

Following the Money Trails with Dangerous Products

Scary Switch Systems Supply Company LLC spent \$13 million developing an innovative new innovative laptop battery system. Subsequent internal testing discovered that these new batteries have a defect which could make them randomly catch on fire and explode after several years of use. The only way to fix this is by investing another \$4 million as a one-time cost to develop additional features including safety software. The Regulator in this industry is either *Corrupt* or *Lazy*, so it is possible to enter the market regardless of whether this fire safety issue is fixed or not. The estimated market demand for the dangerous product in its current state is a quantity of 2 million units with a market price set at \$3 due to existing non-negotiable legal agreements with distributors. The estimated market demand for the improved product with safety software is 1.5 million units and the market price would be set at \$4 due to the perceived benefits of the extra features. The variable cost of producing dangerous batteries is \$1 per unit and the variable cost of producing safety software batteries is \$2 per unit.

- A. What will a logical, risk-neutral, profit-maximizing CEO of this company decide to do?
- B. Suppose a Senator in charge of regulatory oversight discovers that the industry Regulator is either corrupt or lazy and therefore failing to ensure product safety. If the Senator investigates, then the company will not be able to sell dangerous batteries. Using only the following game (with the units for given payoff values in millions of dollars) explain what will happen.

		Regulator	
		Corrupt	Lazy
Senator	Investigate	1.5 2 1 1	1 1
	Reappoint	0 4 0.5 3	0.5 3

- C. Using your Nash Equilibrium outcome obtained from the game, what will the company do now?

Suppose the company finds out that it can influence policy by donating money to the Senator's campaign.

- D. What is the most this company would be willing to donate in exchange for the Senator deciding to reappoint the Regulator? (Remember that the units for the matrix payoffs above is millions of dollars)
- E. Assuming the company knows all of the values in the matrix game above, how much should it offer to donate to the Senator?
- F. Suppose the firm can now cut costs by \$500,000 by dumping toxic waste in the river (regardless of whether it produces dangerous or safe batteries) if the industry Regulator is corrupt. Based on the matrix payoffs, how much should the firm offer to bribe the Regulator to be corrupt instead of lazy?

SOLUTIONS:

A)

The 13m loss is a **sunk cost** – this must be ignored in any logical economic analysis.

Profits from safe product would be $\$4(1.5) - \$2(1.5) = \$3\text{m}$

... and the cost would be \$4m to fix: so *net loss of \$1m* with the fix and safe product.

Profits from dangerous product would be $\$3(1) - \$1(1) = \$2\text{m}$ **so the firm will sell the dangerous product.** It will never choose to fix the product under these conditions because the total costs would be larger than the benefits and profit would become negative.

B)

Corrupt is a dominant strategy for the Regulator and Investigate is a dominant strategy for the Senator. The Regulator will always choose Corrupt because it obtains a higher payoff regardless of what the Senator does. The Senator will always choose Investigate because it obtains a higher payoff regardless of what the Regulator does. This also means Lazy is never a best response for the Regulator and Reappoint is never a best response for the Senator. The unique Nash Equilibrium is {Investigate, Corrupt} and this is called a “Dominant Strategy N.E.” since both players are using dominant strategies in this outcome.

C)

With an investigation, the firm cannot sell dangerous batteries, so **there is no way to profit even after disregarding the sunk cost.** The firm will shut down instead of losing additional money.

D)

The firm would shut down (optimal profit = \$0) with an honest Regulator, or it could make \$2m with a corrupt regulator, so **it would be willing to pay up to \$1.99m** to influence the senator.

E)

Knowing that the Regulator will always choose corrupt, since it is a dominant strategy, the Senator would require at least \$1.5 million to keep the regulator instead of investigating. **The firm should offer to donate \$1.51 million,** which is the smallest amount the Senator would accept because the payoff from choosing Reappoint is \$1.5 million less than the payoff from Investigate. The firm would still make a profit of \$0.49 million in this case instead of having to shut down.

F)

While the firm would be willing to bribe the Regulator up to \$0.49 million to be corrupt instead of lazy, this is not necessary since the Regulator will always choose Corrupt anyway. **The firm does not need to offer anything because Corrupt is a dominant strategy which already maximizes the Regulator’s payoff no matter what the Senator does.**

** Even if the Regulator knew everything about the firm’s higher profit potential, the Regulator would not be able to credibly extort or request anything from the firm because the difference in payoffs for the Regulator is larger than the potential profit gain for the firm. **