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The Bread/Flour/Grain Trading Game: Bidding in and Designing Auction Events

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Strategic sourcing and more specifically, e-procurement have become part of standard industry practice in recent years with the use of forward and reverse auction events. Training materials and games to teach participants to bid in and design such events, however, has been limited. In this paper we describe a Bread/Flour/Grain trading game we developed for instructors to use with student groups. We also provide accompanying materials and suggestions for running and debriefing of the game. The game imparts design and bidding experience, which students can then apply to real world auction events. It is appropriate for group sizes ranging from six to sixty.

1. Introduction

In a global competitive economy, companies are constantly searching to improve the efficiency of trading. In general, buyers seek lower prices for goods and services, faster purchasing cycles, shorter order processing, and fulfillment cycles. Suppliers, on the other hand, desire new distribution channels, more customers, and new means to increase sales, reduce excess inventory, and reduce the cost of goods/services sold. Both parties seek lower transaction costs. The use of web-based electronic trading sites is hoped to generate these benefits for both buyers and suppliers.

Lucking-Reiley (1999) and Kambil and Van Heck (2002) provide an interesting discussion of the earliest Internet and web-based trading sites. Today many Internet trading platforms catering both for B2C and B2B markets exist. Examples for B2B markets include Ariba, Global Exchange, Perfect, Combinenet, Emptoris and Verticalnet, among others. Because of the increasing popularity of electronic market systems, it is important that we teach our students, not only of the existence of such systems and methods, but also that we train them in the art of bidding in and designing such online auction events. Games and other experiential learning devices have been found useful instruments for such purposes (Farr and Felder 2003, MIT Procurement Game Portal).

In this paper we describe the Bread/Flour/Grain trading game that we developed and provide the accompanying teaching materials required to run the game. The game can be played online using an appropriate web-based auction system.[1] It consists of players who represent bread makers, flour producers, and grain producers interacting in a closed economy. Each individual player acts in the role of a supplier and buyer. The participants are required to set up auctions and bid in auctions. The objective for the players is to maximize their total assets, consisting of cash, inventory and production capacity at the end of the auction. The game administrator (instructor) acts as the government, who can participate by selling extra production capacity and a useful record keeping spreadsheet. The game administrator can also manipulate the level of government subsidies to producers and the costs of production.

The target audience for the game is students enrolled in an introductory course in Operations Management, Quantitative Methods, Supply Chain Management, E-Business, Purchasing, or Economics. The

[1] For a basic introduction to auctions see Rothkopf and Park (2001).

game is intended to provide bidding experience, practice in formulating strategies and gathering information, as well as in designing and setting up auction events. A basic version of the game could be used, or it could be played with more complicated enhancements. As such, the game is appropriate for both undergraduate and MBA level students. The game could be played completely remotely, after a software training session, or, it could be played during a 3-hour class where students all have access to the Internet, or, it could be a combination where they play some in class and continue out of class remotely. When played remotely, we recommend that the instructor use a chat program, such as those available in WebCT, Blackboard or Yahoo Chat to facilitate discussion and answer questions, and perhaps debrief.

To date, the game has been played with a small group of practitioners at Media Plaza, Utrecht, The Netherlands, a group of 25 students enrolled in an MBA Operations Management course at the Helsinki School of Economics, three MSc courses varying in size from 12–20 students at the Rotterdam School of Management, an MBA Quantitative Methods course at New Mexico State University with 57 students and an undergraduate Electronic Commerce course at New Mexico State University with 18 students. In general, participating students have found the game useful and exciting. Many of the learning objectives (stated below) were met.

The rest of the paper is organized as follows. Section 2 provides the game description, followed by the software description in §3. In §4 we explain how to set up a game. The learning objectives of the game are presented in §5. Extensions and variations to the game are discussed in §6. Section 7 concludes the paper.

2. Game Description

The game involves players who represent bread makers, flour producers, and grain producers. The bread makers need flour to produce bread, the flour producers need grain to produce flour, and the grain producers need bread to pay their workers. Thus, a closed economy is created where each participant needs to produce and sell to other participants. Typical group sizes are between 12 and 60. They do not require an exactly equal number in each role. In groups of size 6–11, to create a healthy market we suggest the game be varied by only using bread makers and flour producers.[2] Game materials are presented in Appendix 1.

To prime the game, creating an instant demand for goods, the players have a deficit in raw materials inventory that must be paid back before they can begin production. They have enough cash to make these purchases. In addition to cash, they have an initial inventory of their own product, and an initial production capacity. The objective of the game is to maximize one's total assets, consisting of cash, inventory and production capacity at the end of the auction, and thus the participants must strive to earn a profit. In the basic version of the game, the value of the inventory at the end of the game is simply the average market price of that good. The value of the production capacity is what the students paid for it. To make the game easier and to focus attention on the auction markets, government subsidies are provided to cover all production costs, except for the raw materials mentioned above. An additional cash subsidy can be provided for the grain and flour producers. These subsidies are used as an incentive to produce, and should enable the players to eventually expand their overall production capacity. Even if a bias exists in the subsidies across roles, it is irrelevant to the game because competition is restricted to within a role. In other words, bread makers compete with other bread makers, flour producers compete with other flour producers, etc., in the final evaluation of the player's success in the game.

Every virtual day each player has a number of major business decisions to make, namely:

- How much bread/flour/grain to buy, at what price
- How much bread/flour/grain to sell, at what price
- How much bread/flour/grain to produce for the next day sales
- Whether to buy additional capacity
- Whether to set up forward events to sell and/or reverse events to buy, and how many events to set up overall

In addition to the above business decisions, when setting up auctions, the participants need to decide about various design issues having impact on their performance in the game, for example:

- What is the **reserve price**[3] and quantity
- What is the best **bid increment**/decrement
- Do they allow bidders to enter their auction events at will or only by invitation
- What are bidders shown about other bids when they have entered in an event: bids only, bids and bidder names, or, nothing but the status of their own bids
- What is the lot-size requirement
- Whether to place bidders in an "auto" mode where they are provided with a price which makes the bidder **active**, or place them in a "manual" mode where they negotiate one-on-one

[2] You may contact the authors for materials for this variation of the game, also contact them if you have any questions regarding the design of the game or questions while the game is in play.

[3] Bolded terms are defined in a Glossary at the end of the paper.

• Whether to place penalties on specific bidders to allow **price discrimination**, or constrain them to restricted quantities

These settings could be saved in a template and used in all of their auction events, or they could be tailored for each event.

The game, which can be played entirely remotely, could last a minimum of 6 virtual days to 40 or more virtual days. A virtual day consists of grain auctions closing at a specified time, then flour auctions, and then bread auctions with an equal length of time between closings. We suggest that each virtual day last at least 30 minutes with 10 minutes between the closings of each type of commodity. Even with this length of time between auction events, we have noticed that participants experience high levels of stress to complete their tasks. We feel, however, that this reflects a real life trading situation.

3. Software

Any available, basic **forward and reverse auction** software can be used for the game. We use the Negotiauction software we designed and developed (Teich et al. 2001). The Negotiauction software offers various options, which may be desirable for a quantitative methods course. The Negotiauction software is available for use, with permission, from the developers of the software.[4]

Negotiauction can be used in forward (selling) or reverse (buying) situations. It is a hybrid combination of a web-based auction and negotiation system. Bidders can be placed in an auto mode where the system suggests to them what to bid (what price for a desired quantity) to be active in the event. Alternatively, they can be placed in a manual mode, where the **auction owner** himself negotiates one-on-one with the bidder(s), and when/if they converge, they should be active in the event.[5] "Active" means that if the auction closed at that point in time, the bid would be among the winners. "Inactive" means they've been completely outbid, while "semi-active" means they are active with a partial quantity and are next in line to be outbid.

[4] http://www2.fbk.eur.nl/na or contact the authors for the current URL. A user's manual is available upon request. The software is a prototype and it can crash. In fact, it did crash during the New Mexico State University game but a back up had been set up in advance. Four WebCT chat rooms were used as "trading pits" for each commodity. The players entered the chat room and negotiated, haggled, and traded. This added a new twist to the game and allowed the students to compare two different trading mechanisms.

[5] The software also has other features which could be used in an enhanced game, including Negotiable Bid Issues (NBIs), Bidder Attributes, Constraints, Bidder Rankings and Bidder Penalties. See §6.

In designing an auction, the auction owner describes the good to be bought or sold, and specifies the quantity. She then selects either the open or closed format, and determines how the bids appear to the bidders. Reservation prices (possibly different for different quantities), quantity discounts, product descriptions, lot-size requirements, and other miscellaneous items are also inserted at the onset. Screenshots of the system are in Appendix 5.

4. Setting Up the Game

Prior to playing the game, the instructor should print out the roles (see Appendix 1) for each player and assign each with their own username and password. Each student will play a role individually. We recommend that the instructor sets up these accounts prior to the game, on the software of their choice.

Participants in the game then need training in the use of the software. This training session should be same time, same place. Basic concepts, such as differences between forward and reverse auctions need to be introduced, then more advanced concepts of information architecture should be discussed. That is, what amount of information of bids and bidders should be reported to the bidders? When does a full open book of bids make sense as compared to a closed book? Advanced features of the software could also be introduced in the training demo. These include multiple attributes, constraints, rating and ranking of bidders, and if Negotiauction is used, manual mode bidding (the negotiation mode).

Participants should then be shown how to place bids and how to set up their own practice events. After this is accomplished, the first "day" of auction events could begin if played in class. It generally takes about three virtual trading "days" before the participants really learn the game and the software. In the live sessions, after an event closes, trades can be confirmed verbally, however, in the remote sessions that follow, this is no longer possible and participants should be encouraged to confirm trades via email, chat, or a messaging system. Optimistically, the above steps will take about three hours of class time, unless only a training session is held.

We recommend that at least another 5–10 virtual days be simulated remotely. To avoid end game effects, participants should probably expect more trading days than what they will actually play. During the later sessions, some participants may want to buy additional capacity in increments of 1,000. This capacity can also be sold via **forward auction** events by the instructor or sold for a fixed price. An accounting spreadsheet[6] can also be sold in forward auction

[6] The accounting spreadsheets are downloadable with this paper.

events by the instructor prior to, or during the simulation. This spreadsheet is a simple accounting sheet that the students themselves could easily develop. Of course, the students could also keep track of their cash balances and inventories by hand, although this takes time away from trading.

5. Learning Objectives

This game will help students achieve multiple learning objectives. In general, we view the game illustrating three basic concepts, i.e., the design of on-line auction events, the development of a bidding strategy in other's events, and understanding the basic concepts of an electronic market and how such markets operate.[7]

Basic auction concepts, such as the difference between a forward and a reverse auction are illustrated by the game, as well as the difference between the role of a bidder and an auction owner. This could lead to a discussion of the differences between an online vs. live auction event, as well as the differences between auctioning a single unit and **multiple units** of a homogeneous good. If used in an advanced course, the instructor could discuss the difference between a price-only auction vs. a **multidimensional auction**. For a novice business student, it might also be interesting to see what an auction is, to play the role of a purchasing manager, production manager, inventory control manager, and accountant, in the quest to earn a profit and win the game.

With regard to auction design, the **information architecture** is probably the most important concept for the student to grasp. This architecture would include how transparent the bids are to individual bidders and others who may not be bidding in the event but may want to observe. There are several options. An event may be "open" in the sense that anyone can enter it and make bids, once given permission. However, if the event is open, and the auction owner has specified, "show bids," then they can watch the bid stream even without making bids. Or, if the event is "closed," only those bidders who are invited may join the event and observe, but, again, only the bid stream information the auction owner has specified—and that may be no information. Obviously, this will have an impact on how players discover the current market prices, and how they make decisions regarding their reserve prices, and, perhaps their bid increments/decrements.

The development of bidding strategies is another important learning objective. A bidder may exhibit conservative or aggressive bidding behavior, and this could lead to **winner's curse** or even perhaps loser's curse if he/she is too conservative. They must decide whether they should bid a price up to their true underlying valuation, or if they should stop bidding and enter another event. Another important decision is whether to enter numerous auction events and bid simultaneously or not. The risk the players face is that they may end up with nothing or, perhaps too much and run out of cash. The situation could be more complicated if bidders resort to "sniping," i.e. to bidding in the last seconds of the auction event to "steal away" the auction from the current active bidders. As you can see, as a bidder there are many aspects to the game, and this could lead to an information overload and cause stress to the participants. We feel this is an important experience, because in reality electronic markets can be quite stressful, and traders should be able to handle such situations. For example, in the Dutch flower markets a trader can be physically present in one trading room, and be trading simultaneously in other flower markets, either on-site, off-site, or completely electronic.[8]

6. Extensions and Variations

Compared to what we have described here, simpler and more complex versions of the game are possible.

With fewer participants, the game can be played with only the bread and flour producers. If desired, the instructor could also implement additional rules, for example that a bidder may only bid in one event at a time, or a player may only run one event of their own at a time. Or, perhaps, only forward auctions are allowed. Also, by varying the beginning inventories, cash positions, subsidies, reference points (old prices), and the like, groups are surely to have different experiences in the game. Additionally, the starting positions and cost structures could be varied across individual participants. It could be possible to play the game with heterogeneous products (eg. some flour is better than others) or heterogeneous production capabilities (eg. some producers need more grain than others to produce bread due to waste).[9]

The basic version of the game would score the ending inventory and capacity at market value; however, for a more advanced play in a course involving capacity planning and inventory control, the instructor could change this by introducing spoilage of inventory over time, depreciation of capacity, or finite warehouse capacity. The instructor could also play other roles such as a banker, investor, the SEC, or other regulator. We have also experimented with random elements through the use of "shux-n-lux" cards, which

[7] Student comments regarding learning objectives from the New Mexico State University game are included in Appendix 3.

[8] See Appendix 4 for a set of possible debriefing questions and a sample written assignment.

[9] We thank an anonymous reviewer for this suggestion.

are randomly drawn by participants and have impacts on the cash position, inventory or current capacity of the players. For example, one of the cards states: "Mice entered your warehouse and ate half your inventory."

Advanced players may, on their own, or with encouragement, enter into other player's markets by buying certain commodities at a low price and selling them later on at a higher price. For example, a flour producer may buy bread and sell it, or barter it, to a grain producer for a profit.

Instructors may wish to use a variety of trading mechanisms in addition to forward and reverse auctions for the game. As was the case in the New Mexico State University games, chat rooms could be used as "trading pits" for each commodity, where some information is public and some is private messaging. Students could also trade live (same time/same place), without the use of any computer support. Additionally, call markets or continuous double auctions could be set up. Students could also meet with their competitors in the same role and attempt to agree on a market design which they could then use for a period of time. The mechanisms used could then be compared and contrasted during debriefing.

Many real world auctions are not price-only, but they may incorporate other issues such as delivery, quality, payment terms etc. (see Teich et al. 2004). If the instructor wishes to incorporate such **multiple issues** into the game, the advanced features of the Negotiauction software support it.

7. Conclusions

We have described a purchasing and selling game for online auctions. We expect this game to be a useful pedagogical tool for instructors of MS/OR, Operations Management, Purchasing, E-commerce, Supply Chain Management, and Economics courses. It provides hands-on introductions to online auction design, bidding strategies, and market behavior.

Surely, the bread/flour/grain game is not (yet) a perfect mechanism for teaching about online auctions. There certainly is room for improvement. However, students who have played the game have enjoyed it, and found it to be one of the more "educational" experiences in the courses they were enrolled in. This game has no single lesson, or "ahhaa" moment like in the famous MIT Beer Game demonstrating the Bull Whip Effect. It is up to the instructor to decide what lessons are appropriate for the course and then drive the game and the debriefing in that direction. For example, in one recent play of the game, the government canceled all subsidies completely. This had the effect of shutting down all markets, because the profit potential was eliminated. This might be an appropriate lesson for an economics course.

We would be happy to incorporate your suggestions and improvements for the next version of the game and make these updates available at ITE.

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Appendix 1. Bread/Flour/Grain Game Confidential Instructions

1. Bread Maker Confidential Instructions (SAMPLE)

You are a bread producer and seller. You must **use one sack of flour to produce one case of bread**. It takes one day to produce the bread, after you have purchased the flour. So, if you buy flour in Day One, you may sell the resulting bread in Day Two. In other words, you cannot buy the flour and make the bread in the same day. The government has generously provided a subsidy for bread production, which consists of the payment of all production costs (besides the cost of the flour). This subsidy remains, but is subject to revision throughout the game and you will be informed if it happens. Your production capacity currently is 2,000 cases of bread per day, but if you wish to purchase more capacity, you may do so at a cost of 25,000 Dollars per 1,000 cases of extra capacity, or you may request the government to run an auction to gain capacity. The old price you received for your bread, under the old fixed price system, was 25 Dollars per case. The old price you paid for flour was 12.5 Dollars per sack. But, **these prices are totally irrelevant**, because the government has decided that you will now use the Negotiauction system, a dynamic pricing mechanism to determine how much you pay for the flour and how much you receive for the bread. Your beginning accounts are as follows:

Inventory Flour: −500 Sacks, you stocked out of flour and borrowed some from another producer. You must pay this back ASAP!!

Inventory Bread: 400 Cases
Cash on Hand: 10,250 Dollars
Username and Password: Bread31

An accounting spreadsheet is available from the government (jteich@nmsu.edu). You may buy it from them.

This is a cash-based society, and you may not go negative in your cash account. Try to maximize your Cash Account. The value of the unsold Flour and the Bread inventory will be determined at the end of the game (assume the bread does not get stale while held in inventory). Everyday you have a number of decisions to make, namely: 1. How much flour to buy 2. How much bread to sell 3. How much bread to make for the next day sales 4. Whether to buy additional

Day	Flour inventory	Bread inventory	Cash on hand	Production for next day sales & Inv	Production capacity	Flour bought	Bread sold
0 (beginning)	−500	400	10,250	XXXXX	2,000	XXXXXX	XXXXXX
1							
2							
3							
4							
5							
6							
7							
8							
9							

capacity 5. Whether to set up forward events to sell and/or reverse events to buy (it's probably a good idea to set up forward events to sell first). You may use the table on the following page to keep track of your accounts.

Rules:

1. You must not communicate verbally with other producers or consumers, except to verify a trade. You may use the messaging system.
2. You must have more than one trading partner
3. **Include the Day when you name your event**, eg. Day1breadsell, Day2flourbuy etc. so bidders know which event is active when
4. You may want to verify that you bought, or sold with the party on the other side, via the messaging window
5. Grain auctions close on the hour and half hour, bread auctions close 10 past and 40 past the hour, and flour auctions close 20 past and 50 past the hour on the times specified.
6. You will be dealt randomly "shux-n-lux" cards at various times throughout the game. You will keep track of the impact on the books.
7. There are a total of 40 trading "days" in the game. The first day begins at 10 A.M. on Dec. 2nd, and there are two days every hour until 8 P.M. when Day 20 ends. Day 21 begins at 10 A.M. on Dec 3rd and these continue until 8 P.M. when Day 40 ends.
8. The "best" trader from each role, Flour, Bread, and Grain, will be awarded 5 extra credit points for the game. That is, one from each for the combined classes (three in total (not six)).
9. Please manually close all of your auctions at the closing time. If you set the time and expect them to close automatically, they will remain open because of an auto extend feature which automatically extends an auction event 4 minutes when bids continue to stream in.
10. You may verify your trades with your trading partner via the messaging window or via the appropriate chat trading room in Web CT.
11. You will keep track of your own financials and inventories by using a type of table shown below, or by making your own spreadsheet, or purchasing one from the government.

2. Flour Producer Confidential Instructions (SAMPLE)

You are a Flour producer and seller. You must use **one container of grain to produce one sack of flour.** It takes one day to produce the flour, after you have purchased the grain. So, if you buy grain in Day One, you may sell the resulting flour in Day Two. In other words, you cannot buy the grain and make the flour in the same day. The government has generously provided a subsidy for flour production, which consists of all other production costs (besides the cost of the grain), plus a sum to you of 5 Dollars per sack sold. This subsidy remains, but is subject to revision throughout the game and you will be informed if it happens. Your production capacity currently is 2,000 sacks of flour per day, but if you wish to purchase more capacity, you may do so at a cost of 25,000 Dollars per 1,000 sacks of extra capacity or you may request the government to run an auction to gain capacity. The old price you received for your flour, under the old fixed price system, was 12.5 Dollars per sack. The old price you paid for grain was 8 Dollars per container. But, **these prices are totally irrelevant**, because the government has decided that you will now use the Negotiauction system, a dynamic pricing mechanism to determine how much you pay for the grain and how much you receive for the flour. Your beginning accounts are as follows:

Inventory Flour: 700 Sacks

Inventory Grain: −500 Containers, you stocked out of grain and borrowed some from a competitor. You must pay them back ASAP.

Cash on Hand: 9,250

Username and Password: Flour31

An accounting spreadsheet is available from the government (jteich@nmsu.edu). You may buy it from them.

This is a cash based society, and you may not go negative in your cash account. Try to maximize your Cash Account. The value of the unsold Flour and the grain inventory will be determined at the end of the game. Everyday you have a number of decisions to make, namely: 1. How much grain to buy 2. How much flour to sell 3. How much flour to make for the next day sales 4. Whether to buy additional capacity 5. Whether to set up forward events to sell and/or reverse events to buy (it's probably a good idea to set up forward events to sell first). You may use the table on the following page to keep track of your accounts.

Rules:

1. You must not communicate verbally with other producers or consumers, except to verify a trade. You may use the messaging system.
2. You must have more than one trading partner

Day	Flour inventory	Grain inventory	Cash on hand	Production for next day sales or inv	Production capacity	Flour sold	Grain bought
0 (beginning)	700	−500	9,250	XXXXXX	2,000	XXXXXX	XXXXXX
1							
2							
3							
4							
5							
6							
7							
8							
9							

3. **Include the Day when you name your event**, eg. Day1floursell, Day2grainbuy etc. so bidders know which event is active when

4. You may want to verify that you bought, or sold with the party on the other side, via the messaging window

5. Grain auctions close on the hour and half hour, bread auctions close 10 past and 40 past the hour, and flour auctions close 20 past and 50 past the hour on the times specified

6. You will be dealt randomly "shux-n-lux" cards at various times throughout the game. You will keep track of the impact on the books.

7. There are a total of 40 trading "days" in the game. The first day begins at 10 A.M. on Dec. 2nd, and there are two days every hour until 8 P.M. when Day 20 ends. Day 21 begins at 10 A.M. on Dec 3 rd and these continue until 8 P.M. when Day 40 ends.

8. The "best" trader from each role, Flour, Bread, and Grain, will be awarded 5 extra credit points for the game. That is, one from each for the combined classes (three in total (not six)).

9. Please manually close all of your auctions at the closing time. If you set the time and expect them to close automatically, they will remain open because of an auto extend feature which automatically extends an auction event 4 minutes when bids continue to stream in.

10. You may verify your trades with your trading partner via the messaging window or via the appropriate chat trading room in Web CT.

11. You will keep track of your own financials and inventories by using a type of table shown below, or by making your own spreadsheet, or purchasing one from the government.

3. Grain Producer Confidential Instructions (SAMPLE)

You are a grain producer and seller. You pay your workers bread to produce and process the grain. **You pay them 1 case of bread for every 2 containers of grain they produce**. It takes one day to process the grain, after you have purchased the bread. So, if you buy bread in Day One, you may sell the resulting grain in Day Two (because you "pay" your workers in advance). In other words, you cannot buy the bread and make the grain in the same day. The government has generously provided a subsidy for grain production, which consists of all other production costs (besides the cost of the bread), plus a sum to you of 10 Dollars per container sold. This subsidy remains, but is subject to revision throughout the game and you will be informed if it happens. Your production capacity currently is 2,000 containers of grain per day, but if you wish to purchase more capacity, you may do so at a cost of 25,000 Dollars per 1,000 sacks of extra capacity or you may request the government to run an auction to gain capacity. The old price you received for your grain under the old fixed price system was 8 Dollars per container. The old price you paid for bread was 25 Dollars per case. But, **these prices are totally irrelevant**, because the government has decided that you will now use the Negotiauction system, a dynamic pricing mechanism to determine how much you pay for the bread and how much you receive for the grain. Your beginning accounts are as follows:

Inventory Grain: 800 containers

Inventory Bread: −200 Cases, you stocked out of bread and owe your workers. You must pay them ASAP or they will shut you down!

Cash on Hand: 12,600 Dollars

Username and Password: grain31

An accounting spreadsheet is available from the government (jteich@nmsu.edu). You may buy it from them.

This is a cash based society, and you may not go negative in your cash account. Try to maximize your Cash Account. The value of the unsold Grain and the Bread inventory will be determined at the end of the game (assume the bread does not get stale while held in inventory). Everyday you have a number of decisions to make, namely: 1. How much bread to buy 2. How much grain to sell 3. How much grain to process for the next day sales 4. Whether to buy additional capacity 5. Whether to set up forward events to sell and/or reverse events to buy (it's probably a good idea to set up forward events to sell first). You may use the table on the following page to keep track of your accounts.

Rules:

1. You must not communicate verbally with other producers or consumers, except to verify a trade. You may use the messaging system.

2. You must have more than one trading partner

3. **Include the Day when you name your event**, eg. Day1grainsell, Day2 Breadbuy etc. so bidders know which event is active when

4. You may want to verify that you bought, or sold with the party on the other side, via the messaging window

Day	Grain inventory	Bread inventory	Cash on hand	Production for next day sales or inv	Production capacity	Grain sold	Bread bought
0 (beginning)	800	−200	12,600	XXXXXX	2,000	XXXXXX	XXXXXX
1							
2							
3							
4							
5							
6							
7							
8							
9							

5. Grain auctions close on the hour and half hour, bread auctions close 10 past and 40 past the hour, and flour auctions close 20 past and 50 past the hour on the times specified

6. You will be dealt randomly "shux-n-lux" cards at various times throughout the game. You will keep track of the impact on the books.

7. There are a total of 40 trading "days" in the game. The first day begins at 10 A.M. on Dec. 2nd, and there are two days every hour until 8 P.M. when Day 20 ends. Day 21 begins at 10 A.M. on Dec 3rd and these continue until 8 P.M. when Day 40 ends.

8. The "best" trader from each role, Flour, Bread, and Grain, will be awarded 5 extra credit points for the game. That is, one from each for the combined classes (three in total (not six)).

9. Please manually close all of your auctions at the closing time. If you set the time and expect them to close automatically, they will remain open because of an auto extend feature which automatically extends an auction event 4 minutes when bids continue to stream in.

10. You may verify your trades with your trading partner via the messaging window or via the appropriate chat trading room in Web CT.

11. You will keep track of your own financials and inventories by using a type of table shown below, or by making your own spreadsheet, or purchasing one from the government.

Appendix 2. Negotiauction Game Instruction Sheet

1. Logging in

1. Go to www2.fbk.eur.nl/na
2. Hit **Login**
3. Enter Login and Password bread*, flour*, or grain* where* is number on your sheet
4. Enter Auction of any **other** participant's auction event. If you have been already added to their events by them, look under "participated" otherwise look under "others"

2. Bidding

1. Once you've entered an auction and seen the description, you must be changed to either manual or auto mode (unless added by auction owner, then in auto)
2. Send a message to the auction owner using the messaging window at the bottom of the screen, or, send an email
3. Once changed to auto or manual mode (off pause mode), hit **make new bid**
4. A bid screen will pop up

3. Auto Mode Bidding

1. Enter a quantity you want to bid on in quantity field. Leave price field blank.
2. Hit **request price**
3. Algorithm calculates price that will make you active
4. If acceptable hit **OK** or, to view the discounts associated with varying negotiable bid issue levels hit **view discounts**
5. repeat steps 1–4 until a bid is submitted or leave

4. Manual Mode Bidding

1. Enter a quantity, price, and terms that would serve as your initial offer along with a message to the auction owner. Hit **make offer**
2. Wait for auction owner to respond with a counter offer
3. Respond to his/her counter offer, repeat until convergence or you leave
4. If bid is accepted by auction owner, request to be "locked in" on your bid, otherwise you may be outbid later

5. Setting Up Your Own Event

1. Hit **new auction**
2. Fill name of event description etc.
3. Fill time of close, currency, Quantity, etc.
4. Insert Reserve Price
5. Define Criteria, and associated Discounts (if any)
6. Define Constraints (if any)
7. Find and invite bidders to event, Rate them on attributes (optional)
8. Go to ranks, insert weights on criteria, then insert bidder penalties on individual bidders (optional)
9. Save your event as a Template to use for the next round.

Appendix 3. Student Comments Regarding Learning Objectives

Mainly, I learned that you have to be careful with the assumptions you make in the marketplace. Even though prices appeared to justify my grain purchase at the end of day 20, I really had no way to know that prices would eventually plummet, thereby causing me to loose a large amount of money. I also learned that timing is critical. Most of the players that did well were in the game for a long period

of time on both days. They were able to react much sooner to changes in the market and minimize their losses. In my case, I was literally dead in the water because I could not react to the price changes soon enough.

I think the learning objectives for the game should be to watch very closely what supply and demand do to market pricing when there are many similar entrants. I also think it should be taught that there is always another alternative if you are patient. There were a lot of people that wanted to make transaction before they understood what was going on. They were usually taken advantage of.

I learned about negotiation. Many times after an offer was made, the seller would try to raise the price or the buyer would offer to buy more to entice the seller to sell at a low price. I also learned that timing is everything in an auction. The price fluctuated a lot throughout the course of a day. I think that the learning objectives of this game are about how to negotiate so that you end up with a win-win situation for all involved. It was a very fast paced game and was sometimes difficult to keep track of. I think it really taught the usefulness of tools like excel for record keeping.

The main lesson I learned from the auction simulation is that what you want and when you want it is a dream. Depending on others to fulfill your orders is a joke; you must actively seek opportunists to further your bank balance and business. The "learning objectives" for this game in the future is to further the understanding of auctions and how they propel a capitalistic market. Overall the game was a great learning experience and reinforced why I am an accountant and not a day trader.

I learned that markets can go dead. In other words, we went for a long time with no buyers and sellers for certain products, this caused confusion and consternation from those who needed to buy or sell. It is a strange phenomenon considering that the participants were equally divided among professions. The learning objectives could be understanding bidding behavior and a study of the winner's curse. It would also be interesting to keep a record of the transactions so the entire class can actually track bidding behavior. A discussion of bidding patterns and game theory would be nice to have afterwards. Also, a class discussion concerning interesting moves, including selling very cheaply or buying very expensively, not selling at all, or dealing only with specific merchants might be interesting.

I think the learning objectives for this game should be that it is best to enter into the game when the market is active and competitive. I learned that timing is everything and if you hesitate on a deal, you lose your chance to make that deal. Also, I think it was important to learn that when the market is more active with more dealers, prices tend to be much more in your favor.

The biggest lesson I learned, as I mentioned above was in timing. It was best to wait until the very end when you wanted something or the price would escalate too quickly. It's all based on supply and demand at the time. Also, I learned that it was best to have the product in demand! If your product is not in demand, it may be best to try later. Also, it was important to stay on people's good side. Even though we were doing basic business transactions, people's feelings and emotions got in the way. Common courtesy goes a long way! There were definitely sales skills involved. Some people were too pushy and some were too passive. I would say that the objectives were the obvious negotiating and auction skills, but to specifically include learning about timing, "sales pitches," and supply and demand.

Appendix 4. Debriefing Questions and Written Assignment Sample Possible Debriefing Questions

What is the information architecture used in the designs and their implications? Alternatives are open, sealed, semi-sealed, or some combination. Open book occurs when bidders have access to all bids and bidder names. Semi-sealed occurs when bidders are told what they need to bid to be active in the event, but they don't see the other bids or bidders.

Was manual mode used for some of the bidders?

Was there price discrimination in your event? How did this occur?

Did you set up more than one auction for a single closing time? How did this impact the result?

How did you attain information about market prices in general for your product? . . . for your raw material?

What was the bid increment? How did that impact the rate of conversion of the bids?

What was the reserve price?

Did you "snipe" while bidding or did others attempt to snipe in your event? Sniping is bidding at the last moment to try to "steal" the auction win away from the current highest bidder.

Did the reporting of the old prices in the case bias the game by providing reference points?

Did a price equilibrium emerge after a few rounds?

Could you think of a more efficient market mechanism for buying/selling these three products?

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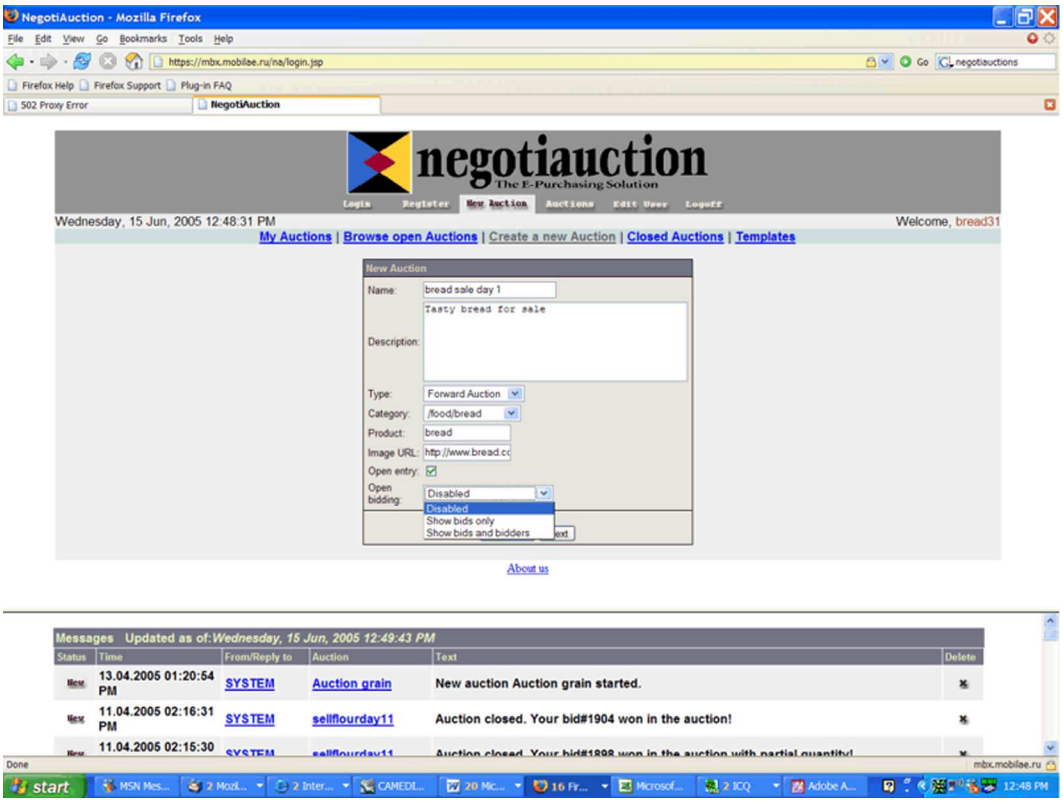
10 Point Assignment

Bread Flour and Grain Game

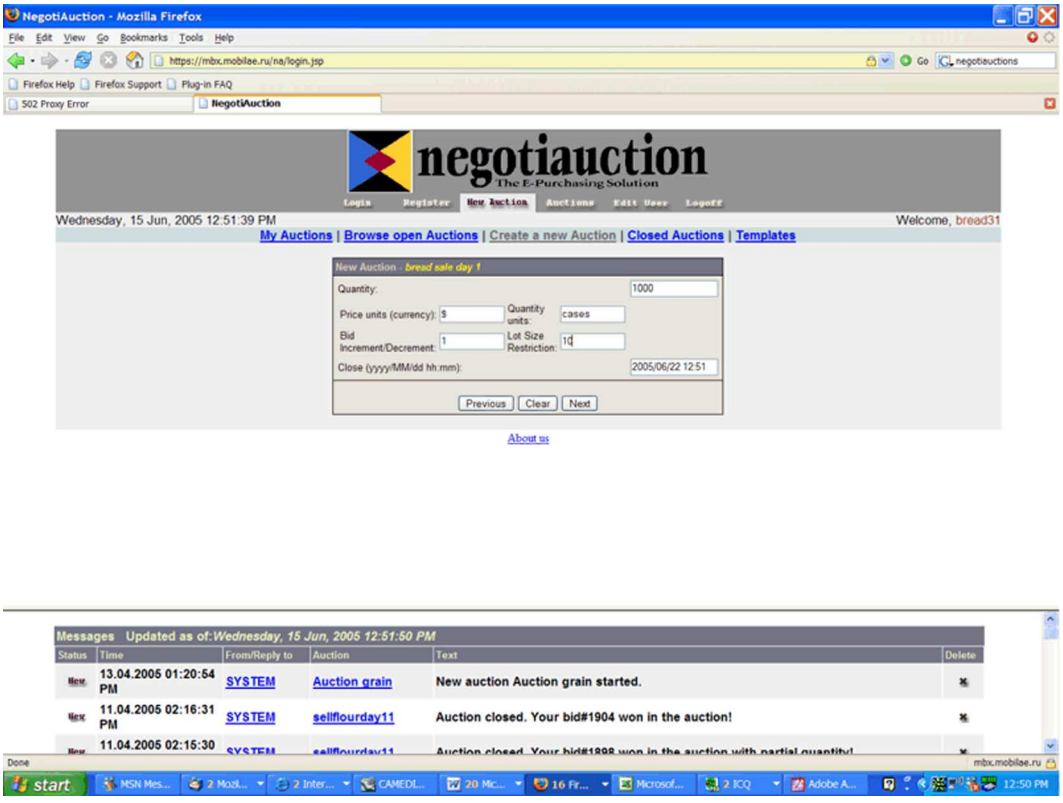
Play the bread/flour/grain game on Dec 2nd and 3rd. Your performance will be compared to the performance of the other players who produce the same product as you do. Performance will be measured by the number and size of trades, value of the cash account, size of capacity, and inventory levels as well as the variety of event types you used (open vs. closed events, manual vs. auto modes, forward vs. reverse, bidder penalties, etc.) Please respond to the following items in your written report:

1. What were your trades? (show a spreadsheet)
2. What are your inventory balances, cash account balance, and the production capacity at the end? (again, the spreadsheet would show these)
3. A short description of the strategy you used in the game, both for bidding, and for setting up events.
4. Did you use completely open bidding showing bids and bidders, only bids but no bidders, neither bids nor bidders, or a combination of the above. Why? What worked best?
5. Did you use manual mode and Auto mode? How did you use manual mode? Did it work?
6. Did you use bidder penalties? How did they work?
7. What would you do differently next time?

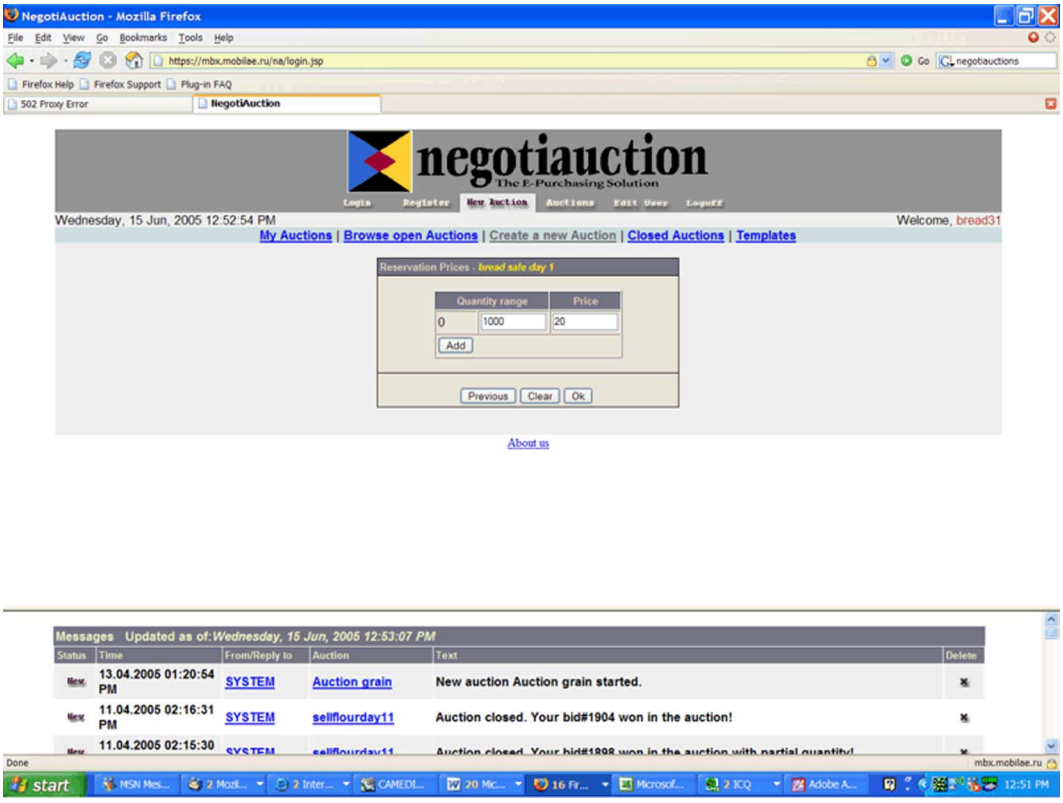
Appendix 5. Screenshots of Negotiauction System



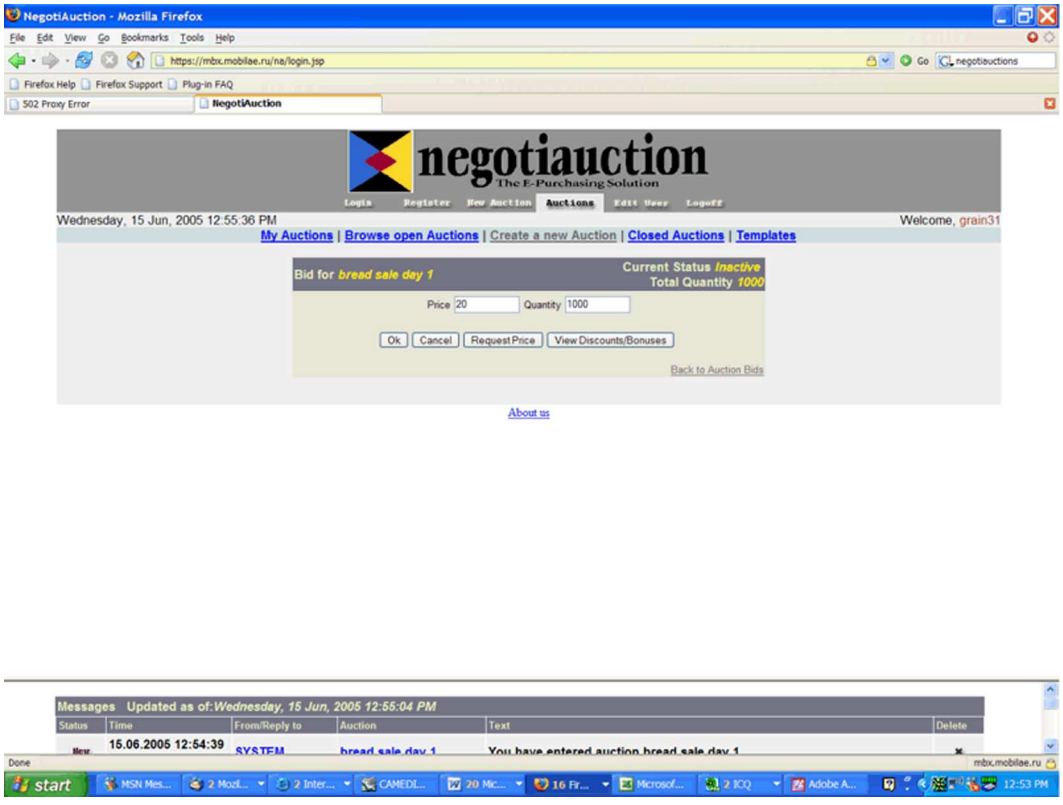
Auction Owner sets up new auction to sell bread



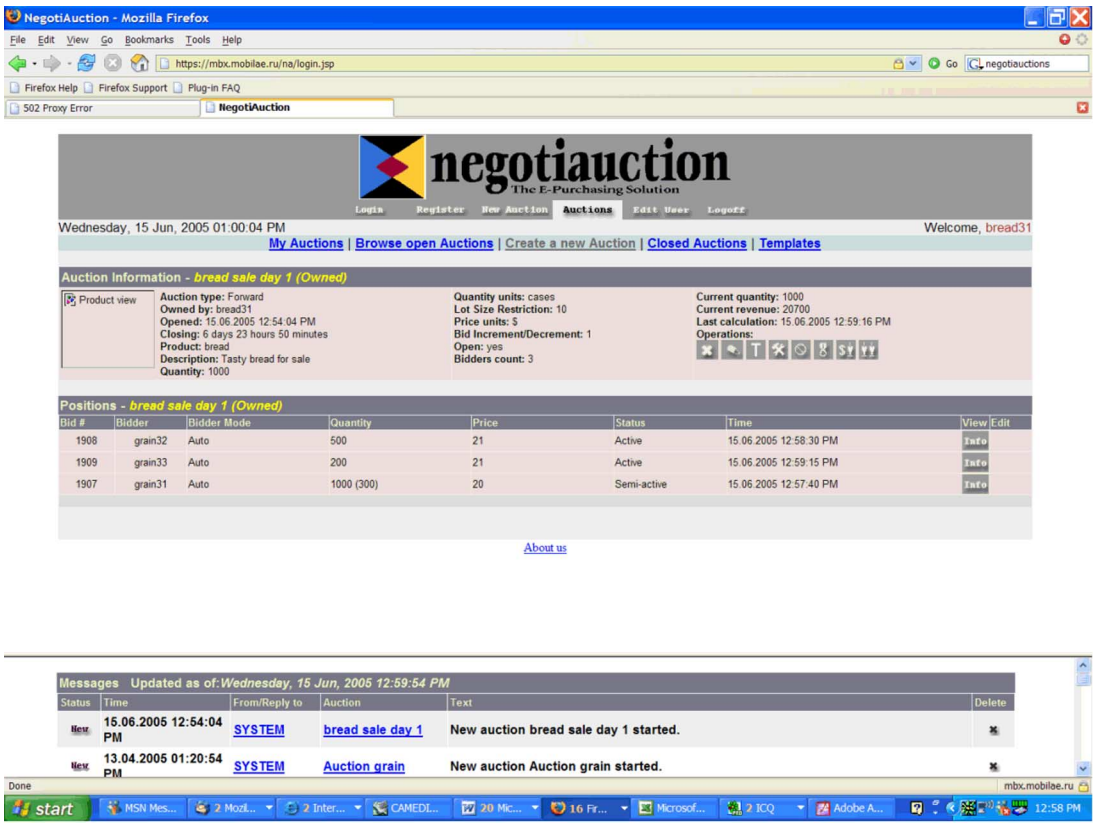
Auction Owner provides details of auction. Messaging system in bottom window



Auction Owner inserts reserve price



Bidder requests price and makes bid



Auction Owner watches bids during event

8. What lessons did you learn? What do you think the "learning objectives" should be for this game?

9. Do you have any general comments about the game? Did you enjoy playing it?

10. Do you have any suggestions for me so that we can improve the game before the next play?

Glossary: Definitions and Terminology

Auction Owner: The initiator of an auction: the buyer in a reverse auction and the seller in a forward auction.

Bid Increment (Decrement): the desired increase/reduction in price (or total cost) from one bid to the next.

Bid Status: "Active," "Inactive," "Semi-Active": Were the auction to close at this very moment, the "active" bids are the winning bids; the "semi-active" bids are partial winners, receiving a partial quantity desired; "inactive" bids are loosing bids.

Forward Auction: An auction format with one seller, many buyers, and ascending price.

Information Architecture: The set of rules that determines what information is or becomes available to which auction participants during the auction.

Multidimensional Auction: Often synonymous to multiattribute, multiple unit auction. Sometimes used to refer to combinatorial bundle auctions with multiple heterogeneous goods.

Multiple Issue (Reverse) Auction: (Also referred to as multiattribute auction): A procurement auction where (generally) multiple units of merchandize varying in terms of quality, warranty, delivery terms, etc. are demanded.

Multiple Unit (Quantity) Auction: An auction where multiple units of a homogeneous good/service are being auctioned. The bidders may or may not be limited to supplying one unit per bidder. In the latter case bids consist of price and desired quantity.

Price Discrimination: Buyer pays different prices for different suppliers for the same good/service. (Quantity discounts may also be regarded as a form of price discrimination, as would bidder penalties.)

Reserve Price: the maximum a buyer is willing to pay for the merchandize/service in a reverse auction, or the minimum a seller is willing to accept in a forward auction

Reverse Auction: An auction format with one buyer, many sellers (suppliers), and descending prices

Winners curse: Highest bidder ends up paying "too much," that is above her true valuation.

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