

This paper has 3 pages (including the coversheet)

UNIVERSITY OF MELBOURNE  
MELBOURNE BUSINESS SCHOOL

## **Managerial Economics FtA**

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Mid-Term 1: Thursday 24<sup>th</sup> February, 2000

Reading Time: 15 minutes

Writing Time: 60 minutes

**THIS IS AN OPEN BOOK TEST**

1. During the reading time candidates may not write on the test paper.
2. Simple calculators can be used.
3. Answer 2 out of the 3 possible questions.
4. Answer *all* questions in the booklet provided and not on this paper.
5. The total marks for this test add to 20.
6. **Good Luck!**

Answer 2 out of the following 3 questions. **DO NOT ANSWER ALL 3!** Answer in the booklet provided. Each question is worth 10 marks.

**QUESTION 1:**

*To take the marriage vows or not to take the marriage vows that is the question!*

Consider the following 'game'. At the first stage, two people get together. During the first period each person can choose whether or not to "invest in the relationship". "Investing in the relationship" means making a special effort in the first period that will only yield the investor benefits in the second period if the couple stay together. At the end of the first period, each partner decides whether to remain together for the second period or to separate. If either prefers to separate, then separation occurs; payoffs in the second period depend on whether the couple separate, and if they stay together, on who invested in the first period.

Suppose the following payoff matrix represents this game:

		HIM				
		<i>INVEST</i>		<i>DON'T INVEST</i>		
		Stay	Separate	Stay	Separate	
HER	<i>INVEST</i>	Stay	(110,110)	(60,60)	(30,105)	(40,115)
	Separate	(60,60)	(60,60)	(40,115)	(40,115)	
	<i>DON'T INVEST</i>	Stay	(105,30)	(115,40)	(60,60)	(70,70)
	Separate	(115,40)	(115,40)	(70,70)	(70,70)	

Since the decision to invest (or not) precedes the decision to separate (or not) we have to work backwards to solve this game.

- (a) For each subgame, (invest, invest; invest, don't invest; don't invest, invest; and don't invest, don't invest) determine if either player has a dominant strategy for staying or separating. If so, determine the likely outcome of each subgame.
- (b) Having solved for the likely outcome of each subgame, solve for the outcome of the invest/don't invest game (i.e. take the likely payoffs from each subgame and solve the reduced game).

- (c) Is the outcome you found in (b) sub-game perfect?

Now, suppose that back at the beginning the pair have the option to take or not to take a vow to stay together regardless. Thus, if they take the vow, only the "stay" payoffs would remain as possibilities. If they do not take a vow, there will be a separation and no investment so we need only consider that possibility. In effect, there are 3 strategies. Take a vow and invest, take a vow and don't invest, or don't take a vow.

- (d) Write the payoff matrix for this game.
- (e) Does either player have a dominant strategy? What is the likely outcome of this game? Explain why the outcome to this game differs from that in (b).

### **QUESTION 2:**

Cartman has purchased a \$50 ticket to a rock concert. On the day of the concert he is invited to a welcome home party for a friend (Starvin Marvin). He cannot attend both the concert and the party. If he had known about the party before buying the ticket he would have chosen the party over the concert. If he is rational will he go to the party anyway? Explain carefully (hint: this is not a trivial question!).

### **QUESTION 3:**

Having performed so well in your economics courses while doing your M.B.A., you have been retained as a consultant for the Melbourne Business School. In particular, you have been asked to evaluate one of the new expansion proposals (put forward by SMS (Speedy Marketing Strategy) Consultants) that plans to utilise the land that MBS owns adjacent to its current building, to build student accommodation and parking facilities. Using the concepts of complementors, opportunity cost etc. comment on the relative merits of such a proposal.

**Managerial Economics Full Time A 2000**  
**Mid-Term Test Solution Sheet**

**Question 1**

(a) We solve this game by backwards induction. This means solving each of the four second-stage sub-games first.

**(I, I)**

		<b>HIM</b>	
		<b>Stay</b>	<b>Separate</b>
<b>HER</b>	<b>Stay</b>	<b>(110, 110)</b>	(60, 60)
	<b>Separate</b>	(60, 60)	(60, 60)

Each player has a dominant strategy to STAY

**(I, DI)**

		<b>HIM</b>	
		<b>Stay</b>	<b>Separate</b>
<b>HER</b>	<b>Stay</b>	(30, 105)	(40, 115)
	<b>Separate</b>	(40, 115)	<b>(40, 115)</b>

Each player has a dominant strategy to SEPARATE

**(DI, I)**

		<b>HIM</b>	
		<b>Stay</b>	<b>Separate</b>
<b>HER</b>	<b>Stay</b>	(105, 30)	(115, 40)
	<b>Separate</b>	(115, 40)	<b>(115, 40)</b>

Each player has a dominant strategy to SEPARATE

**(DI, DI)**

		<b>HIM</b>	
		<b>Stay</b>	<b>Separate</b>
<b>HER</b>	<b>Stay</b>	(60, 60)	(70, 70)
	<b>Separate</b>	(70, 70)	(70, 70)

Each player has a dominant strategy to SEPARATE

**(b)** The reduced game, or first-stage decision is then:

		<b>HIM</b>	
		<b>Invest</b>	<b>Don t Invest</b>
<b>HER</b>	<b>Invest</b>	(110, 110)	(40, 115)
	<b>Don t Invest</b>	(115, 40)	<b>(70, 70)</b>

Again, both players have a dominant strategy, in this case not to invest. Thus the outcome of the game is that neither player invests, and in the second period they separate with payoffs of (70, 70).

This is the classic prisoner's dilemma outcome where both players, acting in their own self-interest, get to a sub-optimal outcome. If the players could somehow coordinate on the investment decision, then they could both be better off.

(c) The idea of sub-game perfection is one of refining the equilibrium concept to get better predictions of likely outcomes in a game. In particular, sub-game perfection deals with the credibility of all actions and promises.

In the solution we found in part (b), the outcome had both players playing credible strategies in every sub-game of the total game, and hence satisfies our definition of sub-game perfection.

(d) Introducing the marriage vow, and given the associated payoffs suggested in the question the new game matrix is:

		HIM		
		Take Vow & Invest	Take Vow & Don't Invest	Don't Take Vow
HER	Take Vow & Invest	(110, 110)	(30, 105)	(70, 70)
	Take Vow & Don't Invest	(105, 30)	(60, 60)	(70, 70)
	Don't Take Vow	(70, 70)	(70, 70)	(70, 70)

(e) Neither player has a dominant strategy in this game. Using the concept of Nash equilibrium, we can predict the likely outcome of this game to be where both players take a vow and invest in the relationship, yielding payoffs of (110, 110).

Essentially, the marriage vow serves as a credible commitment mechanism. In effect, the willingness to take the vow is a signal that the partner intends to invest in the relationship. If she/he didn't, it would make more sense for him/her to avoid the vow.

Both partners are better off if the vow is taken, and if they had no opportunity to bind themselves with a vow, they could not attain the blissful outcome at the upper left.

The analysis in this problem closely resembles the issues that companies forming strategic alliances must face.

### **Question 2**

It is important to carefully delineate the choice problem Cartman faces, and to relate that back to the concepts of willingness to pay and consumer surplus.

We are told that had Cartman known about the party before he bought the ticket for the concert, he would have chosen to go to the party.

This means:

$$WTP(\text{Party}) - OC(\text{Party}) > WTP(\text{Concert}) - OC(\text{Concert})$$

and since

$$OC(\text{Concert}) = P(\text{ticket}) = \$50, \text{ and assuming } OC(\text{Party}) = \$0,$$

this reduces to

$$WTP(\text{Party}) > WTP(\text{Concert}) - \$50.$$

Note that this does not mean that:

$$WTP(\text{Party}) > WTP(\text{Concert})$$

Now, the problem Cartman faces today, is whether to go to the party or to the concert. Though the \$50 ticket price can be considered a sunk cost for the purpose of this decision problem, we still do not know whether Cartman will choose the concert or the party. In short, this depends upon whether Cartman's preferences are such that

$$WTP(\text{Party}) > WTP(\text{Concert})$$

or not.

### **Question 3**

This was a very broad strategy question. While it is beyond the scope of a mid-term to adequately address all the potential issues, some key aspects that needed to be addressed were as follows:

- Does the building of student accommodation/parking facilities increase the value created?
  - if they are complementary products how does this affect willingness to pay?
  - what is the opportunity cost of the provision of these services?
- Just because value is created through increasing willingness to pay with the provision of complementary services, does not mean that MBS ought to be necessarily providing these services themselves (make versus buy decision).