Trading Stock in a Business Game:
Theory and the Management of Unethical Behaviors

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ABSTRACT

We define three stages, 0 to 3, of human economic development, and argue that a Stage-3 game, where participants trade shares in the simulated companies that they manage, enables participants to practice high-level business-executive skills in a setting susceptible to the ethical issues of insider information, conflict of interest, and conspiracy. Recognizing that the ethical issues can be managed by punishment, omission, disclosure, diversion, and blocking, we argue that diversion and blocking are superior to the other methods. We describe how stock is traded in our Stage-3 game, and explain how we apply immediate update and disclosure to insider information, diversion to conflict of interest, and blocking to conspiracy. Primary-share trading, secondary-share trading, and statutory takeovers are covered. Two methods of diversion, the company-agent method and the screening-algorithm method are explained. That a business game might teach participants to avoid, through practice, unethical behaviors may be a novel perspective on the role of business games in business education.

INTRODUCTION

If one were to define the stages of human economic development, one might define Stage 0 as the time when people did not trade; Stage 1, when people bartered products and services; Stage 2, when people traded with money; and Stage 3, when people traded securities. From this perspective, many business games used in collegiate education are at Stage 0 or 1, for in these common games, the participants manage firms that only pretend to trade. The participants make price-promotion-product-place decisions the effectiveness of which is determined by an algorithm that mimics demand (Cannon, Cannon, & Schwaiger, 2009; Cannon & Schwaiger, 2005; Gold & Pray, 1983, 1984, 1990, 2001; Goosen, 2009; Teach, 2007), rather than by the decisions of other players, as would be the case if the trading were real. Certainly, when the firms are managed by teams, team members negotiate work assignments among themselves, so the participants do trade, but the trading of assignments among team members is bartering, a Stage-1 activity.

One might argue that Stage 0-1 business games satisfy the pedagogical purposes for which the games are designed, so no need exists for higher-stage business games, which would be more difficult to design and could be more difficult to administer. The argument accompanies the thinking that the purpose of the game is to reinforce business concepts that are covered in textbooks. Thus, in reviewing eight games used in strategic-management courses, Wolfe and Rogé (1997) scored each game on the extent to which each addressed 24 knowledge components and 12 tools and devices gleaned from seven strategic-management textbooks. By this thinking, the role of the game is to support the textbook by improving comprehension and motivating learning. It follows that those who have the most difficulty with reading comprehension and the least interest in the subject matter should be the ones who benefit most from the game.

Alternatively, one could also see business games as a means of enabling participants to practice the skills that they would have to exercise in the everyday-world setting were they to find themselves one day to be in an important business-executive position. From this perspective, Stage 0-1 business games give low-level practice. The needed game should give high-level practice that involves trading with money and trading securities. Those who benefit most from high-level games would be the ones with the highest aptitude and motivation. If these games should be difficult to design and administer, then the study of how the games might be designed and administered would be a worthy academic pursuit.

Here we take the alternative point of view. We are interested particularly in the Stage-3 game, where participants trade securities in the simulated businesses that they manage. The prices of securities in such games could be determined by an algorithm that models price setting in a centrally planned economy, or by the interplay of supply and demand among participants consistent with free-market logic. For the former, Wolfe and Gold (2004, 2007) studied the stock-price algorithms of six total-enterprise business games, finding that they generally gave stock prices that had face validity only when firm performance was not declining. For the latter, Thavikulwat (2003) describes three free-market processes, bazaar, auction, and agency, that a business games might

support, and argues that the agency market, where both sellers and buyers entrust trading to an automated clearinghouse, enables the greatest volume of trades to be executed.

Yet, a Stage-1 game cannot become a Stage-3 game simply by adding a stock-trading activity to the game, as Bernard (2013), Biggs (2009), McGlashan (1974), and Wharton (2009) report doing. Whereas Biggs (2009), McGlashan (1974), and Wharton (2009) enabled individuals to buy shares in team-managed simulated businesses, Bernard (2013) created an investment-fund business to serve as the fallback activity for those whose operational business had been merged or gone bankrupt. In all these instances, participants supposedly traded shares in the operational businesses, but as no actual trading of shares took place, the Stage-1 game remained at Stage 1. For the game to be a Stage-3 game, money would have to flow from investors to the operational businesses when the businesses sell shares, dividends would have to flow from the businesses to the investors when the businesses pay dividends, and shareholders would have the right to direct the companies in which they own shares by voting their shares. Absent the flow of funds and the exercise of shareholder rights, participants do not experience fully the social aspect of trading rights to a business that shares represent. This social aspect has an ethical component that comes from its susceptibility to insider information, conflict of interest, and conspiracy. Bernard (2013), Biggs (2009), McGlashan (1974), and Wharton (2009) have recognized that trading on insider information is a pertinent issue of Stage-1 games with a stock market. Conflicts of interest and conspiracies, however, are pertinent issues only of Stage-3 games with a stock market.

From our perspective, a Stage-3 game's ethical issues can be managed in five ways: punish, omit, disclose, divert, and block. To punish, the game would impose a penalty on participants caught in the infraction. To omit, the feature would be left out of the game. To disclose, the position of each firm would be immediately updated and made know to all participants as events occur. To divert, the intended path to an unethical outcome would be sidetracked to an un-rewarded conclusion. To block, the unethical scheme would be obstructed when the loss to those adversely affected exceeds a threshold.

Punishment, by causing the punished to think of ways to avoid punishment or reduce its pain, can backfire by making the unethical conduct more available in times of frustration. Omission removes the possibility of engaging in the unethical behavior, and with it the possibility of learning to avoid the unethical behavior. Disclosure might be ineffective because those adversely affected may not notice. Diversion and blocking allow the unethical act to be planned. When execution is attempted, however, the plan is either diverted in a direction that removes the anticipated reward or blocked with an obstacle that raises the cost of execution, so that the net reward of a successful unethical action is negative or negligible. Diversion and blocking allow participants to engage in planning that leads to unethical behavior should they be so inclined, but impede the causal chain from plan to action to reward so as to attenuate the psychological availability of that behavior from the participant's behavioral repertoire.

The thinking behind diversion and blocking is that merely planning to engage in unethical action is not wrong. To the contrary, students might be lectured on unethical action that should be avoided, students may learn their lesson better when they plan without prompting unethical actions and discover that the contemplated actions are unworkable.

In the discussion that follows, we show, for background, how stock trading operates in our Stage-3 business game, after which we explain how we address ethical issues associated with insider information, conflicts of interest, and conspiracies by relying on disclosure, diversion, and blocking. We apply disclosure to insider information for its pedagogically advantageous effect of rewarding participants who study facts available to them. We apply diversion to conflicts of interest and blocking to conspiracies for reasons just explained.

STOCK TRADING IN A STAGE-3 GAME

The core of our Stage-3 game, GEO, is a Stage-2 game in which participants form virtual companies to produce virtual products that they, as consumers, buy to advance their scores. Participants are given a periodic monetary entitlement that they can

FIGURE 1
PERFORMANCE FLOW DIAGRAM
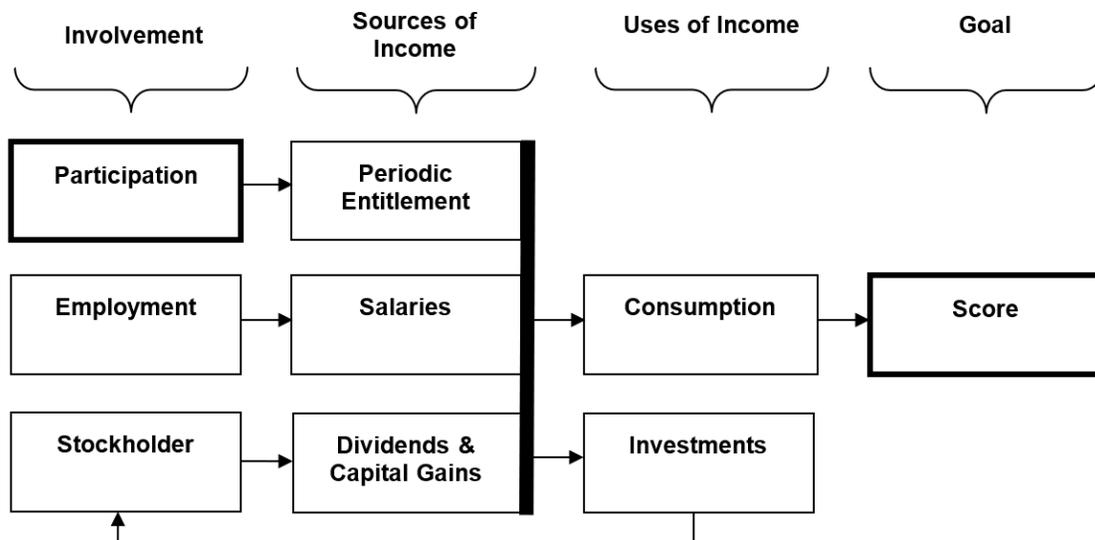
supplement with salaries, dividends, and capital gains, to buy, through an online marketplace, the products produced by the companies they manage. Participant scores are based on their consumption, which incentivizes them to buy products with the highest value in advancing their scores and to maximize their income by gainful employment and astute investments. The performance flow diagram of the game is shown in Figure 1.

Unlike many other business games that give participants companies to manage, GEO gives each participant a line of credit that they can use to invest in companies that they can found. Trading of shares is continuously processed online through a clearinghouse that posts the highest-priced offer to buy shares and the lowest-priced offer to sell shares. Any party wishing to trade shares can either accept the posted offer or post a counteroffer. Thus, if the posted buying price is $150 a share and the posted selling price is $160 a share, a trader desiring to pay $155 can either buy immediately by paying $160 or submit an offer to buy at $155. In the latter case, the posted buying price will rise immediately to $155 a share.

To maintain liquidity, the assumed government serves as market maker. It always has an offer to buy all the outstanding shares of every company at basic value, the higher of book value or zero, rounded down to the nearest dollar. Every share that the government acquires is offered for sale on the same basis, except that rounding is up to the nearest dollar. Thus, shares cannot be sold below the basic-value price, for any party bidding to buy below the basic-value price will have its offer superseded by the government's bid at the basic-value price. Moreover, any party offering to sell below the basic-value price will realize a sale to the government at the basic-value price, or higher should another party offer to buy at a price higher than the basic-value price.

Control of the company vests in the shareholder who receives the votes of a majority of the outstanding shares not owned by the government. Thus, if of 730 shares outstanding the government owns 700, Jack owns 10, and Jill owns 20, then if Jack votes the 10 shares he owns for himself and Jill votes the 20 shares that she owns for herself, Jill controls the company. Jill is therefore in the position to execute an action detrimental to the company for a personal loss of only 2.7% (20 / 730 = .027) of the resulting damage to the company. With cunning, the situation may be exploited by Jill to her advantage, considering especially that the government's loss may be rationalized as a loss that hurts no one.

INSIDER INFORMATION

As generally understood, trading on insider information is trade advantaged by knowledge of information held by a company that is not available to other traders. In the context of a Stage-3 game, the members of a company's executive team have insider information about their intentions and actions.

We ignore intentions, as no viable means exists to obtain true intentions. We apply immediate update and disclosure of actions by requiring all executed actions to be entered into a continuously processing internet-based (Pillutla, 2003) computer

FIGURE 2
BALANCE SHEET PANEL

Company		FOODFUND:Food-Kappa-IS	3-147:1

Report | Balance Sheet | Income Statement | Detail | Control | P ◀ ▶

Book Value/Share (41.0 shares)	K$	66.83
Cash	K$	859
Demand Bank Deposits	K$	8,076
Accounts Receivable	K$	0
Product Inventory	K$	0
Resources Inventory	K$	3,972
Other Short-Term Assets	K$	0
Current Assets	K$	12,907
Term Bank Deposits	K$	0
Investments	K$	0
Business License	K$	2,500
Other Long-Term Assets	K$	0
Total Assets	K$	15,407
Business License Payable	K$	0
Accounts Payable	K$	1,470
Overdraft (6.00% interest)	K$	0
Demand Bank Loans	K$	11,197
Other Short-Term Liabilities	K$	0
Current Liabilities	K$	11,197
Term Bank Loans	K$	0
Other Long-Term Liabilities	K$	0
Total Liabilities	K$	12,667
Capital	K$	5,588
Retained Earnings	K$	-2,848
Total Equities	K$	2,740
Total Liabilities and Equities	K$	13,937

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FIGURE 3
INCOME STATEMENT PANEL

Company		FOODFUND:Food-Kappa-IS	3-147:1

Report | Balance Sheet | Income Statement | Detail | Control | P ◀ ▶

Life

Average Product Price	K$	247.78
Units Sold		2,588
Units Remain		0
Earnings		
Gross Revenue	K$	641,255
Cost of Goods Sold	K$	159,200
Gross Margin	K$	482,055
Salaries	K$	14,453
Deterioration Expense	K$	1,992
Founding Fees	K$	0
Operating Expenses	K$	16,445
Operating Income	K$	465,610
Net Foreign Exchange Gain	K$	-1,470
Interest Income	K$	3,072
Less: Interest Expense	K$	2,891
Net Other Income	K$	0
Income Before Tax	K$	464,321
Corporate Income Tax	K$	232,548
Income After Tax	K$	231,773
Investment Gain	K$	0
Net Income and Gains	K$	231,773
Disposition of Earnings		
Dividend	K$	227,862
Deduction	K$	6,759
Retained	K$	-2,848

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FIGURE 4
CONTROL PANEL

Company — FOODFUND:Food-Kappa-IS — 3-147:1

Tabs: Report | Balance Sheet | Income Statement | Detail | Control | P

Executive	Position	Tenure	Salary	Option	Price	Empower
(none)	Manager					BRETT
JACKY	Buyer	7	K$19	0	NA	BRETT
BRETT	Seller	7	K$500	0	NA	BRETT

Controlling Director: FOODIES

Shares Owning	48.78%
Shares Voting	100.00%
No. of Shares	41 outstanding, 41.0 diluted
Declared Dividend	K$0.00/share
Ownership Layers	2 above, 0 below

Period Milestones

Found	14	Employ	15	Policy	20
List	14	Revenue	21	Produce	16

Director	Type	Own	Vote
FOODIES	Company	20	41
BRETT	Person	21	0

View Trade

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FIGURE 5
LISTING OF COMPANIES

Companies — RACHEL:Kappa-IS, 2.39: [0.00] 39.51+44.41 — 3-147:1

Tabs: Alpha-FT | Beta-FT | Chi-EP | Delta-EP | Eta-ST | Gamma-ST | Kappa-IS | Lambda-MT | Xi-MT | Zeta-MT | *All

Name	Status	S/T	Group	Industry	ROI	EPS (K$)	Div (K$)	Book (K$)	Shares	Dir	Exc	Exp	Market
KT	Private-0%	--	--	Service	NA	NA	0.00	54.67	30.0	0	0	6,101	0.00%
HELPME	Private-100%	--	--	Service	NA	NA	0.00	54.92	36.0	1	0	2,802	0.00%
SAMSERV3	Private-100%	B1	2	Energy	NA	NA	0.00	56.77	71.0	4	1	2,469	0.00%
LEGO	Private-100%	H2	9	Service	NA	NA	0.00	62.00	1.0	1	2	5,382	0.00%
TOPSERV	Private-0%	--	--	Food	NA	NA	0.00	63.45	91.0	0	2	1,346	0.00%
C	Private-100%	H1	6	Investment	NA	NA	0.00	64.33	46.0	1	1	0	0.00%
BLIZZARD	Private-100%	H1	9	Banking	NA	NA	0.00	64.41	22.0	2	1	0	0.00%
FOODFUND	Private-100%	T2	111	Food	NA	NA	0.00	66.83	41.0	2	2	3,131	0.00%
T2-05	Private-100%	B1	2	Investment	NA	NA	0.00	68.42	201.0	1	0	27	0.00%
04ENERGY	Private-100%	H2	14	Energy	NA	NA	0.05	69.07	75.0	1	0	770	0.00%
BOC	Private-100%	H2	15	Banking	NA	NA	0.00	71.85	97.0	3	0	0	0.00%
T1-G	Private-100%	B1	2	Investment	NA	NA	0.00	72.71	200.0	1	1	0	0.00%
T2-P	Private-100%	B1	2	Investment	NA	NA	0.00	76.09	200.0	1	1	0	0.00%
T1-O	Private-100%	B1	2	Investment	NA	NA	0.00	76.24	200.0	1	1	0	0.00%
T1-B	Private-100%	B1	2	Investment	NA	NA	0.00	76.88	200.0	1	1	0	0.00%
T2-08	Private-100%	B1	2	Investment	NA	NA	0.00	76.99	217.0	1	0	105	0.00%
SHIRLEY3	Private-100%	--	--	Investment	NA	NA	0.00	78.13	69.0	1	0	0	0.00%
T1-A	Private-100%	B1	2	Investment	NA	NA	0.00	78.13	200.0	1	1	0	0.00%
T1-C	Private-100%	B1	2	Investment	NA	NA	0.00	78.13	200.0	1	0	0	0.00%
T1-F	Private-100%	B1	2	Investment	NA	NA	0.00	78.13	200.0	1	0	0	0.00%

View Company | View Stock History | View Hierarchy | View Detail — No. of companies: 230

Local

Help | View Takeover Bids | Export... | Close

program that supports the game, and immediately updating company status disclosing the results to all participants, withholding only information on unexecuted offers to trade. Thus, any action that affects the company's financial statements immediately updates the company's balance-sheet panel (Figure 2) and income-statement panel (Figures 3), and any action that changes formal relationships among the members of a company's team immediately updates the company's control panel (Figure 4). Every participant has three-click access to these panels. The first click commands the appearance of a listing of companies (Figure 5). The second click selects the company from the list (highlighted row of Figure 5). The third click (View Company button of Figure 5) commands the appearance of information panels about the selected company that includes its balance-sheet panel, income-statement panel, and control panel (Figures 2 to 4).

CONFLICT OF INTEREST

We view conflict of interest as a situation wherein one's action on behalf of one party might benefit a second party in which one has an interest to the detriment of the first party. The situation is pervasive in a Stage-3 game, because ownership is divided when company shares are traded among participants. As a result, the participant who controls a company with divided ownership can gain from acting against the company's interest. The incentive for such unethical conduct depends on the amount that the company might lose relative to the amount that another party might gain, and on the controlling participant's ownership share in the party that would lose relative to the participant's ownership share in the party that would gain. Such conflicts of interest can arise when primary shares are traded, when secondary shares are traded, and when a statutory takeover is executed.

TRADING PRIMARY SHARES

A company trades primary shares when it buys or sells its own shares. The company loses when it sells its shares below fair value and when it buys its shares above fair value. For our game, we use book value per share as the measure of fair value.

The controlling participant of a divided-ownership company might scheme to gain at the company's expense by trading company shares with herself or with a company in which her ownership interest is greater. For example, if the company's book value is $50 a share, a participant who controls the company in which the participant has a 10% ownership interest might direct the company to buy back her shares at $150 a share. If successful, the scheme would result in the participant gaining $150 – $50 = $100 a share and the company losing the same amount for each share traded. As the participant's share in the company is 10%, the participant would lose only .1 × $100 = $10, netting $100 --– $10 = $90 a share.

FIGURE 6
DIALOG PANEL FOR TRADING PRIMARY SHARES

We divert the scheme by requiring that trading of primary shares be handled by an honest company agent. The agent, essentially an algorithm, will sell company shares only to whichever party bids the highest price at or above the company's book value. Moreover, given available cash, the agent will buy company shares only from whichever party asks the lowest price at or below the company's book value less the equity encumbered by the company's debts (debts divided by the allowed debt-to-equity ratio). Debt encumbrance assures that stock re-purchase does not cause the company to exceed its allowed debt-to-equity ratio. Even so, the company never buys shares below the company's basic value rounded down to the nearest dollar, because the market-making government always has an offer in the market to buy all outstanding shares of every company at that price.

Thus, the participant who controls the company can limit pricing by setting a minimum price on sales of primary shares and a maximum price on buying back those shares, but the actual asking and bidding prices are set by the agent. The company's stock-trading panel is shown in Figure 6.

TRADING SECONDARY SHARES

Trading in secondary shares occurs when neither party is the issuer of the shares. If both parties are companies and both are required to trade through their respective company agents, then the trading of shares can only occur at fair value. That fair value, as determined by book value or another algorithm, is a severe pricing constraint because it does not allow for the possibility that the value of the shares to parties may differ, because of differences in circumstances and risk tolerance, among other considerations.

To avoid the pricing constraint of the company-agent approach, we divert conflict-of-interest scheming in secondary-shares trading by a screening algorithm that executes trades only when the stock-trading shareholder of the company that loses, as based on fair value, owns at least as much of the company that loses as of the company that gains. As in the trading of primary shares, all trades are processed though the clearinghouse, which matches the lowest offer to sell with the highest offer to buy, but matched offers flagged by the screening algorithm are re-matched until an un-flagged match is found. Trades are not executed when un-flagged matches are not found.

The screening algorithm is a feature about which participants are not warned. Participants who should puzzle over why their unethical scheme fails to execute have either to find the reason by themselves, or to ask the game administrator. Asking would mean owning up to the scheme, which would be a teaching moment.

STATUTORY TAKEOVER

A statutory takeover occurs when a party approaches the board of directors of a company with an offer to acquire the targeted company by a legal process that may not be acceptable to every shareholder of the targeted company. In our game, a statutory takeover is an all or nothing proposition: either the entire company is acquired or none of the company is acquired. Procedurally, the acquiring party submits a takeover offer to the board of directors of the targeted company. The directors of the targeted company votes on the offer. If the vote is favorable, the acquiring party executes the takeover.

In our game, a statutory takeover offer (Figure 7) specifies a premium over the target company's basic value. The game does not permit a negative premium, because shareholders can always sell their shares to the market-making government at no less than basic value rounded down to the nearest dollar. Thus, a successful takeover offer generally causes the acquiring company to sustain an immediate accounting loss on the acquisition. In the everyday world, this loss is euphemistically labeled *goodwill*.

FIGURE 7
DIALOG PANEL FOR STATUTORY TAKEOVER
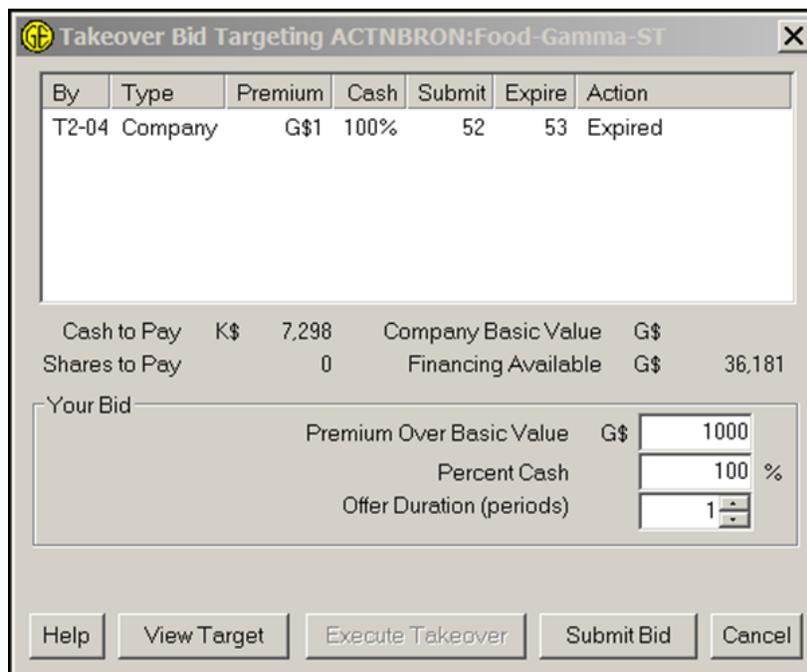
----- Insert Figure 7 about here -----

We apply the screening algorithm of secondary-share trading to takeovers. When the algorithm detects a conflict of interest, the program declines the takeover offer.

CONSPIRACY

The screening algorithm can be sidestepped by a conspiracy. For example, if Jack who owns 10% of Company A submits a statutory takeover offer for Company B in which Jill's ownership is 100%, the screening algorithm would not detect a conflict of interest, because Jack and Jill are two different individuals. Thus, Jack could offer a $10,000 premium for Jill's Company B for a personal loss of $1,000, 10% of the premium. Then if Jill turns around and personally acquires Jack's 100%-owned Company C for a $$5,500 statutory-takeover premium, Jack would net $5,500 – $1,000 = $4,500, and Jill would net $10,000 – $5,500 = $4,500, the same amount.

A screening algorithm to detect a two-person conspiracy would be complicated. Moreover, a two-person screening algorithm could be defeated by a three-person conspiracy, which in turn could be defeated by a four-person conspiracy, and so forth. To avoid the complication of a more encompassing screening algorithm, we supplement our single-person screening algorithm with blocking.

Blocking balances between reducing the reward of engaging in unethical behavior and hindering fair play. To enable the balance to be adapted to circumstances, we define a key measure, the loss ratio (γ), as value lost divided by value invested, together with an adjustable parameter, the maximum permissible loss ratio (γ^*). Trading of shares is blocked if the trade would cause the acquiring party to incur, ex post, a loss ratio exceeding the set maximum, proportionally adjusted for the buyer's ownership ratio (ω) of the acquiring company, that is, when $\gamma^*\omega < \gamma$.

TRADING PRIMARY SHARES

Primary shares are sold when a company is founded. In our game, the founding of a company requires a founding fee (F) that the founder pays to the government. Although the payment is not recorded as an asset of the company that is founded, the payment is cost that the founder should be able to recoup should the founder allow others to share in the initial investment. For example, if a founder pays $400 to found a company and buys part of its initial issue of shares at $50 a share, the founder should be allowed to charge other investors more than $50 a share for the shares that the other investors will buy of the initial issue. For this reason, we consider the acquisition value of primary shares aggregated across all shareholders as equal to the sum of the company's book value (V) and the founding fee.

Thus, if primary shares of a company with n shares outstanding whose book value per share of v are offered at price p, then the value invested by an investor who buys m shares is pm, ignoring trading cost that in our game is zero. The acquisition value of the company is $V + F$ ex ante and $V + F + pm$ ex post, for the purchase adds to the company's capital. The investor's fraction of that value is $m / (n + m)$. Accordingly, the loss-ratio maximum proportionally adjusted for the buyer's ownership ratio of the acquiring company is given by Equation 1. Isolating p from the Equation 1 gives rise to the upper-bound price of Equation 2.

Maximum Ownership-Adjusted Loss Ratio of Buying Primary Shares

$$\gamma^*\omega \geq \gamma = \frac{pm - \frac{m}{n+m}(V + F + pm)}{pm} \qquad (1)$$

Upper Bound of Primary-Share Price

$$p \leq \frac{V + F}{n(1 - \gamma^*\omega) - \gamma^*\omega m} \qquad (2)$$

Equation 2 shows that p depends upon m, which means that the price ceiling depends upon the number of shares the purchaser will buy. To avoid the complication of a quantity-dependent price ceiling, we simplify by setting m to equal the minimum lot size that in our game is one. Thus, if the fee to found a company is $400 ($F = 400), if the participant executing the primary-share purchase owns 50% of the company buying the shares ($\omega = .5$), and if the loss of up to 25% in purchasing primary shares is not to be blocked ($\gamma^* = .25$, so $\gamma^*\omega = .125$), then the price of the primary shares of a target company with an ex ante book value of $50 a share and 100 shares outstanding ($V = vn = $50 \times 100 = $5,000$) must not exceed ($5,000 + $400) / [100 (1 – .125) – (.125 × 1)] = $61.80 per share. In our game, we would round the price ceiling up to $62 a share.

TRADING SECONDARY SHARES

When secondary shares are traded, the founding fee, as sunk cost, has lost its relevance to the company's acquisition value. Moreover, the purchase does not add to the company's capital, so the ownership-adjusted loss-ratio maximum is given by Equation 3 and the upper-bound price is given by Equation 4. Applying Equation 4 to the numbers of the primary-share-trading example, the price of the secondary shares must not exceed ($5,000) / [100 (1 – .125)] = $57.14 per share. In our game, we would round the price ceiling up to $58 a share.

Maximum Ownership-Adjusted Loss Ratio of Buying Secondary Shares

$$\gamma^* \omega \geq \frac{pm - \frac{m}{n} V}{pm} \tag{3}$$

Upper Bound of Secondary-Share Price

$$p \leq \frac{V}{n(1 - \gamma^* \omega)} \tag{4}$$

STATUTORY TAKEOVER

For statutory takeovers, a premium (U) over book value is specified, so the value of the investment is $V + U$ and the ex post value of the target company to the acquirer is $V + F$, considering that the comparable-value alternative to buying a company is founding a company. Thus, the ownership-adjusted loss-ratio maximum and upper-bound premium are given by Equation 5 and Equation 6, respectively. Applying Equation 6 to the numbers of the primary-share-trading example, the premium must not exceed [(.125 × \$5,000) + \$400] / (1 − .125) = \$1,171.43. In our game, we would round the premium ceiling up to \$1,172.

Maximum Ownership-Adjusted Loss Ratio of Statutory Takeover

$$\gamma^* \omega \geq \frac{(V + U) - (V + F)}{V + U} = \frac{U - F}{V + U} \tag{5}$$

Upper Bound of Statutory-Takeover Premium

$$U \leq \frac{\gamma^* \omega V + F}{1 - \gamma^* \omega} \tag{6}$$

CONCLUSION

Trading on insider information, conflicts of interest, and conspiracies are ethical issues of stock markets everywhere, simulated or not. In our implementation of a Stage-3 business game, we apply immediate update and disclosure to trading on insider information. For situations involving conflicting interests, we apply company-agent diversion to the trading of primary shares. We apply screening-algorithm diversion both to the trading of secondary shares and to statutory takeovers. We rely on blocking to discourage conspiracies in all instances.

Diversion and blocking are methods that allow participants to plan unethical behaviors without fully experiencing the reward that would otherwise accompany successful execution. By impeding the causal chain from plan to action to reward, diversion and blocking enable participants to practice fair play while avoiding unethical behaviors. To the extent that practicing fair play inculcates in players the avoidance of unethical behaviors, to that extent participants learn to avoid unethical behaviors by playing a business game. That a business game might therefore teach participants to avoid, through practice, unethical behaviors may be a novel perspective on the role of business games in business education, one that should benefit from further investigation.

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