Nationalization and Privatization in a Computer-Assisted Business Game

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ABSTRACT

We incorporated nationalization and privatization in an idealized manner into a computer-assisted business game by having the virtual government offer to buy and sell shares at $1 per share below book value. We found that the rescue function of the government trading in shares dominated the liquidity function in the game. When firms in which the government owns more than 50% of the outstanding shares incur losses, a government-do-nothing policy that incentivizes risk-taking gave rise to a higher rate of firm insolvency accompanied by higher mean participant performance, results that support prospect theory, which takes the position that people generally overvalue certainty. We argue that business games with idealized features can lead participants to question why similar features are not present in the everyday world, thereby inducing the participants to look forward into the future.

INTRODUCTION

The thought that the U.S. government might nationalize a company, especially a manufacturing company such as General Motors, received little consideration until 2008, when the executives of General Motors asked the U.S. government for a loan so that the company would not default on its debts. In the months that followed, the U.S. government extended the loan that the company had sought and shepherded the company through bankruptcy, from which it emerged with the government owning about 61% of the company. Since then, the government has recovered all of the loans it extended, and reduced its ownership to 26% when shares of the restructured company were sold to the public at its initial public offering on 17 November 2010 (Merced & Vlasic, 2010; Vlasic, 2012).

The case of General Motors is an instance of a government nationalizing a manufacturing company to avert a major collapse. Governments have more often nationalized banks for the same purpose. In the global recession of recent years, the Irish government nationalized Anglo Irish Bank (Saltmarsh, 2009), the British government nationalized the Royal Bank of Scotland (Thomas, 2009), the U.S. government secured warrants on almost 80% of the shares of American International Group (Norris, 2008), and the thought that the U.S. government might nationalize Bank of America and Cititgroup was a subject of serious discussion (Sanger, 2009). If a role exists for governments to nationalize businesses in trying times, perhaps that role should be systematized so that the actions of government would not be seen as favoring special interests over the general welfare of the people.

Olsen's (1971) rational-choice theory, which deduces that governments generally act to favor narrow special interests over broad general interests, has been widely cited in the economic literature. The theory argues that governments are responsive to coalitions and that special-interest coalitions are stronger than general-interest coalitions, because people, being rational free riders, will choose to contribute more to special-interest coalitions than to general-interest coalitions. In the particular case of nationalization and privatization, the theory explains the 1945-1989 waves of nationalization and privatization in the United Kingdom and France, and the 1974-1987 nationalization and subsequent privatization of Conrail in the United States (Pint, 1990). In all these cases, whether nationalizing or privatizing, special interest gained at the expense of general interest, consistent with rational-choice theory. Accordingly, in the absence of a systematic policy for nationalization and privatization, theory and the historical record establishes that governments act to favor special interests.

The case for systematizing the role of government is more compelling in business games than in the everyday world, because the standards that apply to games are higher than the standards that apply to everyday events. Everyday events are often capricious, because of the vagaries of life, but games must be fair, and games of skill, the class to which business games used in collegiate education belongs, must not contain more than a modicum of capriciousness. Minimal capriciousness is especially necessary if performance in a game is taken seriously, as it would be if that performance is a strong determinant of grades.

Accordingly, we take the position that the role of government in business games should be set by systematic rules that are transparent to the participants. In the discussion that follows, we define rules for government intervention to nationalize, manage, and privatize firms in a business game. We hypothesize the effect of the rules on the extent of government ownership, mean rate of firm

insolvency, and the performance of participants given the structure of the game and prospect theory (Kahneman & Tversky, 1979). We show how these rules have been incorporated into a computerized business game and present results from a one-semester administration of the game. We conclude with observations on how nationalization and privatization enriches the business game for participants, and how lessons learned from business games with idealized features may induce participants to look forward into the future.

RULES FOR GOVERNMENT INTERVENTION

The issue of how nationalization and privatization should be systematized in a business game can be broken down into three questions:

1. By what rule should the government acquire ownership of private businesses?
2. Having acquired ownership, how should the government exercise its ownership rights?
3. By what rule should the government dispose of its ownership?

These questions are meaningful for business games that are computer-assisted (Crookall, Martin, Saunders, & Coote, 1986), wherein the computer performs the everyday -world functions of processing transactions and keeping accounts while participants engage in business activities among themselves, as people do in the everyday world. Thus, the computer-assisted business game allows participants to trade shares in each other's firms, to employ each other for the executive tasks that must be performed, and to consume, virtually, the products that are produced. In such a game, nationalization and privatization have consequences for participants-as-shareholders, participants-as-executives, and participants-as-customers. In the case of the many business games that are computer-based and computer-controlled, where the computer subsumes all functions other than the managerial ones, these questions may have less relevance, because the shareholders and consumers refer to the same playing entity as the government—the computer program. Computer-assisted business games wherein these questions have relevance may be rare, but as technology generally moves forward, business games that enable participants to play multiple roles should become more prevalent as advances in informational technology enable such games to be more easily developed and deployed.

Even so, decades ago Lamothe, Mehta, and Churchill (1980), in presenting a progress report on GLOBAL, then an unfinished multinational game, speculated that GLOBAL might include an unforeseen crisis situation such as strikes, floods, or nationalization. They did not elaborate on each crisis situation, so the questions we address here apparently go beyond what they considered.

ACQUIRING OWNERSHIP

We argue for the acquisition rule that the government bids to buy the shares of any and all firms at any time at the price of $1 per share below book value (BV-1). We choose book value as the rule's reference point, because of its objectivity, considering especially that book value is completely determined by objective computer codes in a business game. We choose a bidding price below book value to keep the government out of the marketplace when a firm is doing well and the prospects for investment are favorable, in which case private investors should be willing to bid book value or higher for the shares. We choose $1, a token difference in monetary unit, to discourage the liquidation of firms. Liquidation would stop production, which would destabilize the game's economy if many firms should be liquidated at about the same time. Liquidation generally yields a value lower than book value, and cannot be easier that selling the shares to the government.

EXERCISING OWNERSHIP RIGHTS

The question of what to do with the government's ownership rights is salient when the government has acquired a controlling interest in a firm that is unprofitable. In the case of General Motors, the U.S. government replaced its chief executive (Stolberg & Vlasic, 2009). In the case of a game where a systematic rule is desirable, we would shut down insolvent firms irrespective of ownership and consider two alternatives for unprofitable solvent firms:

1. Suspend operation when losses reach a trigger point
2. Do nothing

We tested the first alternative by setting the trigger point at a net loss for one period when the government owns more than 50% of the outstanding shares (NL1+50), effectively suspending the operation of any firm that realize a net loss in any single period after the government has acquired more than 50% of its outstanding shares. Upon suspension, production stops and the firm's executives are not paid, but the executives also are not dismissed, so they may continue to make decisions for the firm. Interests on deposits and loans of the suspended firm continue to be collected and paid, and sales may continue for products in inventory. If the continuing activities result in a positive net income for one period, the suspension is lifted, and if participants purchase enough of the firm's shares to reduce the government's ownership to 50% or less, the suspension also is lifted.

NL1+50 proved to be unduly heavy handed. It gave rise to the suspension of a large number of firms that were nationalized, so we set it aside in favor of the second alternative: do nothing (DN).

DISPOSING OF OWNERSHIP

To dispose of government-acquired shares, we argue for BV-1, the same rules as the one used to acquire the shares, that is, that the government asks $1 below book value for each share that it owns, irrespective of its

proportion of ownership. Thus, the government neither profits nor loses if the party that sold its shares to the government buys them back before the firm's book value has changed. BV-1 is simple for participants to understand. If the firm is profitable, the BV-1 price is cheap. Participants are therefore incentivized to invest in the shares of profitable nationalized firms before investing in the shares of other firms, so the rule serves to minimize the duration in which the government own shares in profitable firms.

EXPECTATIONS

Incorporating nationalization and privatization into a business game has operational and pedagogical consequences. Operationally, we expect that the market for shares will be more liquid and that economic downturns will be reduced in severity and duration. Pedagogically, we expect that participants of the business game will have enriched experiences, in the selling and buying of shares and in the management of firms in which they have little ownership when the government owns most of the outstanding shares. Those who manage firms in which they themselves have little ownership should be more inclined to take risks than those who manage firms in which they themselves have much ownership, but increased risk taking is not necessarily undesirable, considering that the natural inclination of most people is to choose a smaller certain gain over a somewhat risky but larger expected gain, a foundational observation of prospect theory.

We consider that governmental trading in the shares of a firm serves a liquidity function when the trades do not give rise to the government owning a controlling interest in the firm, and a rescue function otherwise. Whether the liquidity function will dominate over the rescue function or vice versa depends on how the game is administered. If the game is administered such that the game's economy is largely stable, then the liquidity function should dominate because the need for rescue will arise infrequently. We administer our game differently, such that many participants will see it advantageous to dispose of the shares they own at about the same time, which would lead to the collapse of the market for shares and the liquidation of firms were the government not in the market to acquire the shares. Accordingly, we expect the rescue function to be the dominant one. Stating our expectation formally as a testable hypothesis, we have the following:

H1: *Over the duration of the game, the number of firms in which the government owns more than 50% of the outstanding shares exceeds the number of firms in which the government owns less than 50% of the outstanding shares.*

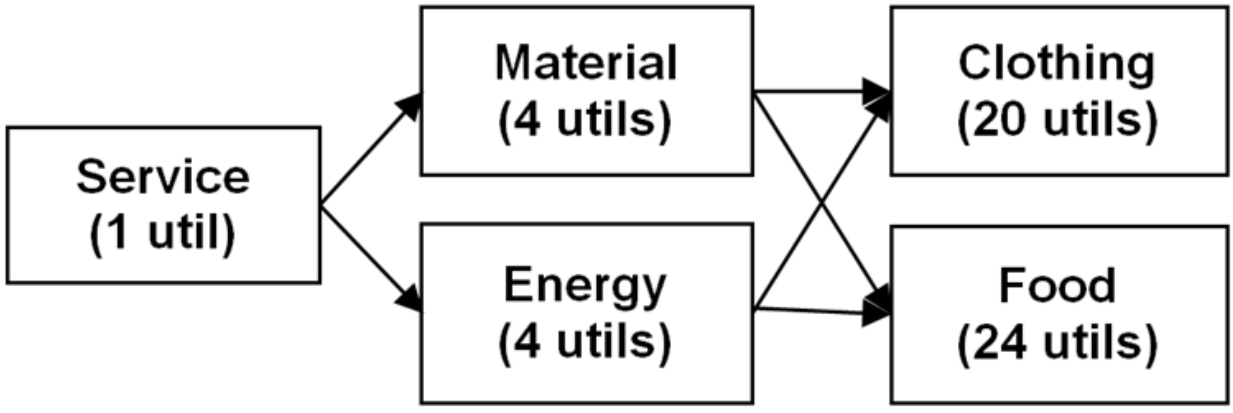
When the government allows private shareholders to manage without intervention firms in which the government has a controlling interest, we expect that the firms will follow a riskier strategy than they would otherwise, because the risk of ownership for the private shareholders is attenuated. By appointing themselves as generously compensated executives, the private shareholders of such firms assure themselves of a more than proportional share of the gains and a less than proportional share of the losses that arise from risky decisions. As a consequence, the mean rate of insolvency should rise when DN replaces NL1+50. Stated formally, we have the following:

H2: The mean rate of insolvency in the duration after DN replaces NL1+50 is higher than the mean rate of insolvency in the preceding duration.

If the participants generally overvalue certainty, as prospect theory asserts, then increased risk taking will result in better decisions and improved performance under DN than under NL1+50. Stated formally, we have the following:

H3: In the duration after DN replaces NL1+50, the mean participants' performance score rises more than it does in the preceding duration of the same length.

Figure 1
Supply Chain of Products



METHOD

Besides being computer assisted, the business game used in our study is a global economy game, essentially a superset of the total enterprise games commonly used in business strategy courses. As such, the game differs substantially from other business games, so we describe its structure and risk-taking characteristics in some detail below, before proceeding to explain how the game was administered.

STRUCTURE OF THE GAME

The game, GEO, is Internet-based (Pillutla, 2003) and enables participants to own shares in the virtual firms, as well as to be those firms' executives. Participants receive salaries and stock options from firms of which they are executives, and dividends from firms in which they own shares. Participants can own shares in up to five firms, and can be employed in one executive position with one firm and in another executive position with a different firm, but, to forestall conflicts of interest, no participant can be employed in the same executive position at two different firms simultaneously. Thus, a participant can be the general manager of a firm and the sales agent of the same or a different firm, but neither the general manager nor sales agent of two firms.

The game scores participants on the value they receive from purchasing, ergo virtually consuming, the products made by the firms. These products fall into five industrial categories: service, material, energy, clothing, and food. The value participants receive from consuming these products is measured in utility units (utils), such that a service item has the lowest value of 1 util and a food item has the highest value of 24 utils. Utility values are fixed, so the products of each firm of each industry have the same value as the products of every other firm of that industry. The utility values of all industries and their supply-chain relationship is diagrammed in Figure 1.

A firm can produce only the product of the industry in which it was founded. This is not a severe limitation, because any firm in any industry can found or acquire subsidiary firms that can be in any industry. So, a family of firms can be horizontally integrated, vertically integrated, or conglomerated.

The game includes two computerized clearinghouses: one for the trading of shares and the other for the trading of products. To assure an efficient market where every party gets the best terms given the condition of the market, the rules of the clearinghouse for products are as follows:

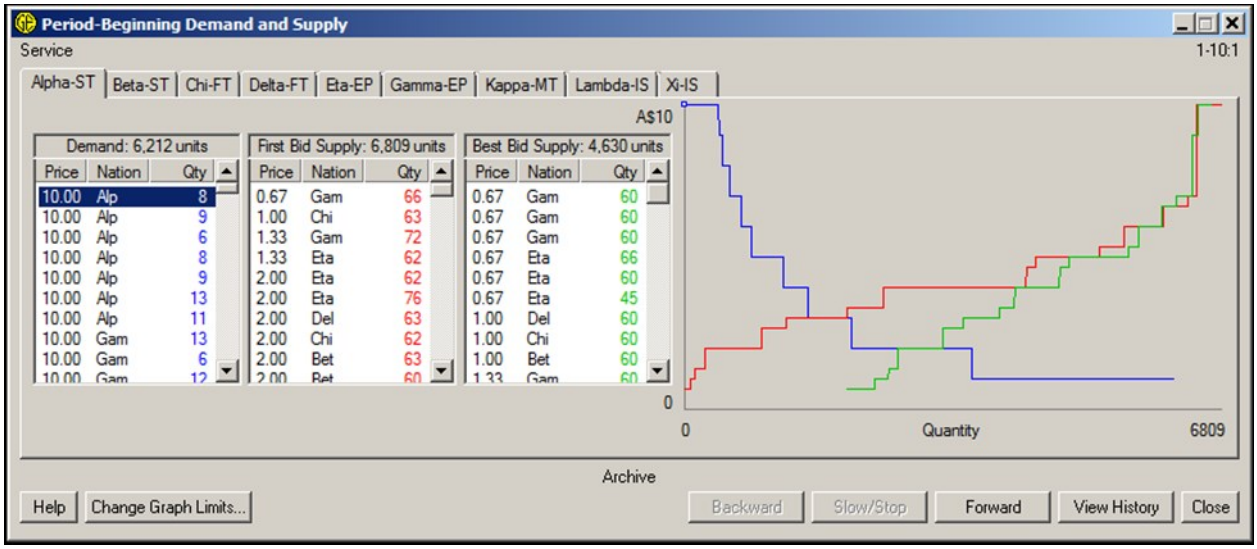
1. Buyers who bid more have priority over buyers who bid less.
2. Sellers who ask less have priority over sellers who ask more.
3. When the highest priority buyer bids a higher price than the asking price of the highest priority seller, the sale is executed at the seller's asking price if the seller sells on a first-bid basis (typical of retail) and at the buyer's bidding price if the seller sells on a best-bid basis (typical of wholesale).

As a class, first-bid sellers have priority over best-bid sellers, so no buyer pays the buyer's bidding price if at least one first-bid seller has products to sell at an asking price that is no higher than the buyer's bidding price.

A screen shot of a panel showing the demand-and-supply curves of service products at the beginning of period 10 is shown in Figure 2. The screen shot shows that at the beginning of period 10, the total demand for service products was for 6,212 units. At that time, the supply of service products was 6,809 units from firms selling on a first-bid basis and 4,630 units from firms selling on a best-bid basis.

The periods of the game advances automatically based on time and participant activity (Thavikulwat, 1996).

Figure 2
Screen Shot of Supply-and-Demand Curve



Generally, the pace begins at one period a week and accelerates gradually to about one period every few hours by the end of the semester-long exercise.

Participants progress through a series of virtual life cycles, with the end of one life cycle followed by the beginning of the next life cycle. Consumption extends the duration of each life cycle. The extent to which a participant extends that participant's life cycles constitutes the participant's score in the game. Thus, if a participant who progresses through two life cycles extends her first life cycle by 4 periods and her second life cycle by 6 periods, that participant's performance score in the game is 4 + 6 = 10.

The connection between participant involvement, income, and objectives is diagrammed in Figure 3. Each participant begins the game with a cash balance sufficient to found a firm, and each participant begins each life cycle with an interval during which the participant receives a periodic cash entitlement from the government. The entitlements, supplemented by salaries, dividends, and capital gains from the participant's involvement in the game, enable the participant to purchase, thus virtually consume, the products of the firms.

Each life cycle ends with the participant paying to the government a 100% estate tax on accumulated wealth. Under these conditions, participants optimize their scores by budgeting to buy shares at the beginning of each life cycle and to sell the shares as they approach the end of the life cycle. If many participants begin their first life cycles at the same time, as they must for the game to be fair when they are enrolled in the same class, and if their first life cycles are of approximately equal durations, then the interest of one participant in selling shares will coincide with the interest of many other participants to do likewise, resulting, in the absence of government intervention, to the collapse of share prices and the liquidation of firms as each participant attempts to recover as much cash as possible from the shares the participant owns, so that the cash can be applied to consume products, to add as much as possible to the participant's score before the participant's life cycle ends. Without government intervention, the liquidation of many firms at about the same time will cause a collapse of employment and production that spirals into an economic depression.

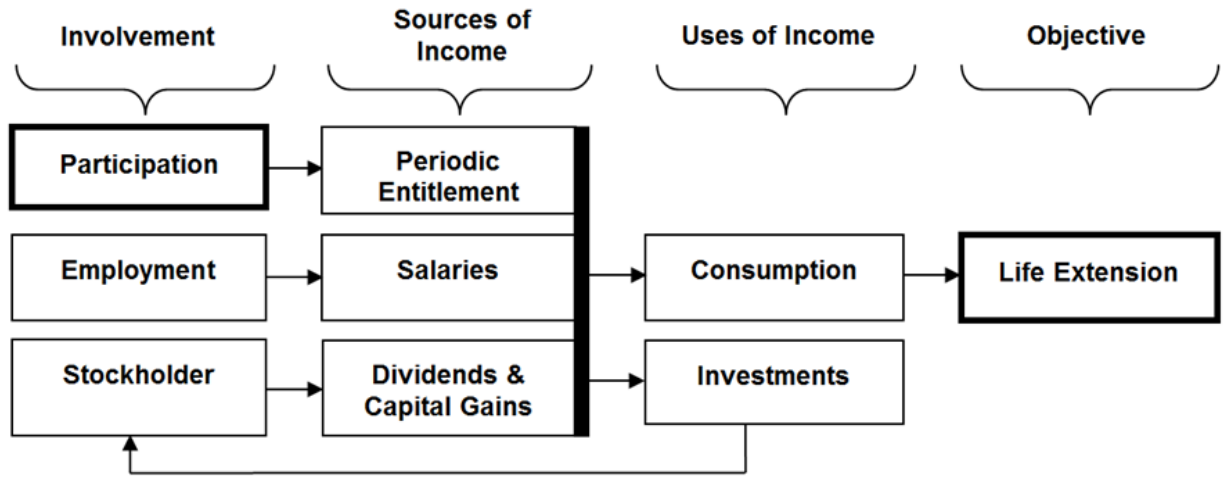
RISK TAKING CHARACTERISTICS

A participant can play the game for a certain gain in points towards grades with almost no effort and without taking any risk simply by placing high bids for consumer products that remain fixed for the duration of the life cycle, and executing the decision to advance to the next life cycle at the end of each life cycle's entitlement interval. Somewhat risky alternatives in the game include founding firms and buying shares, employing other participants to be executives of the firm in place of oneself, merging firms, and speculating on currency values by borrowing in one nation's currency and depositing the funds in another nation's currency. Prospect theory asserts that for most people the certain-gain alternative will dominate over the somewhat risky alternative of equal expected value, so few will choose the risky alternative unless the expected value of the risky alternative is much higher.

Yet, the general level of performance in the game depends on the participants' willingness to take risks. If every participant opts for certain gain, then no firm will be founded, no product will be produced, nothing will be consumed, and everyone's performance score will be zero. In the 18-year history of the game, this null-score outcome for every participant has never happened. Some participants are always ready to take risks, as prospect theory allows. Their general success, by reducing the perceived risk, induces others to follow their lead. Nonetheless, our casual observation is that the overweighing of certain outcomes over somewhat risky ones is pervasive among the undergraduate business students who have participated in the game.

Under DN, risks are substantially attenuated when a participant buys a small share in a solvent firm that the government has completely nationalized, because the small ownership stake suffices to enable the participant to control

Figure 3
Performance Flow Diagram



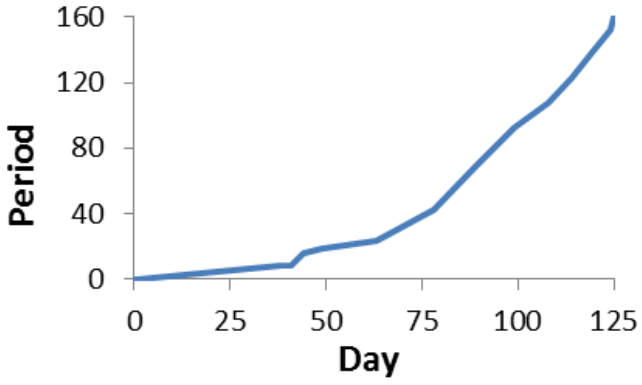
the firm when the government owns all the remaining outstanding shares. The investing participant appoints herself as the firm's manager with a generous salary and stock options, thereby benefitting from taking risks that win gains. Losses redound to the participant only if the losses suffice to bring the firm to insolvency, in which case the participant loses only her salary and small investment in the firm, with no clawback of salaries paid. The incentive structure is similar to that presented to top management executive of the many U.S. firms with widely dispersed share ownership, which may explain the notable successes of such firms better than either of two opposing theories that are frequently cited, stewardship theory (Donaldson, 1990; Donaldson & Davis, 1991) and agency theory (Jensen & Meckling, 1976), considering that attenuating risks corrects for the dominance of certain gain.

GAME ADMINISTRATION

We applied our rules for nationalization and privatization to a one-semester administration of the game to undergraduate students from two universities with schedules that overlapped. Within the 160-period duration of the game, 211 students participated between periods 8 and 78, inclusive, with participation dropping to 74 students after period 90, when the students of one university departed as planned due to the earlier ending of their classes, which had begun about two weeks earlier. Besides the students, 6 fictional entities participated throughout the duration of the exercise. These entities (named Admin-a Baseline, Admin-b Baseline, through Admin-f Baseline) served as benchmarks by which the students could gauge their performance on an absolute basis, because the entities did nothing more than consume products with a fixed set of decisions over the duration of the exercise, in the manner of one who takes no risk.

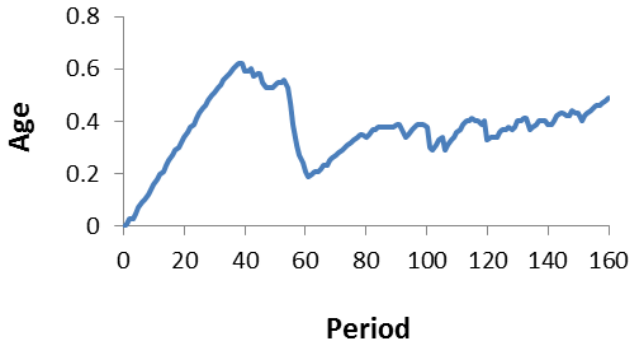
The game began at the pace of one period a week, accelerating gradually to the pace of one period every two hours. A graph of elapsed days over elapsed periods is shown in Figure 4. The kink in the graph from days 40 through 60 is due to an administrative adjustment of the game's pace to speed it up to illustrate a feature and then slow it down to merge back to the underlying trajectory.

Figure 4
Elapsed Periods
Over Elapsed Days of the Exercise



The game measures participants' age within each life cycle on a scale of 0 to 1. The mean age of participants over the duration of the exercise is graphed in Figure 5. The drop in mean age between periods 40 and 60 reflects the transition of many participants, who had begun the exercise at the same time because they were enrolled in the same class, from their first life cycle to their second.

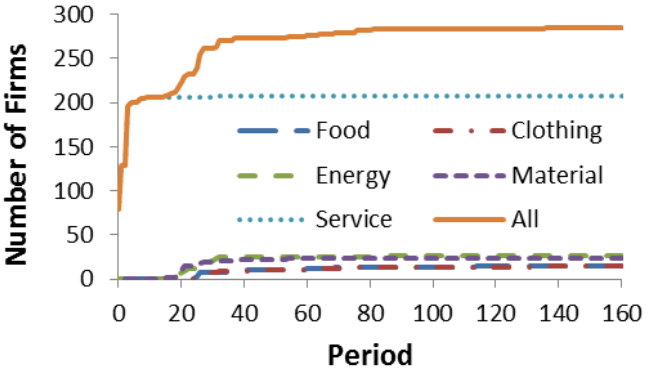
Figure 5
Mean Age Over Duration of Exercise



RESULTS

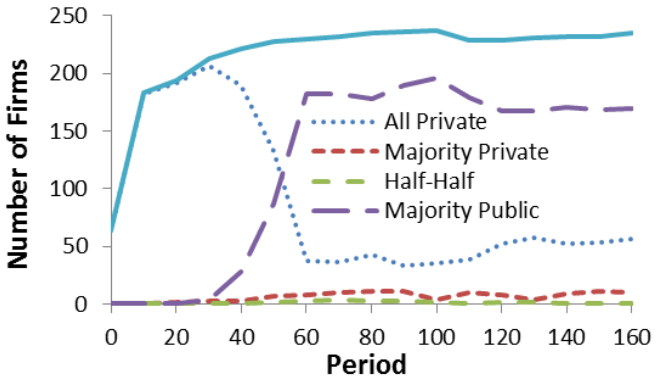
By the end of the exercise, the participants had founded 285 firms across the game's five industries. The service industry had 208 firms; the material industry, 23 firms; the energy industry, 26 firms; the clothing industry, 14 firms; and the food industry, 14 firms also. The number of firms in each industry over the 160-period duration of the exercise is graphed in Figure 6.

Figure 6
Number of Firms Over Duration of Exercise



Over the duration of the exercise, between 11% and 19% of firms never became active, either because the firm's minimum financing and staffing requirements were not met or because the firm's sales policy was never set. Of those that were active, about 76.1% were majority-owned by the government by Period 60. The number and ownership of active firms over the duration of the exercise is graphed in Figure 7.

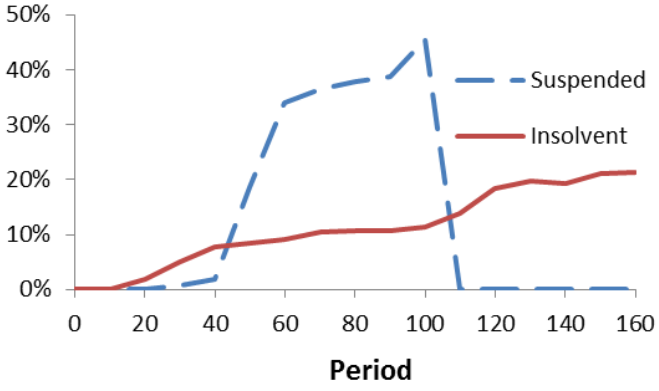
Figure 7
Number and Ownership
of Active Firms Over Duration of Exercise



Examining the ownership distribution of firms every 10 periods from Period 10 through Period 160, we find that the data support H1: The number of firms in which the government owned more than 50% of the outstanding shares exceeds the number of firms in which it owned less than 50% of the outstanding shares over the last 14 of the 16 periods examined, $\chi^2(1) = 7.56$, $p = .006$. Accordingly, the rescue function of government trading in shares dominated the liquidity function.

The rate of suspension of firms under NL1+50 and the rate of insolvency, assessed every 10 periods from Period 10 through Period 160, are graphed in Figure 8. The data support H2: The mean rate of insolvency in the five assessed period up to and including Period 100, when DN replaced NL1+50, is 10.4%, whereas the mean rate of insolvency in the five following assessed periods (Period 110 through Period 150) is higher, at 18.4%, $\chi^2(1) = 6.73$, $p = .009$. Accordingly, DN did give rise to a higher mean rate of insolvency than NL1+50.

Figure 8
Rates of Suspension and Insolvency
Over Duration of Exercise



A graph of participants' mean performance scores over the duration of the exercise is shown in Figure 9. The kink in the curve at Period 90 came about because students of one university, whose performance was generally lower, departed at that time, as previously explained. The performance scores of the 73 students who completed the entire 160-period exercise are summarized in Table 1. The mean performance score rose by 6.62, 6.53, and 9.29, between Periods 0 and 50, Periods 50 and 100, and Periods 100 and 150, respectively. The data support H3: The difference between the last rise and the previous one, after DN replaced NL1+50, is 9.29 – 6.53 = 2.76, a statistically significant difference, $t(72) = 5.14$, $p = .000$. Accordingly, participant performance rises in the duration after DN replaced NL1+50 more than it does in the preceding duration of the same length.

Figure 9
Mean Participant Performance
Over Duration of Exercise

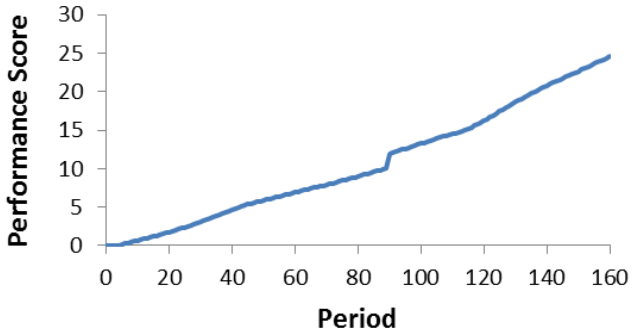


Table 1
Performance Scores of Participants
Who Completed the Entire Exercise

	Period 50	Period 100	Period 150
M	6.62	13.15	22.44
SD	1.14	3.70	7.41

Note: $N = 73$

CONCLUSION

The results show that the liquidity function of the government policy to trade in shares by offering to buy at any time any and all shares at $1 below book value is dominated by the policy's rescue function after the economy of the game encountered it first economic crisis. Moreover, the results support the expectation that a do-nothing policy when the government has acquired a controlling interest in a firm will induce the participants who manage the firm to engage in increased risk taking that in turn will lead to a higher rate of insolvency. Nonetheless, the results also show that the higher rate of insolvency is not detrimental to the overall economy. To the contrary, mean participants' performance improves. Mean participants' performance improves apparently because the participants generally succumb to the certainty effect, so increased risk taking moves them closer to optimal decision -making, as prospect theory predicts.

Although our results support prospect theory, this study is a design-science study rather than an analytical-science study. An analytical-science study is primarily concerned with the questions "Is this a valid theory? Is this the right conclusion?" but a design-science study is primarily concerned with the questions "Does it work? Is it an improvement?" (Klabbers, 2006, p. 168). A rigorous study to obtain results that strongly support or refute prospect theory would require randomization of subjects between treatment and control conditions, which our study does not do.

What our study has done, however, is to establish that nationalization and privatization can be usefully incorporated, operationally, into a business game. We have not proven that incorporation of nationalization and privatization is pedagogically useful, that is, that students learn for their experiences. The attempt to prove learning is fraught with conceptual and practical difficulties that those who study business games have only begun to unravel (Anderson & Lawton, 2009; Chin, Dukes, & Gamson, 2009; Gosen & Washbush, 2004). We think, however, that progress can be made even without addressing the pedagogical issue directly, because students exposed to nationalization and privatization in a business game surely will understand the role of government better than if they have not had the experience.

Moreover, participation in a business game where nationalization and privatization occur through the application of systematic rules may lead students to consider why everyday-world governments have not adopted similar rules. Certainly, if the U.S. government had such rules in place before 2008, its nationalization of General Motors to rescue the firm would have been less controversial, considering that the government regularly applies rules, with little controversy, to take over banks that fail. So, the lesson the participants of the business game may learn can go beyond understanding the world as it is to considering the world as it could be. Lessons of this kind that induce participants to look forward into the future may be the most valuable ones that educational games convey.

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