Online Share Trading
An Experimental Study of Naïve Traders and the impact of Groups

Richard Heaney, RMIT*, F. Douglas Foster, UNSW, Shirley Gregor, ANU, Terry O'Neill, ANU, Robert Wood, AGSM

Abstract

While there is considerable use of groups in business, particularly in finance, there is little research into the impact of small groups relative to individual traders in a share-trading environment. We compare the performance of individual traders and groups, consisting of two traders, using an electronic share market trading game. Overall, we find that participant trading profit is negatively related with the level of trading and positively related with participant confidence but we find no evidence of a statistically significant difference in trading profit between individual traders and group based traders. Nevertheless, there is evidence that group profit volatility is more sensitive to the level of trading than individual trading profit volatility. Finally, when focusing just on group performance, we find that group trading profit is positively related with group attitude and negatively related with the group perceptions concerning the difficulty of the game and that the level of trading in groups is negatively related with coworker impressions.

JEL Code: D44, G14,
Key words: share market trading game, groups versus individual trading.

Acknowledgement
We would like to thank those students that took part in the experiment and we would also like to thank the ANU for providing access to students, staff and facilities. This research was funded under an ARC Discovery grant (DP0343994).

Contact Author
* Richard Heaney, School of Economics and Finance, Business, RMIT, Level 12, 239 Bourke Street, Melbourne, Australia, 3000, Richard.Heaney@rmit.edu.au, Phone: +61 3 9925 5905, Fax.: +61 3 9925 5986

Version: 8 March 2005

1. Introduction

The statement, "two heads are better than one", is often heard though rarely tested in the finance literature. Our paper provides a brief overview of an experimental test of whether there is a difference between trading profit generated by groups over the trading profit generated by individuals in a stock market game. The game is an electronic limit order based share-trading game and it is similar to the systems that appear in the modern European and Australasian electronic share trading markets. Important differences from actual share trading systems include the mechanism used to limit information flow into the market as well as unlimited short sales and unlimited borrowing. We use undergraduate students as our source of investors. We focus on these naïve traders because we expect that if there is some natural benefit to be gained from forming trading groups then this should most apparent with naïve traders.

The literature on group decision-making is substantial. While the use of groups in the work place is a widespread phenomenon, there are considerable problems that can occur with the selection of individuals that make up the group (Eby and Dobbins, 1997 and Jehn, Chadwick and Thatcher, 1997) and in getting the group to use the information resources that it possesses in the best possible way (Dennis, 1996). Nevertheless, there is support for ability of groups to learn faster than individuals (Kocher and Sutter, 2000). Given the literature, it is not clear that groups of naïve individuals will trade more profitably than naïve individuals in a fairly complex share market game.

An important paper in the finance literature dealing with group based share trading is that of Barber, Heath and Odean (2003) who describe stock club trading

where stock clubs are groups of traders that meet on a regular basis to make stock investments. Barber, Heath and Odean obtain a large sample of share trades executed by both individual traders and stock club traders. They show that individuals and groups make differing stock selections because of the greater tendency for groups to make their stock selections on the basis of "ranking by good reasons" though this approach does not necessarily equate to choosing the stocks on a cost-benefit basis. Consistent with this ranking argument, they find that stock club investment choices differ significantly from those made by individuals, with stock clubs tending to favour the most admired companies. It is important to note that the observed difference in stock selection did not lead to the stock clubs making greater profits than individual traders. Indeed, the stock clubs under performed individual investors after costs (Odean, 1999 and Barber and Odean, 2000a and 2000b). Thus groups may behave in a more reasoned manner than individuals though this need not result in improved profits, particularly where group decisions lead to investment in well known, well understood and heavily traded shares whose price is most likely to reflect value.

In analysis of naïve traders it is important to capture some of the key individual characteristics that might explain performance at the individual level. The most obvious is the level of understanding of the game. If the individual does not understand the task at hand then they cannot be expected to perform. Further, an individual's confidence in their ability to complete a complex task will also be an important determinant of individual trading ablity. This individual characteristic is termed self-efficacy (Bandura, 1978). Self efficacy has proven to be an important factor in explaining individual success in learning and Chan et al (2004), Christoph et al (1998), Hayashi et al (2004) and Tan and Zhao (2003) expand this notion to different learning scenarios. Self efficacy is defined as, "the belief in one's

capabilities to organize and execute sources of action required to manage prospective situations," (Bandura, 1986). Generally the greater the self-efficacy about a task the better the participant does at that task. The level of self-efficacy that an individual feels about their ability to complete a task can have a considerable impact on their actual performance in the task. Bandura (1986) suggests that self-efficacy will tend to increase over time as the participants gain greater exposure to the task at hand.

Our research extends the literature, focusing on the impact of group trading in a limit order share market trading system. It provides insight into: the impact of the level of trading on trader trading profit; the determinants of volatility in trading profit across participants as well as; focusing on the determinants of group trading profit. While we observe that groups generate more trading profit on average than individuals, this difference is not statistically significantly. Further, there is evidence that trading profit volatility is more sensitive to the level of trading for groups than it is for individuals. With more detailed analysis of groups we find that group profitability is a function of the level of trading, group attitude and difficulty of the task for the group. Further, the level of group trading is decreasing in the level of coworker impressions, suggesting that strong groups tend to trade less. This is important, given our finding that lower trading levels are associated with greater trading profits. Section 2 and Section 3 describe the participants in the study and the trading game used to simulate the share market. Data are defined in Section 4 while results are reported in Section 5. Further, analysis of the groups and their trading behaviour appears in Section 6 with conclusions following in Section 7.

2. Participants

The participants in the experiment were drawn from a first year undergraduate finance course. Cash incentives were paid to the participants with a fixed component to compensate for time lost and a further performance based cash amount paid to participants as an incentive to encourage risk neutral, return maximising, behaviour. All the participants have similar levels of previous experience with the trading game. They all attended a one-hour tutorial, required as part of their finance course, and they all completed a further one-hour of trading experience while taking part in an earlier experiment dealing with individual trading behaviour.

There are 54 first year undergraduate students that participated in the experiment, allocated to 17 groups of two participants and 20 individual traders. Stratified random allocation was used in distributing participants either to the individual traders or to the group traders, with stratification based on sex.[1] The trading groups were physically separated from the individual traders using different rooms, though all the participants traded in the same electronic share trading market game using a common computer network. More detailed questionnaires were issued to the groups, than to the individuals, to allow further analysis of specific strengths and difficulties faced by the groups participating in the experiment.

3. Trading Game

We use one of a suite of computer trading games, the Market efficiency game (RE1), described in O'Brien and Srivastava (1991)[2] and supplied by OS Financial

[1] There were 17 males and 17 females allocated as group traders and 10 males and 10 females allocated as individual traders. Those allocated to trade as groups were fairly randomly allocated across the groups with 4 groups consisting of two males, five groups consisting of two females and 8 groups consisting of one male and one female.

[2] OS Financial Trading Systems, P.O. Box 11356 Pittsburgh. P.A. 15238, 1 800 967 9897, email address: fts@ftsweb.com, web address: www.ftsweb.com.

Trading Systems. The market includes two shares and there is no limit on short selling or borrowing. There are three 10-minute trials, with each trial consisting of two 5-minute trading periods, period 1 and period 2.

While participants have access to up-to-date market information, including last trade and bid-ask spread for each of the shares, they are not endowed with full information about future dividends as discussed below. Further, there is a facility for discounting in the valuation of the shares but for simplicity we set the discount rate to zero and so share value is simply the sum of the expected dividend payment or payments.

The two assets traded in the market pay an uncertain dividend at the end of each of two 5-minute trading periods making up a trial. The security dividend schemes described in more detail in Appendix 1. A new valuation scheme applies to each trial consisting of a pair of 5-minute trading periods. For example, in a particular 10-minute trial a participant might receive the information that the dividend in period 1 is not X and the dividend in period 2 is also not X. If this information is provided for CRA then at the beginning of the trial the participant knows that CRA will take a value of either 8, 12, 18, 20, 24, 30, 32, 36 or 42, each with a probability of 1/9. The participant can work out the expected value of the share with two dividend payments to due (24.7) as well as the maximum value of 42 and minimum value of 8. On completion of the first trading period within the trial the first dividend is paid and so valuation focuses on the remaining dividend with a 1/3 probability of receiving 8, 12 or 18 (expected final dividend value of 12.7 with maximum value of 18 and minimum of 8). Thus, each of the participants in the market receives incomplete information but sufficient information is made available to the market to identify the value of the share.

[Insert Appendix 1 about here]

At the beginning of the game the participants are allocated cash and securities though the split between these two asset categories varies across the individuals. Once trading begins, the participants flag their wish to buy or sell securities by either entering a bid or ask price or choosing to accept existing ask or bid prices through buying at market or selling at market.

A dump of the trading screen is provided in Appendix 2. The key features of the game are apparent in this screen dump including the facility to enter bid and ask price and quantity, disclosure of current bid and ask prices as well as the current position of the participant in each of the two stocks, ABC and CRA. The central white rectangle contains the participant's endowed information about dividend payments.

[Insert Appendix 2 about here]

4. Data

Measures of trading profit, level of trading, confidence of traders and their understanding of basic characteristics of the game are obtained either from the FTS audit trail (trading profit and level of trading) or from questionnaires (measures of confidence and understanding). A separate questionnaire was also issued to the groups in an attempt to ascertain how well the groups functioned.

4.1 Performance

Trading profit (TOT_GC) reflects dividends, received from the shares on hand at the end of each 5-minute trading period, plus trading profits and losses and the

value of shares on hand at the end of the game. As indicated in Table 1 the average for group traders (12.83) is considerably larger than for the individual traders (-5.43) with a sample average of 2.96. The group trader's trading profit is considerably more variable as is evident with the maximum and minimum values and a standard deviation of 68.21, compared with a standard deviation of 23.40 for the individual traders.

[Insert Table 1 about here]

The level of trades (TOT_TRDS) also varies considerably between the two groups with individuals making roughly double the number of trades (238) that the groups make (127) on average. We define the level of trades as the number of orders entered into the system, being the total number of the bids, asks, clear bids, clear asks, buys and sells that the individual or the group make during the total trading period. There is considerable variation in the level of trading for both individual and group traders, with one individual trader entering 1284 transaction of different sorts over a 30-minute period. Although this activity was rather frenzied, the audit trail shows that the trader followed a series of simple, yet rapidly enacted, trading strategies that generated very small profits on each trade. While this approach worked well in the early part of the game is seemed to fail later in the game with the participant suffering considerable losses.

4.2 Self Efficacy or Confidence

Participant self-efficacy (Bandura, 1978), or confidence, (CONF_I) is often argued to be an important factor in determining the success of an individual in

completion of a task (Chan et al., 2004, Christoph et al., 1998, Hayashi et al., 2004 and Tan and Zhao, 2003) and we include a measure to capture this effect on the participants in the trading game. We ask the participants how confident they are about five tasks with responses coded over a 5-point likert scale ranging from 1 (not at all confident) to 3 (moderately confident) to a maximum of 5 (totally confident). The five tasks are "pricing a share", "setting a bid", "setting an ask", "buying" and "selling" and these account for parts a) to e) of the first section of the questionnaire. These questions were answered before the simulation and the question are replicated in Appendix 3. Given the Cronbach alpha for the five questions is 0.92 we sum the five responses to provide our measure of participant confidence (CONF_I). The CONF_I measure is averaged across the two members in the group to get a confidence measure for the group though the analysis was also repeated using the questionnaires completed by the partner that did most of the trading and the results were little changed.

[Insert Appendix 3 about here]

4.3 Understanding

Participant understanding of the pricing of securities and the dividend process should also be important in successful trading in a share market and we include a series of questions that address the participant's understanding of the key elements of valuation of the shares, dividend uncertainty and the functioning of a limit order system. We measure participant understanding (UN_TOT_I) using a series of questions that make up the latter part of the questionnaire in Appendix 3. The first

subsection has four questions, a) though d), though the remaining subsections include only one question per subsection. The first subsection is concerned with the dividend information that is provided to each participant in the simulation. The second and third subsections focus on the ability of participants to identify share price limits. Subsection 4 questions the relationship between first period dividends and the dividends that are paid in the following period. Finally, subsections 5, 6 and 7 test the participant's understanding of the bid and ask prices and how market prices are set. The responses to the understanding based questions were either correct or incorrect in each case and these were allocated a value of either 1 or 0. We sum the responses to these questions to obtain measure of participant understanding (UN_TOT_I). The Cronbach alpha for this measure of 0.67 is somewhat lower than that obtained for our measure of self-efficacy. The UN_TOT_I measure is averaged across the two group members to estimate the group's understanding of the game though, as with the confidence measure, the analysis was repeated using the questionnaires completed by the partner that did most of the trading and the results were consistent across the two measures.

4.4 Group Characteristics

Appendix 4 details the group questionnaire completed at the end of the game and Panel B of Table 1 provides descriptive statistics for the key summary measures used in analysis. The questionnaire consists of four parts, approach to the game, team effectiveness, team impressions from a coworker perspective and ranking of group tasks. Two participants in one group failed to complete all of the questions in this questionnaire and so we ignore this group in the following discussion. With 17

groups in the study, this results in either 32 or 33 individual responses for each of the questions and 16 complete group responses.

Six questions are used to assess participant approach to the game and the participants are asked to comment on the core tasks of the trading game, setting a bid price (bidding), setting a ask price (asking), buying, selling and valuing the share (valuing). Questions that required the answer yes or no were coded with a 1 if yes and 0 in no. Question 1 asks how well the participant feel that they performed. The average of 3 suggests that the participants believed that they performed well at most of the tasks though on closer analysis of the individual responses a number of the participants do not believe that they performed well in valuing shares. Question 2 focuses on whether tasks are split between the participants in the group. More than half of the participants indicated that tasks were not split between the participants in their group. Question 3 asks whether tasks are changed during the game, as distinct from split between the participants and the responses to this question show that 7 of the 17 groups did change tasks during the game. Further, the responses to question 3a show that there is considerable variation in terms of the number of task changes that occurred with one change for two of the groups and two or more changes for the remaining 5 groups. This observation provides further support for the use of averages when comparing group behaviour with individual behaviour in the game. Question 4 asks whether the group discuss strategy changes and question 5 focuses on whether the group collaborate at a lower level and thus discuss actual transaction that are entered into the market. With means of 5 and 4 for these questions there is little doubt that all of the groups discuss both strategy as well as the transactions completed during the game. In summary the groups seemed to have a fairly sound attitude to the game, discussing general strategy as well as the actual trades. The groups appear

reasonably satisfied with their performance and there is some evidence of splitting tasks as well as changing tasks during the game. We sum the responses to all of these attitude based questions, excluding question 3a due to its rather narrow focus, to construct the variable entitled GRP_ATT. The Cronbach alpha for this variable is 0.76.

The second part of the questionnaire consists of two questions about team effectiveness. In the first question the participants are asked about team communication and in the second question they are asked whether the group effectiveness improved over time (Cronbach alpha = 0.52). The responses are added together to create the variable, GRP_EFF.

The third section assesses coworker impressions. There are 17 questions in this section. For a strongly performing group with good cohesion and a sense of a common goal we would expect to see numbers close to 5 for questions 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15 and 17 and numbers close to 1 for questions 8, 13, 16. The signs for the responses to questions 8, 13 and 16 were reversed and this adjusted group of responses give a Cronbach alpha of 0.86. The variable created by adding the signed response values together is COWORK_I.

The last of the four sections in the group questionnaire consists of four parts, with 5 questions each, where the participants are asked to rank bidding, asking, buying, selling and valuing from easy (1) to hard (5) with respect to level difficulty for the team, level difficulty for the participant, whether the team is best at the task or whether the participant felt that they are best at the task. There was some variation in the responses to these questions, particularly for questions that ask the participant to self assess their behaviour though the Cronbach alpha for this set of responses is 0.66. The variable created by summing these responses is called TASK_DIF.

5. Analysis

The first question to address is whether the groups actually performed better than the individuals in trading. The individual average result was a trading loss of 5.43 while the groups average trading profit was 12.83 with a total market trading profit of 2.96 (Table 1). Note that there is no limit on either the level of borrowing or the level of short selling that the participants can undertake in the game. While the averages suggest that the groups performed better than the individuals this is not born out in t-tests. The t-statistic for difference between the trading profit earned by groups and that earned by individuals is not statistically significant at the 5% level (Table 1). Further, there is no statistically significant difference for the other variables reported in Panel A of Table 1 between the individual traders and the group traders.

6.1 Trading profit

There is considerable variation in trading profit across the participants in the game, whether they be trading as individuals or trading as groups yet the univariate analysis suggests that splitting the sample into groups and individuals is not particularly informative. We use multivariate regression to provide further analysis of the impact of groups on the share market trading game.

A model is estimated to explain individual or group trading profit in terms of the confidence, understanding and the level of trading. The individual or group trading profit (TOT_GC) is regressed on participant confidence, understanding, level of trading and a group dummy variable to capture differences between group and

individual participant trading profit and interaction terms between the group dummy variable and participant confidence, understanding and level of trading.

$$TOT_GC_i = \begin{bmatrix} \alpha_0 + \alpha_1 CONF_I_i + \alpha_2 UN_TOT_I_i \\ + \alpha_3 TOT_TRDS_i + \alpha_4 GRP_TRDR_i + \alpha_5 GXCONF_I_i \\ + \alpha_6 GXUN_TOT_I_i + \alpha_7 GXTRD_i + \varepsilon_i \end{bmatrix} \quad (1)$$

where TOT_GC_i = trading profit for individual i,
$CONF_I_i$ = self-efficacy or confidence for individual i,
$UN_TOT_I_i$ = participant understanding for individual i,
TOT_TRDS_i = level of trading for individual i,
GRP_TRDR_i = group trader dummy variable with value of 1 if a group and a value 0 otherwise for individual i.
GXCONF_I, GXUN_TOT_I and GXTRD = interaction terms between the group trader dummy variable and the other explanatory variables

Only one of the variables, TOT_TRDS, shows much promise as an explanatory variable and the probability associated with an F-test for exclusion of all but the total trades variable was 0.831. This gives a reduced model of:

$$TOT_GC_i = \alpha_0 + \alpha_1 TOT_TRDS_i + \varepsilon_i \quad (2)$$

As indicated in Panel A of Table 3 there is a statistically significant negative relationship between the level of trading and trading profit. Thus, consistent with Odean (1999), the greater the level of trading the less profit accumulated over the trading game. While the regression is statistically significant and the majority of the diagnostic statistics suggest a well-behaved model the residuals are not normally distributed. On checking the data there are a number of extremely large positive and negative trading profit numbers in the data.

[Insert Table 2 about here]

In an attempt to reduce the impact of outliers without losing observations, TOT_TRDS is ranked and the ranks are included as the dependent variable in a further regression. The full regression follows equation (1) with TOT_GC being replaced by the ranks derived from this variable (RTOT_GC). As before, insignificant variables are dropped from the equation using F-tests and t-test but with the final two variables, CONF_I and TOT_TRDS, each is statistically significant when included on its own. As a result we report the regression in Panel B of Table 3 with both variables included. The low t-statistics in this regression suggest multicollinearity though the correlation coefficient between these variables of –0.234 is not statistically significant. Nevertheless, this regression is better behaved than equation (2), with no rejection of the assumption of normally distributed residuals. The final model takes the form:

$$RTOT_GC_i = \alpha_0 + \alpha_1 CONF_I_i + \alpha_1 TOT_TRDS_i + \varepsilon_i \quad (3)$$

where RTOT_GC_i = rank of the trading profit for individual i within the sample,

There is a positive relationship between confidence and trading profit earned and a negative relationship between the level of trading and trading profit. Thus, while the level of trading is instrumental in determining trading profits, self-efficacy also has a positive impact on the level of trading profits earned in the game. While the level of understanding does not appear to have had much effect on trading profits and whether an individual trades as part of a group does not appear to have much impact on the individuals trading profits.

6.1 Variance in trading profit

While the previous section suggests that there is little evidence of group impacts on actual trading profit earned in the game it is possible that the existence of groups could have an impacts on volatility and so we are concerned here with the characteristics of traders that explain volatility in trading profit across the sample. Volatility is important to risk-averse investors and so this second analysis models volatility in trading profit across the participants.

The natural log of the absolute value of the trading profit (TOT_GC) is used as an estimate of trading profit volatility (LATOT_GC) and this is regressed on participant confidence, understanding, and level of trading. A group dummy variable is used to capture differences between group and individual participant volatility and interaction terms between the group dummy variable and participant confidence, understanding and level of trading are also included in the final model.

$$LATOT_GC_i = \begin{bmatrix} \alpha_0 + \alpha_1 CONF_I_i + \alpha_2 UN_TOT_I_i \\ + \alpha_3 TOT_TRDS_i + \alpha_4 GRP_TRDR_i + \alpha_5 GXCONF_I_i \\ + \alpha_6 GXUN_TOT_I_i + \alpha_7 GXTRD_i + \varepsilon_i \end{bmatrix} \quad (4)$$

where $LATOT_GC_i =$ trading profit volatility for individual i,

The results of the final estimated model are reported in Table 3. The full model was estimated with the group dummy and the all of the interaction terms. The t-statistics on two of the interaction terms and the group dummy variable were small and an F-test for exclusion of these variables was conducted with a probability of 0.953. The model was re-estimated without these variables resulting in the final model reported in Table 3. The F-test indicates a statistically significant model and the Jarque-Bera test for normal distribution, White's test for heteroscedasticity and the

Ramsey RESET tests for functional form problems suggest that the model fits the data reasonably well. The final model takes the form:

$$LATOT_GC_i = \begin{bmatrix} \alpha_0 + \alpha_1 CONF_I_i + \alpha_2 UN_TOT_I_i \\ + \alpha_3 TOT_TRDS_i + \alpha_4 GXTRD_i + \varepsilon_i \end{bmatrix} \quad (5)$$

[Insert Table 3 about here]

The two coefficients dealing with the level of trading, TOT_TRDS and GXTRD, are both statistically significant and positive. The TOT_TRDS coefficient shows that the level of individual trading is positively correlated with the level of trading profit volatility and the interaction term, GXTRD, suggests that this positive relationship is much more sensitive for the group traders than for individuals. The coefficient on UN_TOT_I is positive and statistically significant at the 5% level of significance. The coefficient for the level of confidence, or self-efficacy, (CONF_I) is positive and statistically significant at the 10% level of significance, suggesting that self-efficacy is positively related with cross-sectional variation in trading profit. It appears that knowledgeable, confident participants who trade heavily generate more volatile trading profit outcomes. Perhaps these results are not particularly surprising given our sample of young, naïve individuals, with limited experience, taking part in a complex share market trading game.

In summary, there is statistical support for the argument that those participants that trade more and have a better understanding of the game tend to exhibit greater volatility in their trading profit. There is also some evidence that more confident traders also exhibit greater volatility in their trading profit as well some indication that group trading profit volatility is more sensitive to the level of trading that individual trading profit volatility.

6. Groups

Given that groups are so common in finance it is important to take a closer look at the group behaviour that we see in this game. The maxima and minima in Table 1 show that the groups are responsible for both the best and the worst trading performance. While the average level of confidence, understanding and trading is fairly similar across the groups and individuals, the standard deviation in level of trading is much less for the groups than for individuals. Thus groups appear to be much more measured in their trading behaviour, at least in terms of the level of trading. This has implications for trading profit, particularly after trading costs are deducted. The lower the level of trading, the lower the transaction costs and, for some of the participants in our trading game, transactions costs would be substantial. Nevertheless, lower levels of trading have not stopped particular groups from generating the greatest level of trading profit as well as suffering the greatest loss recorded in the experiment.

As indicated in the data section we have collected measures of group attitude to trading, group effectiveness, coworker impressions and task difficulty in an effort to better explain the behaviour of the groups. The group questionnaire (Appendix 4) was completed at the end of the trading game and although the respondents were aware of their own profitability they were not aware of the profitability of the other participants in the game at the time the questionnaire was completed.

It is important to determine whether group characteristics help us to understand the level of trading profit earned. Equation (1), based on the TOT_GC trading profit measure, was estimated using the group data but there was no statistically significant regression at the 5% level. The model was then re-estimated

using the rank of TOT_GC (RTOT_GC) and in this case three variables were identified, though individual statistical significance of the variables is sensitive to variable inclusion due to multicollinearity and small sample size (See Table 4, Panel A). Nevertheless, the reported model is statistically significant at the 5% level. The final model is:

$$RTOT_GC_i = \alpha_0 + \alpha_1 TOT_TRDS_i + \alpha_2 GRP_ATT_i + \alpha_{31} TASK_DIF_i + \varepsilon_i \qquad (6)$$

where GRP_ATT_i = attitude to trading for group i,
$TASK_DIF_i$ = individual perceptions about difficult of the task for the group and for the individual for group i,

[Insert Table 4 about here]

These results provide some insight into what determines trading profit for the 16 groups included in this study. Consistent with the full sample analysis, there is a negative relationship between trading profit and the level of trading. Both group attitude and task difficulty appear to have an impact on trading profit, with increased perceived difficulty associated with lower levels of trading profit and stronger group attitude to the game being associated with higher levels of trading profit.

Analysis was also conducted on the cross-sectional variance in trading profit though the regressions were not statistically significant either for the full model or the reduced form models. Regardless, the parameter signs were generally consistent with the full sample analysis. (These results are not reported separately here.)

The level of trades is important in determination of trader performance in the game and so we regress the various group descriptive variables on the level of trading (TOT_TRDS) to ascertain whether our measured group variables provide some insight into the trading behaviour of the groups. The final model takes the form:

$$TOT_TRD_i = \begin{bmatrix} \alpha_0 + \alpha_1 GRP_ATT_i + \alpha_2 GRP_EFF_i \\ + \alpha_3 COWORK_I_i + \alpha_4 TASK_DIF_i + \varepsilon_i \end{bmatrix} \quad (7)$$

After dropping insignificant variables based on t-tests and F-tests the final model (See Table 4, Panel B) is:

$$TOT_TRD_i = \alpha_0 + \alpha_1 COWORK_I_i + \varepsilon_i \quad (8)$$

The coefficient on the coworker impressions is negatively signed and so the greater the individual's impression of their coworker the less trading that occurred. All of the groups indicated that they discussed both strategy and the trading but it appears that in groups, where the individuals had a fairly high degree of respect for each other, trading proceeded more slowly..

7. Conclusion

The simple t-tests for difference in trading profit across group traders and individual traders as well as dummy variable based tests using regression analysis provided little evidence to support the argument that forming groups adds value to share market trading. One area of difference is the finding that the sensitivity of trading profit volatility to the level of trading is greater for groups than for individual. It is found that the main determinants of trading profit are the level of trading and the level of self-efficacy. Essentially, the greater the level of trading the greater the losses that the participant earned during the game. Further, higher levels of confidence about the task, or self-efficacy, are associated with greater levels of the trading profit. Volatility in trading profits is also modelled using the natural log of the absolute value of trading proftis earned during the game. It is apparent the higher levels of trading

profit volatility are associated with higher levels of trading, understanding of the game and self-efficacy.

On separate analysis of the groups it was found that the level of trading is important in determining profits just as it was for the full sample though it is also apparent that group attitude and the level of task difficulty had an impact on group performance. Finally, coworker impression is negatively correlated with the level of trading. These results provide some insight into the determinants of small group behaviour in a complex share-trading environment.

References

Bandura, A., 1978, The Self–System in Reciprocal Determinism, *American Psychologist*, 33, 344-358.

Barber, B. M., C. Heath and T. Odean, 2003, Good Reasons Sell: Reason-Based Choice Among Group and Individual Investors in the Stock Market, *Management Science*, 49, 1636-1652.

Barber, B. M. and T. Odean, 2000a, Trading is Hazardous to Your Trading profit: The Common Stock Investment Performance of Individual Investors, Journal of Finance, 55, 773-806.

Barber, B. M. and T. Odean, 2000b, Too Many Cooks Spoil the Profits: The Performance of Investment Clubs, Financial Analysts Journal, 56, 17-25.

Chan, S.-C., and M.-T. Lu, 2004, Understanding Internet Banking Adoption and Use Behavior: A Hong Kong Perspective, *Journal of Global Information Management*, 12, 21-43.

Christoph, R. T., G. A. Schoenfeld, Jr. and J. W. Tansky, 1998, Overcoming Barriers to Training Utilising Technology: The Influence of Self-Efficacy Factors on Multimedia-Based Training Receptiveness, *Human Resource Development Quarterly*, 9, 25-38.

Eby, L. and G. H. Dobbins, 1997, Collectivistic Orientation in Teams: An Individual and Group-Level Analysis, *Journal of Organizational Behavior*, 18, 275-295.

Dennis, A. R., 1996, Information Exchange and Use in Group Decision Making: You can Lead a Group to Information, But you Can't Make it Think, *MIS Quarterly*, 20, 433-457.

Hayashi, A., C. Chen, T. Ryan and J. Wu, 2004, The Role of Social Presence and Moderating Role of Computer Self-Efficacy in Predicting the Continuance Usage of E-Learning Systems, *Journal of Information Systems Education*, 15, 139-154.

Jehn, K. A., C. Chadwick and Sherry M. B Thatcher, 1997, To agree or not to agree: The effects of value congruence, individual demographic dissimilarity, and conflict on workgroup outcomes, *The International Journal of Conflict Management*, 8, 287-305.

Kocher, M. G. and Sutter, M., 2000, When the 'Decision Maker' Matter: Individual versus Team Behavior in Experimental 'Beauty-Contest' Games", Institute of Public Economics Working Paper, University of Innsbruck, 1-23.

O'Brien, J. and S. Srivastava, 1991, Dynamic Stock Markets With Multiple Assets: An Experimental Analysis, *Journal of Finance*, 46, 1811-1838.

Odean, T., 1999, Do Investors Trade Too Much?, American Economic Review, 89, 1279-1298.

Tan, H. H. and Zhao, B., 2003, Individual-and Perceived Contextual–Level Antecedents of Individual Technical Information Inquiry in Organizations, *Journal of Psychology*, 137, 597-621.

Appendix 1 – Dividend determination

There are two trading periods and the dividend payments are paid at the end of the two trading periods. Participants do not have full information concerning the dividend payments but instead each participant is given partial information about the dividend payment occurring at the end of period 1 and period 2. The following table describes the equally likely events affecting each firm, and the dividends paid at the end of period 1.

Firm ABC		Dividend
Event x	Poor economic conditions, labour strike	0
Event y	Poor economic conditions, no strike	12
Event z	Fair economic conditions, good labour relations	24
Firm CRA		**Dividend**
Event w	Poor economic conditions, labour strike	0
Event x	Poor economic conditions, no strike	12
Event y	Fair economic conditions, no strike	12
Event z	Fair economic conditions, good labour relations	24

The dividends paid at the end of period 2 depend on both the period 1 event and the period 2 event.

Firm ABC

Period 1 Event	Period 2 Event		
Per2 Col/Per 1 Row	x	y	z
x	0,0	0,0	0,12
y	12,0	12,12	12,24
z	24,12	24,12	24,24

Firm CRA

Period 1 Event	Period 2 Event			
Per 2 Col/Per 1 Row	W	X	Y	Z
W	0,8	0,8	0,12	0,18
X	12,8	12,8	12,12	12,18
Y	12,8	12,8	12,12	12,18
Z	24,8	24,8	24,12	24,18

Examples for Interpreting the Dividend Tables

Suppose the realized events for ABC are:

i. Y in period 1 and Y in period 2. At the end of period 1 ABC pays a dividend equal to 12 and at the end of period 2 it pays 12 (see cell row Y, column Y in the ABC table above (12,12 for period 1 and period 2 respectively)

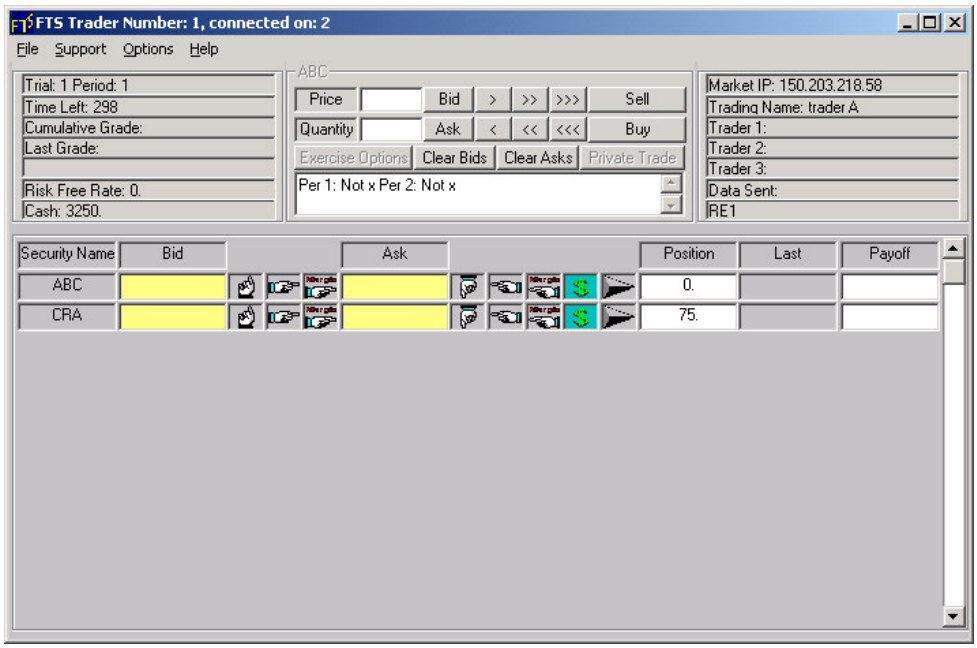
ii. Z in period 1 and X in period 2. At the end of period 1 ABC pays a dividend equal to 24 and at the end of period 2 it pays 12 (see cell row Z, column X in the ABC table above (24,12 for period 1 and period 2 respectively)

Suppose the realized events for CRA are:

i. W in period 1 and Z in period 2. At the end of period 1 CRA pays a dividend equal to 0 and at the end of period 2 it pays 18 (see cell row W, column Z above (0, 18 for period 1 and period 2 respectively)

ii. Z in period 1 and X in period 2. At the end of period 1 CRA pays a dividend equal to 24 and at the end of period 2 it pays 8 (see cell row Z, column X above (24,8 for period 1 and period 2 respectively)

Appendix 2 – Screen dump for the trading screen



Note: This is the screen that the participants see while trading. There are essentially four sections to the screen, the top right section, the top left section, the top middle section and the section in the middle of the screen. The top left hand section identifies the particular trading periods, time remaining in the present trading period, measures of trading profit (cumulative grade and last grade), the risk free rate and level of cash currently on hand. Last grade is a measure of trading profit earned in the last trading period and cumulative grade is the trading profit accumulated over the trading periods completed so far. The risk free rate is set to zero for simplicity. The top right hand section provides static participant identification information. The top centre section is where trades are entered into the system. For a buy or sell at market, the participant enters the quantity of shares and selects Buy or Sell. For a limit order the participant enters the quantity and the price that is required and then enters bid or ask. There are also buttons to clear current bids and asks. The section in the middle of the screen provides current best-bid and best-ask prices as well as the participant's current position in the shares the last price for the share and the last dividend payoff received from the share.

Appendix 3 – Self-Efficacy and Understanding Questionnaire

Confidence in trading with the FTS trading system game (Self Efficacy)
Listed below are activities that could be completed during financial trading with the FTS system. Please indicate how confident you feel in performing each activity by circling one number. If you are not sure of what to do or what the question refers to, please circle the "0".

a) Pricing a share

0	1	2	3	4	5
Not sure	Not at all confident		Moderately confident		Totally confident

b) Setting a bid

0	1	2	3	4	5
Not sure	Not at all confident		Moderately confident		Totally confident

c) Setting an ask

0	1	2	3	4	5
Not sure	Not at all confident		Moderately confident		Totally confident

d) Buying

0	1	2	3	4	5
Not sure	Not at all confident		Moderately confident		Totally confident

e) Selling

0	1	2	3	4	5
Not sure	Not at all confident		Moderately confident		Totally confident

FTS Stock Valuation
Please answer the following questions about stocks ABC. You may need to read the "Dividend Determination Sheet" to answer these questions.

1. For stock ABC, if it is event "Y" in the first period and event "Z" in the second period:
   a) What is the dividend paid in the first period? _____
   b) What is the dividend paid in the second period? _____
   c) What is the value of the share in the first period? _____
   d) What is the value of the share in the second period? _____
2. What is the minimum value that ABC can take in the first period? _____
3. What is the maximum value that ABC can take in the second period? _____
4. If you know "not y in period 1" for stock ABC what are the possible dividends that could be paid in period 1? _____
5. If the current bid and ask prices / depths are $22 / 200 and $26 / 300, respectively and you place a "buy" order for 200 shares, what price will you pay for the shares?
   $_____ per share
6. If the current bid and ask prices / depths are $22 / 200 and $26 / 300, respectively and you place an "ask" at a price / depth of $25 / 250, will your new ask be used if the next action in the market is a buy order for 100 shares?
   ☐ Yes ☐ No
7. If the current bid and ask prices / depths are $22 / 200 and $26 / 300, respectively and you place an "ask" at a price / depth of $27 / 250, will your new ask be used if the next action in the market is a buy order for 100 shares?
   ☐ Yes ☐ No

Appendix 4 – Groups

1. How your group approached the game

In this section we ask you how your group approached trading. Please write the letter required in each box below the task.

Attitude to Trading	Bidding	Asking	Buying	Selling	Valuing
1. For each task, do you think you performed well at it? (Y = yes, N = no)					
2. How were the tasks split (ie. which person did what)? (Y = you, P = partner, B = both)					
3. Did you change who did which task? (Y = yes, N = no)					
3a. If you changed tasks, how often did you change? (1 – once, 2 – twice, …, M = many)					
4. Did you discuss trading strategies with your partner often? (Y = yes, N = no)					
5. Did you discuss transaction details with your team member often? (Y = yes, N = no)					

2. Team effectiveness

Question	Response
Was your team effective at communicating? (Y = yes, N = no)	
Did your team's effectiveness improve over time? (Y = yes, N = no)	

3. Team impressions

INSTRUCTIONS:
Using the following scale to record your impressions of your trading partner. Write a number from 1 to 5 in each box in the grid:

1 = doesn't describe trading partner at all
2 = doesn't describe trading partner very well
3 = describes trading partner somewhat
4 = describes trading partner well
5 = describes trading partner very well

COWORKER

Impression		Number
1.	Had high performance expectations for the task.	
2.	Raised issues regarding how well we worked together.	
3.	Assumed a leadership role in the task.	
4.	Was well prepared for the task.	
5.	Is someone I enjoy working with.	
6.	Tries to get us back on track when we wandered off the task.	

7.	Pulled his/her weight in the completion of tasks.	
8.	Only participated in group activity when asked.	
9.	Stimulated me to continue working when we lost focus.	
10.	Tried to resolve conflicts that arose.	
11.	Was concerned about the quality of our performance.	
12.	Is someone I trust.	
13.	Took the work on the task too lightly.	
14.	Helped us to maintain focus.	
15.	Encouraged me to talk and listened to me.	
16.	Did not perform up to the level I expected.	
17.	Is someone I would like to work with in the future.	

4. Ranking of the group tasks

Listed below some questions concerning your views on how your team performed during financial trading with the FTS system. Please indicate your ranking by circling one number. If you are not sure of what to do or what the question refers to, please write a "0".

a) For your **team**, rank order the tasks by **difficulty**

Task	Team rank (1 - easy to 5 - hard)
Bidding	
Asking	
Buying	
Selling	
Valuing	

b) For **yourself**, rank order the tasks by **difficulty**

Task	Your rank (1 – easy to 5 - hard)
Bidding	
Asking	
Buying	
Selling	
Valuing	

c) For your **team**, rank order the tasks that your team was best at

Task	Team rank (1 - best to 5 - worst)
Bidding	
Asking	
Buying	
Selling	
Valuing	

d) For **yourself**, rank order the tasks that you were best at

Task	Your rank (1 - best to 5 - worst)
Bidding	
Asking	
Buying	
Selling	
Valuing	

Table 1
Descriptive Statistics

Panel A: Trading performance and participant characteristics

	LATOT_GC	TOT_GC	RTOT_GC	TOT_TRDS	CONF_I	UN_TOT_I
Individuals (N = 20)						
Mean	1.04	-5.43	26.50	237.65	17.25	6.65
Minimum	-3.99	-89.82	3.00	33.00	2.00	1.00
Maximum	4.50	32.53	50.00	1284.00	25.00	10.00
StdDev	1.84	23.40	15.53	277.21	5.17	2.06
Kurtosis	2.07	9.38	-1.40	11.30	2.98	1.79
Skewness	-0.49	-2.59	-0.19	3.12	-1.22	-1.00
Group (N = 17)						
Mean	1.21	12.83	28.09	127.00	16.12	5.82
Minimum	-2.95	-113.48	1.50	15.00	7.50	2.00
Maximum	5.48	239.02	53.50	292.00	24.00	8.50
StdDev	2.22	68.21	16.29	93.70	4.31	2.04
Kurtosis	-0.01	8.53	-1.15	-1.15	0.03	-1.00
Skewness	0.37	2.20	0.09	0.59	-0.24	-0.17
Total (N = 37)						
Mean	1.12	2.96	27.23	186.81	16.73	6.27
Minimum	-3.99	-113.48	1.50	15.00	2.00	1.00
Maximum	5.48	239.02	53.50	1284.00	25.00	10.00
StdDev	2.00	49.42	15.68	218.14	4.76	2.06
Kurtosis	0.67	15.48	-1.23	18.05	1.49	-0.03
Skewness	0.04	2.73	-0.04	3.79	-0.79	-0.56
t-statistic	-0.26	-1.12	-0.30	1.57	0.72	1.22
Prob (t-test)	(0.80)	(0.27)	(0.76)	(0.13)	(0.48)	(0.23)

Note: TOT_GC is a measure of trading profit and it reflects the sum of dividends, received from the shares on hand at the end of each 5-minute trading period, plus trading profits and losses and the value of shares on hand at the end of the game. TOT_TRDS is the number of orders entered into the system, being the total number of the bids, asks, clear bids, clear asks, buys and sells that the individual or the group make during the total trading period. CONF_I is a measure of self efficacy or confidence. UN_TOT_I is a measure of participant understanding. The t-statistic is a test for equality of the means for the individual relative to the group means. The test assumes constant variance between the groups given that we could not reject Levene's test for equality of variance across the two samples. Prob (t-test) is the t-test probability reported in parentheses below the t-statistic. * (+) statistically significant at the 5% level of significance.

Panel B: Trading performance and participant characteristics correlation coefficients

	LATOT_GC	TOT_GC	RTOT_GC	TOT_TRDS	CONF_I
TOT_GC	0.16				
	(0.36)				
RTOT_GC	0.02	0.61*			
	(0.92)	(0.00)			
TOT_TRDS	0.25	-0.36*	-0.32*		
	(0.14)	(0.03)	(0.05)		
CONF_I	0.21	0.18	0.35*	-0.23	
	(0.22)	(0.29)	(0.03)	(0.16)	
UN_TOT_I	0.30+	0.10	0.14	-0.15	0.28+
	(0.07)	(0.56)	(0.40)	(0.36)	(0.09)

This is a table of Pearson Correlation coefficients for the variables defined in Panel A. The probability associated with the test for zero correlation coefficient is reported in parentheses below the correlation coefficient. (N= 37) * (+) statistically significant at the 5% level of significance.

Panel C: Group characteristics

	GRP_ATT	GRP_EFF	COWORK_I	TASK_DIF
Mean	14.48	1.85	44.00	59.81
Minimum	6.00	0.00	17.00	32.00
Maximum	22.00	2.00	63.00	100.00
Standard Deviation	3.29	0.44	10.58	10.25
Kurtosis	1.57	9.82	0.51	8.47
Skewness	0.46	-3.11	-0.65	1.44
No of items	25	2	17	20
Cronbach alpha	0.76	0.52	0.86	0.66

Note: There are 33 useable responses out of a maximum of 34. GRP_ATT is the sum of the 25 responses to the questions in the first part of the questionnaire dealing with group attitude. GRP_EFF is the sum of the 2 responses to the questions in the second part of the questionnaire dealing with group effectiveness. COWORK_I is the sum of the 17 responses to the questions in the third part of the questionnaire dealing with coworker impressions. TASK_DIF is the sum of the 20 responses to the questions in the last part of the questionnaire dealing with task ranking.

Panel D: Trading performance and group characteristics correlation coefficients

	TOT_GC	LATOT_GC	RTOT_GC	TOT_TRDS	CONF_I	UN_TOT_I	GRP_ATT	GRP_EFF	COWORK_I
LATOT_GC	0.40								
	(0.13)								
RTOT_GC	0.66*	0.26							
	(0.01)	(0.33)							
TOT_TRDS	-0.33	0.28	-0.42+						
	(0.21)	(0.29)	(0.10)						
CONF_I	0.28	0.15	0.35	-0.45+					
	(0.29)	(0.58)	(0.18)	(0.08)					
UN_TOT_I	0.19	0.18	0.12	-0.38	0.53*				
	(0.47)	(0.51)	(0.66)	(0.15)	(0.04)				
GRP_ATT	0.05	0.06	0.56*	-0.28	0.37	0.05			
	(0.85)	(0.83)	(0.02)	(0.29)	(0.16)	(0.87)			
GRP_EFF	0.12	0.14	0.26	-0.47+	0.64*	0.33	0.44+		
	(0.65)	(0.60)	(0.33)	(0.06)	(0.01)	(0.21)	(0.09)		
COWORK_I	0.40	0.10	0.40	-0.47+	0.68*	0.52*	0.55*	0.58*	
	(0.12)	(0.71)	(0.12)	(0.07)	(0.00)	(0.04)	(0.03)	(0.02)	
TASK_DIF	-0.08	0.02	-0.40	-0.18	0.09	0.13	-0.25	0.24	-0.14
	(0.78)	(0.93)	(0.13)	(0.50)	(0.73)	(0.64)	(0.36)	(0.36)	(0.61)

This is a table of Pearson Correlation coefficients for the variables defined in Panels A and C. The probability associated with the test for zero correlation coefficient is reported in parentheses below the coefficient. (N= 16) * (+) statistically significant at the 5% level of significance.

Table 2
Determinants of Participant Trading profit (TOT_GC and RTOT_GC)

Panel A: regression using TOT_GC as the dependent variable

	Coefficient	Standard Error	t-statistic	Probability
C	18.2138	10.1773	1.79+	0.08
TOT_TRDS	-0.0817	0.0357	-2.29*	0.03

Note: The final estimated regression equation takes the form:

$$TOT_GC_i = \alpha_0 + \alpha_1 TOT_TRDS_i + \varepsilon_i$$

The measures of fit and diagnostic tests for the regression include R-Square = 0.13, Standard Error = 46.74, F-test for statistical significance of the regression probability = 0.028, Jarque-Bera test statistic for normal distribution probability = 0.000, White's test statistic for heterscedasticity probability = 0.930, Ramsey's reset test (1) statistic probability = 0.947, Ramsey's reset (2) statistic probability = 0.978.

Panel B: regression using TOT_GC ranks (RTOT_GC) as the dependent variable

	Coefficient	Standard Error	t-statistic	Probability
C	14.3950	9.7874	1.47	0.15
CONF_I	0.9713	0.5237	1.85	0.07
TOT_TRDS	-0.0183	0.0114	-1.60	0.12

Note: The final estimated regression equation takes the form:

$$RTOT_GC_i = \alpha_0 + \alpha_1 CONF_I_i + \alpha_2 TOT_TRDS_i + \varepsilon_i$$

The measures of fit and diagnostic tests for the regression include R-Square = 0.19, Standard Error = 14.55, F-test for statistical significance of the regression probability = 0.030, Jarque-Bera test statistic for normal distribution probability = 0.362, White's test statistic for heterscedasticity probability = 0.304, Ramsey's reset test (1) statistic probability = 0.437, Ramsey's reset (2) statistic probability = 0.658.

* (+) is statistically significant at the 5% (10%) level of significance. TOT_GC reflects the trading profit of the individual (the sum of dividends, received from the shares on hand at the end of each 5-minute trading period, plus trading profits and losses and the value of shares on hand at the end of the game). RTOT_GC consists of the ranks for TOT_GC. CONF_I is a measure of self-efficacy or confidence. TOT_TRDS is the number of orders entered into the system, being the total number of the bids, asks, clear bids, clear asks, buys and sells that the individual or the group make during the total trading period.

Table 3
Volatility in Participant Trading profit (LATOT_GC)

	Coefficient	Standard Error	t-statistic	Probability
C	-4.2704	1.4800	-2.89*	0.01
CONF_I	0.1244	0.0658	1.89+	0.07
UN_TOT_I	0.3489	0.1477	2.36*	0.02
TOT_TRDS	0.0033	0.0014	2.45*	0.02
GXTRD	0.0085	0.0034	2.49*	0.02

Note: * (+) is statistically significant at the 5% (10%) level of significance. The final estimated regression equation takes the form:

$$LATOT_GC_i = \begin{bmatrix} \alpha_0 + \alpha_1 CONF_I_i + \alpha_2 UN_TOT_I_i \\ + \alpha_3 TOT_TRDS_i + \alpha_4 \left(GRP_TRDR_i \times TOT_TRDS\right) + \varepsilon_i \end{bmatrix}$$

The measures of fit and diagnostic tests for the regression include R-Square = 0.34, Standard Error = 1.72, F-test for statistical significance of the regression probability = 0.008, Jarque-Bera test statistic for normal distribution probability = 0.775, White's test statistic for heterscedasticity probability = 0.144, Ramsey's reset test (1) statistic probability = 0.546, Ramsey's reset (2) statistic probability = 0.419.

LATOT_GC is the dependent variable and this provides a measure of trading profit volatility. It is the natural log of the absolute value of TOT_GC which reflects the trading profit of the individual (the sum of dividends, received from the shares on hand at the end of each 5-minute trading period, plus trading profits and losses and the value of shares on hand at the end of the game). CONF_I is a measure of self efficacy or confidence. UN_TOT_I is a measure of participant understanding. TOT_TRDS is the number of orders entered into the system, being the total number of the bids, asks, clear bids, clear asks, buys and sells that the individual or the group make during the total trading period. GRP_TRDR is the group trader dummy variable with value of 1 if the participant is a group and a value 0 if the participant is an individual. GXTRD is the product of GRP_TRDR and TOT_TRDS and it is an interaction term added to the regression to capture the differing response to trading between the groups and the individuals.

Table 4
Determinants of Group Trading profit (RTOT_GC)

Panel A: regression using TOT_GC ranks (RTOT_GC) as the dependent variable

	Coefficient	Standard Error	t-statistic	Probability
C	12.2440	14.1304	0.87	0.40
TOT_TRDS	-0.0218	0.0121	-1.81+	0.10
GRP_ATT	0.9512	0.5887	1.62	0.13
TASK_DIF	-0.2364	0.1328	-1.78+	0.10

Note: The final estimated regression equation takes the form:

$$RTOT_GC_i = \alpha_0 + \alpha_1 TOT_TRDS_i + \alpha_2 GRP_ATT_i + \alpha_{31} TASK_DIF_i + \varepsilon_i$$

The measures of fit and diagnostic tests for the regression include R-Square = 0.52, Standard Error = 4.04, F-test for statistical significance of the regression probability = 0.028, Jarque-Bera test statistic for normal distribution probability = 0.491, White's test statistic for heterscedasticity probability = 0.844, Ramsey's reset test (1) statistic probability = 0.951, Ramsey's reset (2) statistic probability = 0.969.

Panel B: regression using TOT_TRDS as the dependent variable

	Coefficient	Standard Error	t-statistic	Probability
C	374.2287	123.6100	3.03	0.01
COWORK_I	-5.4896	2.7668	-1.98+	0.07

Note: The final estimated regression equation takes the form:

$$TOT_TRDS_i = \alpha_0 + \alpha_1 COWORK_I_i + \varepsilon_i$$

The measures of fit and diagnostic tests for the regression include R-Square = 0.22, Standard Error = 485.68, F-test for statistical significance of the regression probability = 0.067, Jarque-Bera test statistic for normal distribution probability = 0.827, White's test statistic for heterscedasticity probability = 0.282, Ramsey's reset test (1) statistic probability = 0.504, Ramsey's reset (2) statistic probability = 0.807.

* (+) is statistically significant at the 5% (10%) level of significance. RTOT_GC consists of the ranks for TOT_GC where TOT_GC reflects the trading profit of the individual (the sum of dividends, received from the shares on hand at the end of each 5-minute trading period, plus trading profits and losses and the value of shares on hand at the end of the game). TOT_TRDS is the number of orders entered into the system, being the total number of the bids, asks, clear bids, clear asks, buys and sells that the individual or the group make during the total trading period. GRP_ATT is the sum of the 25 responses to the questions in the first part of the questionnaire dealing with group attitude. COWORK_I is the sum of the 17 responses to the questions in the third part of the questionnaire dealing with coworker impressions. TASK_DIF is the sum of the 20 responses to the questions in the last part of the questionnaire dealing with task ranking.