

## Supplemental Material for

### An Experimental Test of the Impact of Overconfidence and Gender on Trading Activity (Richard Deaves, Erik Lüders, Guo Ying Luo)

#### APPENDIX C: Pre-experimental questionnaire

##### Preliminary questions

This part of the questionnaire is designed to collect general information. Such information may help us better understand differences found between participants in this experiment.

1. What year are you in university?
2. What is your sex? (m = male; f = female)
3. What is your age?
4. What is your primary means of financial support? (a = self-supported; b = parent or relative; c = spouse or significant other; d = scholarship, financial aid or other loans; or e = other)
5. How many economics and finance courses have you successfully completed at the university level?
6. How many economics and finance courses are you currently enrolled in?
7. Have you invested in mutual funds for yourself or others? (y = yes; or n = no)
8. Have you traded securities for yourself or others? (y = yes; or n = no)
9. I never buy securities or funds that will underperform in the future. (5=totally agree; 4=agree; 3=neutral; 2=disagree; and 1=totally disagree)
10. I am not able to identify securities or funds with above-average performance in the future. (5=totally agree; 4=agree; 3=neutral; 2=disagree; and 1=totally disagree)

## General knowledge questions

Next we would like to assess your general knowledge, and how well you know how much you know. For the following series of questions with clear-cut numerical answers, please provide 90% confidence intervals. Such an interval has a lower and an upper bound such that you are 90% sure that the correct answer lies in this interval. Note that, if your intervals are too wide, the correct answer will fall in your interval more than 90% of the time, while, if you intervals are too narrow, the correct answer will fall in your interval less than 90% of the time.

1. World population growth between 1990 and 2000 (in percentage terms)	11. GDP per capita in France (in thousands of \$US) in 2000
2. Year in which Newton discovered universal gravitation	12. Number of countries in the United Nations
3. Number of nations in OPEC	13. Year in which Mozart wrote his first symphony
4. Number of medals that Greece won at the first Olympic Summer Games in 1896	14. Gestation (conception to birth) period of an Asian elephant (in days)
5. Year in which Bell patented the telephone	15. Elevation (in meters above sea level) of Mt. Everest
6. Percentage of total area in world covered by water	16. Number of babies born in world in 2001 (per 1000 people)
7. Height of Sears Tower in Chicago (in meters)	17. World-wide life expectancy at birth in 2001
8. Number of nations in NATO	18 Land area in the world (in millions of sq km)
9. Age of sun in billions of years	19. Greatest depth (in meters) of the Pacific Ocean
10. Number of joints in human body	20. Number of calories in 8-ounce baked potato

## APPENDIX D: Session instructions

*Note: Blanks have been filled in using values from Session 1 in Canada. See Appendix A for further details.*

### INSTRUCTIONS for TRADING SESSION NO. 1 DATE March 31, 2003

#### 1. Introduction

**1.a. The nature of the session.** This experiment is concerned with the economics of market decision-making. Using a computerized trading simulation system known as *Financial Trading System (FTS)*, we are going to simulate a trading environment in which you will buy and sell shares of a stock during 12 distinct independent markets. (FTS calls these distinct markets trials.) Based on your decisions you will be able to generate profits. *These profits will be paid to you in cash at the conclusion of this experiment.*

**1.b. What materials should you have?** In addition to these instructions, please *make sure that you have received an introduction to the session, a consent form (which you should immediately read and sign if you agree to participate) and 12 prediction tickets.* Please refer to these pages while we go through the instructions with you. In addition, you can use scrap paper and writing utensils.

#### 2. Basic Setup

**2.a. Markets.** We will conduct 12 distinct independent single-period markets. *Markets are not related in any way to those coming before or those coming after. Each market will last five minutes.* An experimenter will announce the beginning and end of each market.

**2.b. Endowment.** At the beginning of each market, *every trader will be provided with the same endowment of 1800 baht (a currency unit) and four shares of a stock which pays a dividend at the end of the market.* The endowment and cash position will be displayed on your computer screen.

**2.c. Trading.** When trading starts in each market, you may sell part or all of your holdings of shares. You may alternatively use your cash endowment to purchase more shares. *You may also decide to do no trading and hold on to the shares that you are endowed with at the beginning of the market.*

**2.d. Dividends.** *At the end of each market, the stock will pay a dividend. The dividend per share in each market is randomly taken from an interval between 9 and 891 (at increments of 9). Each number in that interval has an equal chance of being drawn. After dividends are paid, the stock is worth nothing. The total dividends you will receive in each market are computed as the dividend per share multiplied by the numbers of shares of the stock you hold at the end of that market. The total wealth you have at the end of each market is the summation of your total dividends and your cash holding at the end of that market. The random draws of dividends in all markets are not related to each other. For more details on dividends, please see section 3.*

**2.e. Market price.** *Naturally your goal is to maximize your total wealth in each market. How you choose to do this is entirely your decision. If you choose to do so through the buying and selling shares of the stock, you would make a profit if you are able to “buy low and sell high,” namely selling at a higher price than the purchase price. If your trades turn out to be ones involving selling shares at lower prices than buying prices, you would make losses. As to what would be an appropriate price at which to buy or sell, that is a trader’s decision. Again we stress that if a trader so chooses nothing compels him/her to trade at all in a given market.*

**2.f. Signals.** *At the beginning of each market, before any trading takes place, each trader is given a signal (or private information) regarding the size of the upcoming dividend. The signal appears in a box on your computer screen. (You must first click on ‘Stock A.’) For your information, the average signal over all traders in a market is equal to the true dividend in that market. Section 3 provides a more detailed description of the signal.*

**2.g. Independence of markets.** *It is important to stress that you begin each market afresh with the same endowment. More specifically, the amount of baht cash that you have at the end of the previous market is in no way related to the amount of baht cash that you begin a new market with.*

**2.h. Determination of the payout market and the conversion rate.** *The money you take home will be based on your total wealth in only one of the 12 markets you participate in, but in advance you do not know which one this is. This being so, you are well advised to try to maximize wealth in each market. This market (called the payout market) will be randomly chosen by the roll of a 12-sided die after the 12 markets are finished. One of the participants will perform the die roll witnessed by another participant. (You may choose your own representatives if you like.) Note that to keep the exercise within budget a pre-selected conversion rate (dollars for baht) will be applied to convert your baht cash into dollars. (This conversion rate is the same for everybody, so if you have earned more baht*

than somebody else you will also earn more dollars than this same person.) The amount will be rounded up to the nearest dollar. *Note that the conversion rate has been chosen so that the average trader should make about \$50, but traders performing much better than average can earn well in excess of this figure.*

**2.i. Market trading mechanism.** While some basic points about trading rules are introduced below, a more detailed description is outlined in section 4. Before any trade can occur, there must be one trader who expresses a willingness to either buy or sell a share of stock at a specified price. An order to *buy at \$x* is called a *bid*, and an order to *sell at \$y* is called an *ask*. When you see that a trader has posted a bid at a price which you find acceptable as a selling price, you can express your willingness to make a sale at the posted price via a sell order. On the other hand, when you see that a trader has posted an ask at a price which you find an acceptable buying price for a share, you can express your willingness to make a purchase at the posted price via a buy order.

### 3. Dividends and Signals

**3.a. Dividends.** As said earlier, for each market, the dividend will be a randomly selected number between 9 and 891. All numbers between (and including) these values (at increments of 9) have the same chance of being picked. Note that dividend payout in a given market is determined independently of both past and future dividends in other markets. *For convenience all 12 dividends have been chosen in advance by a random number generating program.* (This is so we could prepare the signals in advance.) *Also for convenience, all 12 dividends will be announced only at the end of trading of all 12 markets.* To make things fair to participants, the average of all 12 dividends is *guaranteed* to be not more than 2% different from the midpoint of the uniform distribution (450). *(Feel free to check this afterwards if you like.)*

**3.b. Signals.** *Prior to each market each trader is provided with a private signal revealing some information on the upcoming dividend.* The private signal appears on your computer screen. It is of the utmost importance to keep this private signal private. For your information, the *average signal over all traders in a market is equal to the true dividend.*

**3.c. Signal accuracy.** Recall the questionnaire that you did several days ago. For a number of questions with quantitative answers you were asked to supply 90% confidence intervals. We calculated the midpoints of your lower and upper boundaries for each interval and compared these midpoints to the true answers. Based on these comparisons we calculated an accuracy index for all participants here today. Then we randomly generated eight sets of signals (one for each participant). *We guarantee that the higher is your accuracy index (that is, the more*

*accurate were your responses in the questionnaire session), the closer your signals will be on average to the true dividends. (That is to say, not every signal will be closer to the true dividend if your responses were more accurate than those of another trader, but, averaged over all 12 markets, your signals will be more accurate.) In fact, the most accurate individual will receive a set of signals three times more accurate than the least accurate individual!*

#### **4. Market Organization and Trading Rules**

**4.a. Possible actions.** If you wish to conduct a trade, you can do so by taking one or more of the following *four actions*: 1/*place a bid*; 2/*place an ask*; 3/*buy*; and 4/*sell*.

**4.b. Placing orders.** To take these actions, you must utilize your main FTS Trader window. When you look at it you will see that there are four sub-windows. First note that you only input information (orders) into the top middle sub-window which we call the 'Order Window.' Also important is the lower sub-window which we call the 'Book Window.' To place an order you must first click on the name of the stock (in the Book Window) in which you wish to conduct a trade. (This being only stock, we call it Stock A.) You will see the name of the stock is then indicated above the Order Window after you have clicked on it. There are two cells that now potentially should be filled in. First for a bid or ask the price cell should be filled in. Second, for all orders (bids, asks, buys and sells) a quantity of '1' needs to be filled in. *This is because in this experiment all orders must be for one share.*

**4.c. Placing a bid.** By placing a bid, you inform the market that you wish to purchase a share of a specified stock at a specified unit price. For example, if you wish to buy a share at a price of \$xx.xx, then you will enter:

xx.xx

and click on '**Bid**' in your trading window. (You must also have first selected a quantity of '1.')

*You are, however, prohibited from entering a bid whose purchase price exceeds your current cash balance.*

**4.d. Display of best bid.** The order window will display only the bid order with the highest price. *Bettered bids are replaced and cease to exist. To see the identity of the trader posting the best bid (you certainly will want to know if it is your order), you can double-click on the stock name. Doing so reveals a new window, which includes a graph that shows the evolution of bids, asks and transaction prices during the period.*

**4.e. Order cancellation.** *To cancel your bid, click on 'Clear Bids.'* Of course you cannot cancel another trader's bid.

**4.f. Selling shares.** When you observe the highest bid for the stock and if you have a share to sell, you are free to accept or not accept that highest bid. *To accept it, you have to enter the number of shares, which you must set at '1,' in the Order Window and click on 'Sell.'* You should not specify a price. If you do so the sale will not occur. After you have put in the order your sale will be immediately executed at the bid price. *You are prohibited from submitting a sell order if you do not hold the security.*

**4.g. Placing an ask.** On the other hand, if you wish to sell but are not satisfied with the observed bid price, you can place an ask into the trading system. Once again a price has to be specified. Also, once again, the number of shares must be set at '1.' *You are prohibited from submitting an ask order if you do not own a share.* Again, to delete your ask, you can click on 'Clear Asks.'

**4.h. Buying shares.** *If you wish to buy at the lowest ask price, you have to enter '1' and click on 'Buy' in the trading window. Again note that you should not specify the price.* The buy order will be immediately executed at the ask price. Again, traders are prohibited from buying more shares than they have the cash balance for.

**4.i. Updating of cash and share holdings.** *After a trade is executed, the trading system will immediately update your cash balance and share holdings and display them on the screen.*

**4.j. Ends of markets.** At the end of each market, a dividend is paid on the stock. *Your trading profit for a market is calculated as your cash plus the number of shares that you own times the dividend payout.* For convenience, the FTS system will wrongly show that your dividend is zero at the end of each period. At the end when all dividends are revealed, it is straightforward for you and the experimenters to calculate the true payout attached to the payout market.

## **5. Predictions**

**5.a. Making predictions.** Prior to the beginning of each market, you will attempt to predict the dividend to be paid out at the end of the market. You have been given 12 tickets to enter your predictions for the 12 markets. *You should only fill out one prediction ticket at a time, and you should only make your prediction one market ahead! (Failure to do so can lead to a penalty.) When told to do so you will have about 30 seconds to fill out these prediction tickets.*

**5.b. Prediction errors.** An experimenter will walk around the room to collect your tickets before each market begins. *The prediction error for a given prediction is the absolute value of the difference between your prediction and the true dividend.*

**5.c. Profiting from your predictions.** *The participant with the lowest prediction error in the payout market will earn an additional \$20. The identity of the winner (and the prediction performance of all participants) will be kept strictly confidential. You will find out if you have “won the prediction game” at the end when you are called to receive your cash payment.*



## APPENDIX E: Post-experimental questionnaire

**Participant's Name:**

**Participant's Student Number:**

### *Post-experimental questionnaire*

This questionnaire gathers information that may help us better understand differences found between participants in this experiment.

1. At the outset of the experiment you were given information on what a dividend might be in each market (that is, the dividend in each market was randomly drawn from an interval between \_\_\_\_ and \_\_\_\_ at increments of \_\_\_\_). On a scale of 1 to 10, how much importance did you assign this information relative to your private signal in coming up with your dividend predictions? \_\_\_\_\_

2. Did the number that you have written above change as the experiment progressed? (Tick off one.)

INCREASE \_\_\_\_\_

STAY SAME \_\_\_\_\_

DECREASE \_\_\_\_\_

3. Of the 32 (yourself included) people doing this experiment (not just those in today's session), how many do you think will end up making more money from it than you? \_\_\_\_\_

4. Do you think that your answers were more accurate than your colleagues in the pre-experimental session? (Answer yes or no.)

\_\_\_\_\_

5. Do you have any other comments on this experiment?

6. As before please complete 90% confidence intervals for these 10 general knowledge questions.

**General Knowledge Questions  
(JUST WRITE IN NUMBERS - NO UNITS!)**

	LOWER BOUND	UPPER BOUND
1. Year in which CIA was established		
2. Population of Australia in 2001 (millions of people)		
3. Number of companies listed on the Toronto Stock Exchange in February 2003		
4. Maximum number of meters below sea level of the Dead Sea		
5. GDP per capita in Finland (in thousands of \$US) in 2000		
6. Land area of Venezuela (in square kilometers)		
7. Year in which <i>Gulliver's Travels</i> by Jonathan Swift was published		
8. Number of muscles used to smile		
9. Number of paved runways in Germany in 2000		
10. Length of Nile River (in kilometers)		