

READ ALL INSTRUCTIONS BEFORE YOU BEGIN THE GAME. YOUR SUBMISSION WILL BE MARKED AS A GROUP EFFORT. HOWEVER, THERE ARE BONUS MARKS AVAILABLE FOR INDIVIDUALS AS DETAILED BELOW.

1 Objective

The members of your team will participate in a derivatives trading market. You will make markets, place trades, record profit and loss, and strategically reveal information.

2 Instructions

2.1 Roles

There are four or five roles (depending on team size):

1. The *spades market maker*. This trader is in charge of setting prices for spades contracts.
2. The *hearts market maker*. This trader is in charge of setting prices for hearts contracts.
3. The *clubs market maker*. This trader is in charge of setting prices for clubs contracts.
4. The *diamonds market maker*. This trader is in charge of setting prices for diamonds contracts.
5. (Optional) The *speculator*. This trader does not set prices.

2.2 Initial Setup

The game will deal a few cards privately to each of the four market makers and the speculator (if there is one). Each trader can view his or her cards (private information), and all traders will eventually get to see all the other cards (public information). All cards will be revealed over the course of the game.

2.3 Objective and Rules of Trade

Each trader's objective is to maximize his or her profits by trying to buy and sell contracts. There are four types of contracts:

- A spades contract pays off \$1 if the last card is a spade, and pays off \$0 otherwise.
- A hearts contract pays off \$1 if the last card is a heart, and pays off \$0 otherwise.
- A clubs contract pays off \$1 if the last card is a club, and pays off \$0 otherwise.
- A diamonds contract pays off \$1 if the last card is a diamond, and pays off \$0 otherwise.

All trades are for *one contract only*. In order to make a trade, a trader can click “Buy” or “Sell” from another market. All market makers must provide prices at all times, by providing bid and an ask for the contracts. If for example, the clubs market maker quotes 24-27, that means that he or she is willing to buy a clubs contract for 24 cents, and is willing to sell a clubs contract for 27 cents. You may trade multiple times per action, and multiple times with the same counterparty per action. There is a one-second buffer to prevent spamming orders. Although you start out with a cash balance of zero, you can feel free to buy or sell as many contracts as you want - that is, don’t worry about having a negative cash balance. Another way of saying this is that you can borrow freely at a 0% risk-free rate.

2.4 Mechanics

I would highly recommend watching the walkthrough made by Phil Tulip which will be sent around. This game is played at <https://www.derivativescardgame.xyz/>. One of you needs to log in first and click on “Create a new game?”. This will generate a Game ID, which everyone else can log in with. Once logged in, the group member who created the game will become the admin and can assign each of his teammates to a role (one of the four market makers, and if there are five of you, one speculator). The admin can set a maximum bid-ask spread that will limit prices. You should agree on this maximum level before you create the game. The maximum level should be large enough that there can be some variation in spreads throughout the game.

Once you are all logged in, and have assigned roles, you should see four rows of information for each of the markets. Under ‘Markets’ each row has a bid and an ask at which you can sell and buy, respectively, contracts for each suit (or, if you are the market maker suit, that is where you set your bid and ask). The ‘My Inventory’ section tells you under ‘my contracts’ how many of each contract you currently hold, and under ‘my cards’ how my

privately held cards of each suit you can see. The ‘Deck’ section tells you how many cards of each suit have been publicly revealed to all traders. The ‘Trades’ section has a running ticker of the last twenty trades.

The admin will be in charge of moving the game along, and should make sure that they check with all their teammates before doing so prematurely. The admin will click ‘start game’ and traders will then, in a prespecified order, either have to pick a card of their own to reveal, or get to see a card from the common pool of unobserved cards. Once one of these events has occurred, traders will be able to adjust prices, and trade with each other. The admin can then choose when to move on to the next revelation. Recently revealed suits will be in bold.

Once the game is completed, and the last card is revealed, its suit will determine which contracts pay out and which contracts do not. Profit and loss can then be calculated. Afterwards, you will be able to download data on all trades which you will use for your analysis.

If you were just playing a game as practice, and don’t want to keep the data, you can click on ‘End Game’ which will delete the data and remove the users for that game. Then a new game will have to be created.

3 Deliverables

You, as a team, are responsible for providing the following, in a *concise* and *typed* writeup:

- A running tally of all quoted bids and asks in all four markets.
- Summary statistics for each trader. These must include but are not limited to: Profit/Loss, Number of trades, Average Spread, and Final Inventory.
- The average bid-ask spread of all quotes from all participants.
- The total number of contracts traded.
- The sum of the absolute values of inventories of all participants.
- Individually, each trader must describe his or her strategy in approaching the game, what they felt worked well, and what they would have changed in retrospect.

- After discussing as a team: provide an analysis of the derivatives market. How liquid was it? How did traders use private information? How did the revelation of private information affect trades? Did it differ from how public information affected trades? Were there arbitrage opportunities? If so, what were they, and did anyone take advantage of them?

4 Evaluation

Each group can receive a maximum of 50 points, excluding bonuses (which are described below). Points will be given for: the cleanliness of presentation and statistics, the clarity and succinctness of explanation, and the innovation and thoughtfulness of trading strategies.

- Submission/Pricing: 5 points
 - Have clear and complete summary statistics
- Individual writeups: 7 points each for teams of 4 (6 points each for teams of 5)
 - Discussion of informational strategy
 - Discussion of other aspects influencing trading and pricing.
 - Anything else extra or interesting
- Group Analysis: 17 points for teams of 4 (15 points for teams of 5)
 - Discussion of market characteristics (trading patterns, pricing patterns, etc)
 - Discussion of informational environment and interactions.
 - Discussion of arbitrage opportunities.
 - Anything else extra or interesting.

5 Suggestions

- Make each trading interval last for no more than about 2-3 minutes on average, otherwise the game will last a very long time.

- Set a cap, as a team, on the bid-ask spreads. Tighter spreads encourage trade. For example, you could set a maximum spread of 10 cents. Don't set the cap so small that you cannot vary your spread meaningfully.
- Try practicing the game once or even twice to get a sense of the flow.
- Try to plan ahead in terms of strategies and responses to information (Excel can be helpful!)
- Remember that ending the game with inventory (positive or negative) is not, in and of itself, a problem.
- Remember that having a good strategy does not guarantee profit, and that making a profit is not necessarily indicative of a good strategy.

5.1 Bonuses

- +3 points for team with most total volume traded.
- +3 points for team with lowest average final inventory.
- +1 point for trader on each team with highest profit.
- +1 point for trader on each team with highest volume.
- +2 points for any trader who has highest profit *and* highest volume on his or her team.