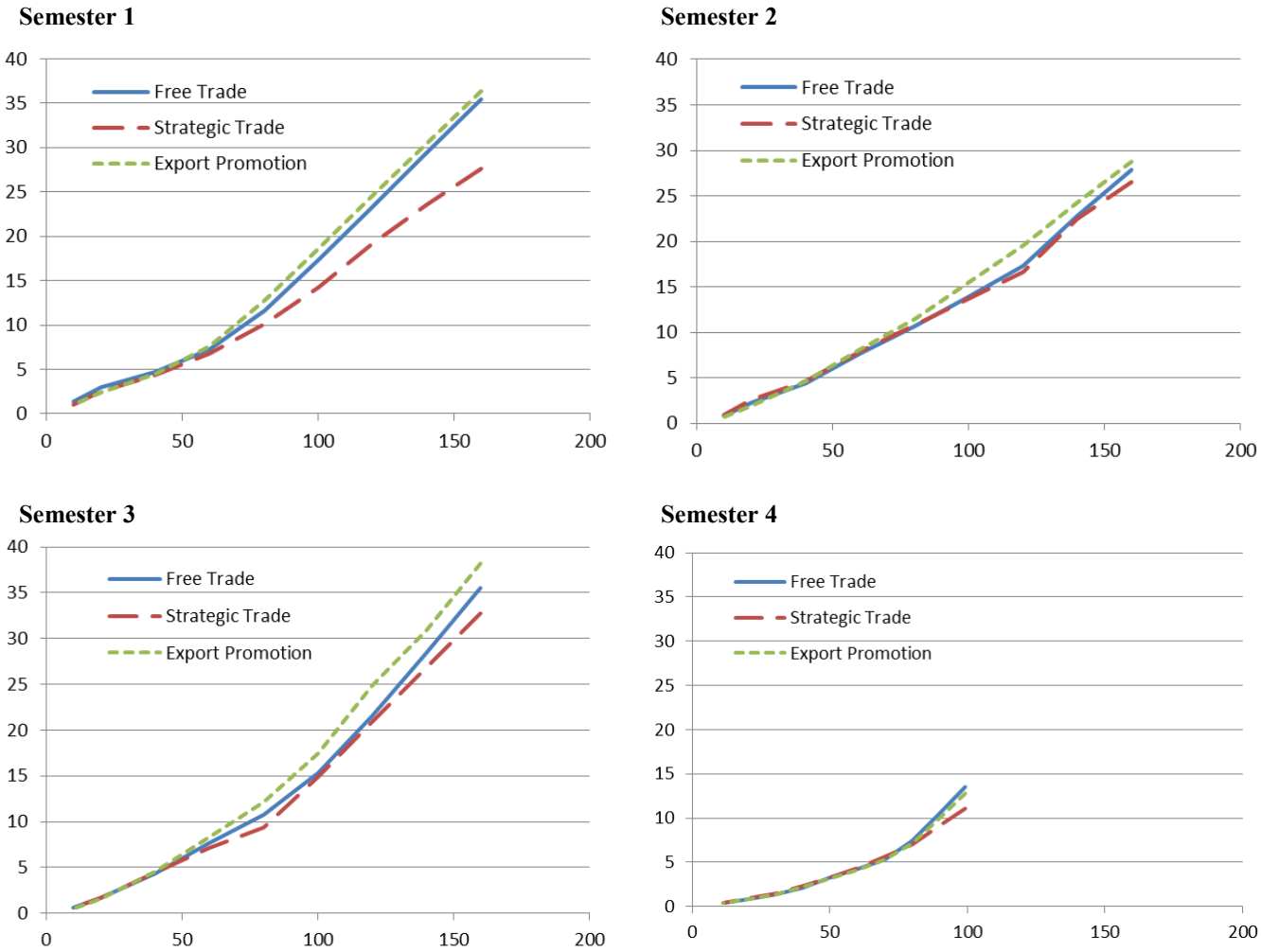
FIGURE 4
CUMULATIVE PERFORMANCE SCORES OF GHOST PLAYERS IN FOUR SEMESTERS



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