

On the Survival of Some Unstable Two-Sided Matching Mechanisms

Online Appendices

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1 Appendix A: The Details of the Simulations

A genetic algorithm (GA) is a reinforcement learning algorithm that uses operators based on sexual reproduction and biological evolution of living beings in closed environments (Holland 1975). In a GA, initially a pool of strategies is chosen for each type of players . Then these are updated by the GA operators based on their fitnesses determined in a tournament. Each pool of strategies is called as a *generation*. Each strategy is represented by a string of integers each of which is a decision variable. The GA that we use has three basic operators:

1. Selection under Pressure: Best strategies of the current generation are copied directly to the next generation of strategies.
2. Crossover: The better strategies of the current generation are crossed over to form offspring. An arbitrary crossover point is determined on the string representation. The first part of one parent strategy representation preceding the crossover point and the second part of the other parent succeeding the crossover point are combined to form one offspring.
3. Mutation: Each digit of each offspring strategy is randomly updated with a small probability.

The three genetic operators, selection under pressure, crossover and mutation play different roles in learning. There are two sources of learning in a GA environment: innovation and imitation. Selection under pressure ensures the most successful strategies are used again in the next generation by imitation; crossover and mutation ensure innovation in learning. A GA works in principle like a reinforcement learning model by giving more chance of crossover and selection under pressure to previously used successful strategies. The fitness (or measure of success) of strategies used for these operators are determined in a tournament against other strategies: that is the average payoff each strategy earns in the tournament.

Traditionally, GAs are used for optimization in big search spaces. They are shown to be efficient on the trade-off between discovering new strategies and utilizing the successful strategies used in the

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past. They are extensively used to model the behavior of heterogeneous agents interacting in economic systems. Commonly, they are referred to as “social learning” models due to the fact that crossover operator combines the experience accumulated through two strategies in a single offspring.¹ A GA is particularly suitable to model the strategic behavior displayed in the current experiment. Since the agents of this experiment have a huge strategy space and since GAs are proven to search very well in huge strategy spaces, we propose a GA as the way of modeling the learning behavior. For example, a firm can have $7 \times 7 \times 2^7 = 6272$ meaningful strategies (with the representation we use) many more than the number individual learning models can handle.

The approach we use in this paper is unconventional, in the sense that the “short-run” GA simulation dynamics are loosely mapped with the experimental learning dynamics. Conventionally, researchers have used long-run learning results of GAs for predictive value. Thus we use the GA as a short-run learning model.

The GA, which is run SN number of times to determine the average behavior, is stated as pseudo-code in Figure 1. Figure 2 shows the representation of the strategies in the GA.

We use the following parameters: $SN = 30$ is the number of runs of the GA. The number of agents in each side are set as $m = n = 6$ as we did in the experiment. The speed and magnitude of adjustment dynamics can be calibrated by these parameters. For the simulations presented here, $q = 0.05$ is the mutation probability and the crossover rate is $p = 0.90$. The population of strategies is determined to be $4s_t = 28$ ($s_t = 7$ for each type). The number of directly reproduced strategies is set to be $h = 1$. The values are jointly chosen based on reports of other researchers in the area of genetic algorithm applications (the same as in Ünver 2001. Also see the same study for a sensitivity analysis on these parameters). The number of plays of a single strategy in the tournament of the genetic algorithm is $7^3 = 343$. The fitness of the strategy is the average payoff the strategy earns for the three agents of a type in these 343 plays. Number of generations is set to be equal to 160 with 40 decentralized markets. Markets 31-55 are used in the short-run learning results. Whole length simulations are used for the steady state predictions.

Note that this technique was previously used in the Ünver (2001) study. Nevertheless, there are some differences between the computational experiments done here and adopted in the original experiments of Ünver 2001. Following modifications are made to make them compatible with the laboratory environment:

- The games considered here are slightly different. Here, unraveling costs are charged only if the early matches are realized under the linear programming markets. This game is extensively described in the current study. In simulations of the previous study, costs were charged regardless of success of transactions.
- We assure that there is at least one mismatch between high and low type of agents in the preference profiles under the unstable mechanisms. We use the same preference profiles used in the laboratory experiment and fix them across simulations. In using the genetic algorithm learning model in the previous study, the profiles were perfectly random according to the partially correlated preference profile distribution. Moreover, we generated different profiles for each simulation. For example, we observe mismatches 39.70% of the time in the random preferences, while there are always mismatches in the laboratory experiment’s fixed preferences for the priority matching

¹For example, see Dawid 1999, and Duffy 2004 for genetic algorithm applications in social and economic environments.

For $i = 1$ to SN , simulation number

- 1 Randomly generate the initial population s_t of strategies for each type T =High firms, high workers, low firms, low workers.
- 2 For $g = 1$ to G , number of generations.
 - 2.1 Generate a preference profile using the partially correlated preference distribution.
 - 2.2 Conduct a tournament between each strategy of each type, treating them as symmetric strategies.
 - 2.2.1 If $g \leq DG$, decentralized game generation, then use “decentralized game” in the tournament.
 - 2.2.2 Otherwise use one of the “mixed” games in the tournament.
 - 2.2.3 Fitness of a strategy is the average of all payoffs that the strategy achieves in the tournament.
 - 2.3 For $k = 1$ to h , select h highest fitness strategies.
 - 2.4 For $k = 1$ to $s_t - h$, crossover the parents linearly for each type.
 - 2.4.1 Randomly choose four parent candidates C_1, C_2, C_3, C_4 for each type among the current generation.
 - 2.4.2 The higher fitness strategies of C_1, C_2 and C_3, C_4 become the two parents P_1, P_2 for each type.
 - 2.4.3 With probability p crossover the parents P_1, P_2 , with probability $1 - p$ directly clone the parents as the offspring.
 - 2.4.3.1 Randomly draw a crossover “joint” digit in the strategy string of the size “length.”
 - 2.4.3.2 Copy the digits 1,.., “joint” of P_1 and “joint” + 1 , . . . , “length” digits of P_2 to form the child O_1 .
 - 2.4.3.3 Copy the digits 1,.., “joint” of P_2 and “joint”+1, . . . , “length” digits of P_1 to form the child O_2 .
 - 2.5 Mutate each digit in the offspring strategies of each type with probability q .
 - 2.5.1 For mutation of offer/acceptances draw a digit from $\{1, 2\}$.
 - 2.5.2 For mutation of rank-orders draw a digit from $\{1, 2, 3, \dots, 6\}$.

Figure 1: Genetic Algorithm

Decentralized game “firm” strategy string

$$o_{-2}r_{-2} - o_{-1}r_{-1} - r_0$$

$o_t \in \{1, 2\}$: 1 for offer, 2 for no offer in round $t \in \{-2, -1\}$

$r_t \in \{1, \dots, 6\}$: the rank-order of the worker to make an offer in round $t \in \{-2, -1, 0\}$

Decentralized game “worker” strategy string

$$a_{-2}r_{-2} - a_{-1}r_{-1} - r_0$$

$a_t \in \{1, 2\}$: 1 for accept, 2 for reject the best offer in round $t \in \{-2, -1\}$

$r_t \in \{1, \dots, 6\}$: the threshold rank-order of the worst firm whose offer is accepted in round $t \in \{-2, -1, 0\}$

Mixed game “firm” strategy string

$$o_{-2}r_{-2} - o_{-1}r_{-1} - r_{0,1}r_{0,2}\dots r_{0,l}$$

$o_t \in \{1, 2\}$: 1 for offer, 2 for no offer in round $t \in \{-2, -1\}$

$r_t \in \{1, \dots, 6\}$: the rank-order of the worker the firm makes an offer to in round $t \in \{-2, -1\}$

$r_{0,1}r_{0,2}\dots r_{0,l}$: is the length l rank-order list of the firm for round 0, $r_{0,i} \in \{1, \dots, 6\}$, length $l \in \{1, \dots, 6\}$

Mixed game “worker” strategy string

$$a_{-2}r_{-2} - a_{-1}r_{-1} - r_{0,1}r_{0,2}\dots r_{0,l}$$

$a_t \in \{1, 2\}$: 1 for accept, 2 for reject the best offer in round $t \in \{-2, -1\}$

$r_t \in \{1, \dots, 6\}$: the threshold rank-order of the worst firm whose offer is accepted in round $t \in \{-2, -1\}$

$r_{0,1}r_{0,2}\dots r_{0,l}$: is the length l rank-order list of the worker for round 0, $r_{0,i} \in \{1, \dots, 6\}$, length $l \in \{1, \dots, 6\}$

Figure 2: Representation of strategies as “integer” strings in the genetic algorithm

mechanism. We observe mismatches 96.14% of the time in the random preferences for the linear programming matching mechanism, while there are always mismatches in the experiment's fixed preference profiles.

- The linear programming mechanism algorithm considered here is slightly different from the one used in Ünver (2001). This change is due to the algorithm used in the experimental program. The effect of this change is expected to be minor on the results.
- Here, we only consider 3 mechanisms as we did in the laboratory experiment. The Ünver (2001) study used all 7 mechanisms of all categories (see the description of mechanisms) and reported the average results among the linear programming, priority matching and Gale-Shapley mechanisms.
- Initial conditions in the GA evolution is adjusted to be compatible with the laboratory. For example, here agents submit truthful rank-order lists when the mixed regime starts. In the previous study, the regime change led to randomization of initial rank-order lists. However, a figure in that study gave some idea about how the evolution would have looked like with the current initial conditions.
- The Ünver (2001) study is not related to the short-run behavior of artificial agents. Here, we are mostly interested in the short-run behavior.

Despite of these differences, our findings did not change much in the long run with respect to the Ünver (2001) study. This shows the robustness of the results.

2 Appendix B: Experimental Instructions

FIRST PART - The Decentralized Matching Game “Subject Instructions”

Please do not do anything yet, while we tell you about the experiment.

This experiment involves matching between firms and workers, and throughout the experiment, you will be either a “firm” or “worker”.

A firm and a worker become “matched” if the firm makes an offer to the worker and the worker accepts it. You will have the opportunity to make and accept offers in a number of “matching cycles.”

How much money you will earn will depend on whether you end a matching cycle matched or unmatched, and, if you are matched on who you are matched to. How much money you will earn also depends on when you become matched. There will be three rounds in each matching cycle, numbered -2, -1, and 0. Round -2 comes first, followed by round -1, followed by round 0. You will earn \$2 less if you are matched in round -2, you will earn \$1 less if you are matched in round -1 and there will be no deductions in payoff if you are matched in round 0. So there is a cost for matching earlier than round 0.

Are there any questions?

Let’s move to the computer screen² – as each matching cycle begins, you will see a screen like this one. (For the moment, all the firms are seeing the screen for firm 1, and all the workers are seeing the screen for worker 1 – when we actually begin the matching cycles, you will be assigned a different firm or worker number each cycle.)

We will now go through the information on the screen.

First locate the blinking triangular cursor. Right now, it is pointing at the upper left corner of your screen, where you see which round we are in. Now we are in round -2.

Now I am moving the cursor to the center of the top line: If you are a firm, you will see here that you are firm number 1 for this matching cycle, if you are a worker you will see here that you are worker number 1.

Now I have moved the cursor further to the right, where it indicates whether you are a “high” type or a “low” type. There are two kinds of firms and two kinds of workers – high and low productivity. I’ll explain this in a moment. For the moment you are all high types as indicated as type: H. During the experiment, some of you will be low type, indicated by type: L. Notice that high types are indicated in red, low types will be indicated in green.

Moving the cursor to the upper right hand corner you will see a countdown clock. Right now, it indicates that xx.xx is the remaining time for this round. (In fact, actual rounds will be much shorter when we play them.)

The screen also gives you information about the types on the other side of the market.

If you are a firm the information about the workers is on the left side of the screen, while if you are a worker this location contains information about the firms.

Remember, firms and workers come in two types, “High” and “Low” productivity. Regardless or whether you are a firm or a worker, if you are matched to a high productivity partner your payoff will be between \$14 and \$16. If you are matched to a “low” productivity partner your payoff will be between \$4 and \$6.

²We used a (non-MS-Windows) computer tutorial for the decentralized markets. The subjects had a written copy of the instructions and followed them when they were read.

So, everyone prefers to be matched to a high than to a low, but you can't tell which is anyone's first, second or third choice among the highs and among the lows, (nor can you tell if you are someone's first, second, or third choice among whichever category you are in).

Notice on the screen that next to the red H, and also next to the green L, are some tan boxes, which lists the information headings for the description of the three High types and the three Low types on the other side of the market from you. First is the ID of a particular worker (if you are a firm) or firm (if you are a worker). Then is the payoff you personally will receive if you end up matched to a particular firm or worker. (Note that the firms or workers are arranged in the order of their payoff to you if you are matched with them. So other people may be seeing different orderings—i.e. your first choice among the “Highs” may not be the same as someone else's. . .) Right now, for the purpose of this tutorial, you are all seeing the same numbers. During an actual matching cycle, you will each see different individual payoffs. Right now, your individual payoffs tell you that then if you are matched in round 0 to firm 1 (if you are a worker) or worker 1 (if you are a firm), your payoff will be \$15.75 i.e. 1575 points (conversion 100 points = \$1). If you are matched to firm or worker 3 your payoff will be 1505, and if matched to firm or worker 2 your payoff will be 1485. Similarly, your payoffs if matched to a “Low” firm or worker are 555 if matched to #6, 495 if matched to #5 and 475 if matched to #4. Remember these are your payoffs if matched in round 0, you will get less if you are matched earlier.

At the right of the screen is a reminder about the makeup of your side of the market. In every matching cycle, there are 3 type H firms and 3 type L firms, and 3 type H workers and 3 type L workers. You don't know how much anyone on the other side of the market will earn if they are matched to you, or any of your competitors, but if you are a type H it is between \$14 and \$16, and if you are a type L then it is between \$4 and \$6. (These are the payoffs for being matched in round 0; the payoff in earlier periods is correspondingly less.)

Regardless of your own type, if you are a firm you may make offers to both low and high type workers, and if you are a worker you may accept or reject offers from both low and high type firms.

In each round, each firm may choose not to make any offer (and wait until the next round) or it may choose to whom to make an offer. Workers who receive no offers must wait until the next round, while workers who receive offers may choose either to reject all of them (and wait until the next round) or they may accept the best (highest paying) offer they have received.

Let's see how this is done.

We'll start by walking all the firms through the process of making an offer to their highest valued worker, which for the moment is worker #1.

On the lower right corner of the screen (if you are a firm) you are asked to enter your offer (in the blue rectangle). What you need to do first is type Y (followed by [Enter]) to indicate that you wish to make an offer. Then type the ID # of the worker to whom you wish to make an offer. Every firm should now make an offer to worker 1, and verify it by typing Y (followed by [Enter]) at the last prompt. (Wait for firms)

Once a firm has made an offer, this offer, and its payoffs, appear on both the screens of the firms making the offer, and the worker receiving it. If you are a firm, you see in the upper left-hand corner of your screen that the color of worker #1 has changed from tan to purple. If you are a worker, you see that the color of firm #1 has changed color, to indicate that an offer has been made from firm #1 to worker #1.

Now note the information in the purple rectangle at the lower right of your screen. For firms, it shows that you have made an offer to worker #1, that your payoff for being matched to worker #1 is 1575, that the cost of matching in this round, round -2, is 200, so that your total profit from this cycle if worker 1 accepts this offer will be 1375. Note that the gray and purple panel at the bottom of the left side of your screen also records that you have offered your one position to worker #1, and that your profit if he accepts will be 1375 points.

Now the workers.

When an offer comes in, the block associated with the firms which made an offer turns from tan to purple. So right now, your screen shows firm #1 in purple, and all the other firms still in tan, meaning that you have an offer from firm #1. Looking at the purple rectangle on the lower right you see that your base payoff for matching with firm #1 is 1575, but since this is round -2, if you accept this offer your actual payoff would be 1575-200. (During the course of the actual game you might get more than one offer at a time, or no offers.) You can not accept any offer until the end of the offer period, when you will know what offers you have received.

Suppose that you got offers not only from firm 1, but also from firms #5 and #3. Then the blocks for firms #3 and #5 would also turn purple on your screen, and they would be listed, in order of payoff, in the gray and purple box at the bottom of the left side of your screen.

At the end of the offer period, only the highest offer you have received will be displayed in the purple rectangle. Your choice is either to accept the highest offer you have received during a round, or to reject all the offers you have received. When all the offers are in, a blue box will appear at the bottom right of your screen, to prompt you for an answer.

We're going to show you how to reject an offer, following the prompts in the blue box at the bottom right of your screen.

If you wish to reject all of the offers you have received, type "N" followed by the "enter" key, and then verify by typing "Y" and hitting "enter". Workers please reject your offer now.

(Wait for workers)

Firms will now see (in red at the lower right) that their offer has been rejected.

If a firm's offer were accepted, then that message would instead appear in the same place, like this. .

If a worker had accepted the offer, the screen would now indicate the resulting match, like this.

Now we move to round -1.

Notice in the purple box that if you make a match this round, your base payment will be reduced by 100 points.

If you are a firm which made an offer and had it accepted in round -2, then you are already matched, and your screen would indicate that you can not now make another offer, like this.

If you are a worker who accepted firm #1's offer in round -2, then you are already matched, as shown in red. If you receive a new offer, in this case from firm #5, it will be displayed on your screen, so you can see what your payoff would have been were you in a position to accept this offer. But, since you have already accepted an offer, you can not accept, and the offer will be automatically rejected, which is displayed in the blue box at the bottom right.

Whether or not you are matched, notice that if you are a firm, you can not tell if any worker accepted an offer from a firm other than yourself. Similarly, if you are a worker, you can not tell if any firm has already matched to some worker other than yourself.

Now let's suppose that you were not matched in round -2.

So now you are in round -1. (Firms, notice again, that you can not tell if any workers were already matched in round -2.) This time, please indicate that you do not wish to make any offer, by typing N at the prompt in the blue box, and verifying it. (Remember, after you type anything you must follow it by hitting "enter"). (Wait for firms.)

Workers who receive no offer will now see this indicated on the lower right of their screen. Now for round 0.

If firm 1 made an offer to worker 1 now and worker 1 accepted, then you would see this indicated on your screen like this.

Notice that, because this is round 0, nothing is deducted from the base pay, so both worker 1 and firm 1 earn \$2.00 more than if they made the same match in round -2.

When round 0 is over, you will see a full display of who is matched to whom, the round at which they were matched, and who (if anyone) is unmatched.

For example, right now, your screen shows you that firm 1 and worker 1 were matched together in round 0, as were firm 2 and worker 5, while firm 5 and worker 6 were matched together in round -1. Firms 3, 4, 6, and workers 2,3, and 4 were not matched at any round.

Notice that your own match is indicated by a blinking symbol.

Finally, notice that you can see from the display which workers and firms are Highs (in red) and Lows (in green), and what kind of partners they are matched to. You only learn about other people's matches at the end of round 0. Before then, you learn only about your own activity.

When we start the experiment, in a moment, we are going to run a number of matching cycles of the kind just described. Each cycle consists of rounds -2, -1 and 0. Each cycle is independent of the others, and will begin at round -2 with a description of your payoffs being matched in that cycle. (Everyone will get new payoffs each cycle, but everyone will remain either a "high" or a "low" throughout all the cycles. Further, each cycle all firms and workers will have new ID numbers next to their payoffs, so that you will not be able to identify firms and workers across cycles.)

Your actual cash payoff for first 10 cycles will be the payoff you earn in one of them, randomly chosen after all 10 cycles are completed. So you should treat each of the cycles as if it is the one that will determine your payoffs. (Remember again 100 points = \$1).

After these 10 cycles, we will conduct 15 cycles under a modified set of matching rules with one of this second group of cycles (again randomly chosen) selected for payment as well.

In addition, all firms and workers will receive an \$8 participation fee.

Finally, you should have a record sheet on which you can record, for each matching cycle, at what round you were matched and how much you earned. This will allow you to check that you are being paid properly at the end.

Are there any questions?

Now we should be ready to play the first 10 matching cycles. Are there any questions?

[Program parameters are entered]

OK, we will begin cycle 1 in a minute or so. Before we start, I'd like to caution you about the countdown clock again. It is important that you always finish making and verifying your decisions before the clock reaches 0. If you don't, you will be considered by the computer to have made no offer (if you're a firm), or to have rejected all offers (if you are a worker). Even if this is the decision you meant to

make, you should still type your decisions instead of waiting for the clock to count down. Firms have 60 seconds to make offers. Workers have 25 seconds to accept/reject offers.

SECOND PART - The Priority and Gale-Shapley Mixed Game Instructions

You have just completed the first part of this experiment. For the second part, there will be a new way of making matches in round 0, via a centralized matching mechanism. Firms and workers will submit a rank order list of their possible matches, and the centralized mechanism (which is a computer program) will determine the final matching, based on the submitted rank order lists.

This centralized matching mechanism is designed to produce the best match possible, taking everyone's rank order lists into account. For example, if somebody ranks you first and you list that firm (or worker) first in your rank order list if you're a worker (or firm), then you will be matched with that choice. Moreover, the higher you rank a firm (if you are a worker) or you rank a worker (if you are a firm), the greater your chance of being matched to that firm or worker. If you submit a rank order list having all of the choices, and if each of these include you in their rank order lists you can be sure of being matched. The matching mechanism can only match a firm to a worker each of whom lists the other in his/her rank order list. If everyone includes all of the choices then the mechanism will leave no one unmatched.

The procedure we use is one which has been used in certain actual labor markets. The reason this procedure was adopted was to make it more likely that everyone would be matched. The procedure makes it a good idea to rank your choices in order of your payoffs, i.e. to list as your first choice the match that gives you the highest payoff, and so forth.

Before we begin the actual matching cycles (each of which will consist of three rounds, -2 and -1 as before, and then round 0) let's first concentrate on round 0, in which the centralized matching mechanism will be available to those firms and workers which have not made matches in rounds -2 or -1.

Look at upper left corner of the transparency: we are in round 0 now, which you can tell by noticing that the cost of making a match in this round is 0. The transparency looks just your screen would have in round 0 of the first part of the experiment (if you had not yet been matched), except that both firms and workers will be asked for their rank order lists.

The blue rectangle at the lower right hand corner of your screen is where you will enter your rank order list. First you are asked if you wish to make any offers in this round, and if so you enter Y. Then you enter the number of offers you wish to make. So, if you are going to submit a rank order list that includes all of your choices you enter the number 6 here. Then you will be prompted to enter your first choice (If you enter the wrong number you can erase it with "backspace" key)

After you have entered your first choice it will appear on the rank order list, and you will be prompted for your second choice, third choice etc. After you have entered all choices you need to verify them by entering Y. (Note do not verify after each choice but verify after all choices are entered.) The following transparency shows how these will look like for a worker who has entered complete rank order list with the order that is matching to his/her preferences.

Note that this is round 0, your profit would equal to your payoff; there is no charge for matching.

Once everyone has submitted his or her rank order list, the centralized clearinghouse performs the match, results of which you will then see on your screen. For example on this transparency, you see the matches resulting when each firm and each worker has submitted complete rank-order list ranked in order

of his/her preferences. Every firm and every worker is matched, as must happen when everyone submits a full preference list. The only way someone can be unmatched at the end of the centralized matching mechanism is either they have failed to list all of their options on their rank-order list, or if some of the options they did list did not list them. Also note that W1 is matched with his/her highest choice.

Remember, in the matching cycles we are about to begin, you will have the opportunity to match, if you wish, at round -2 , and then at round -1 , just as the first part of the experiment. As before, there is a cost of going early. But now, if you wait until round 0 to be matched, you will have an opportunity by submitting a rank order list to a centralized matching mechanism, as we have just demonstrated. And, as before, there is no cost to matches, which are made in round 0.

[Wait for program parameters entered]

OK. We will begin the next matching cycle, starting in round -2 , in a minute or so. Please make sure to verify your decisions before the clock counts down. Firms and workers have 90 seconds to fill rank-order lists in round 0.

Thank you for your participation.

SECOND PART - LP Mixed Game with Tentative Early Offers – Instructions

You have just completed the first part of this experiment. For the second part, there will be a new way of making matches in round 0, via a centralized matching mechanism. Firms and workers will submit a rank order list of their possible matches, and the centralized mechanism (which is a computer program) will determine the final matching, based on the submitted rank-order lists.

This centralized matching mechanism is designed to produce the best match possible, taking everyone's rank order lists into account. For example, if there is a match which gives everyone his or her first choice, there is a high probability that this will be the outcome of the matching mechanism. Even if this is not possible, if your first choice also ranks you first there is a high probability that you will be matched to your first choice. Further, the higher you rank some firm (if you are a worker) or some worker (if you are a firm), the greater your chance of being matched to that firm or worker. Finally, if you submit a rank order list that lists all six of your possible matches, and if each of your choices includes you on their rank order list, then you can be sure of being matched. That is, the matching mechanism can only match a firm and a worker each of whom lists the other on his rank order list, and if everyone includes all of his six options then the mechanism will leave no one unmatched.

The procedure we use is one which has been used in certain actual labor markets. The reason this procedure was adopted was to make it more likely that everyone would be matched. The procedure makes it a good idea to rank your choices in order of your payoffs, i.e. to list as your first choice the match that gives you the highest payoff, and so forth.

Before we begin the actual matching cycles (each of which will consist of three rounds, -2 and -1 as before, and then round 0) let's first concentrate on round 0, in which the centralized matching mechanism will be available to all firms and workers.

Look at upper left corner of the transparency: we are in round 0 now, which you can tell by noticing that the cost of making a match in this round is 0. The transparency looks just your screen would have in round 0 of the first part of the experiment (if you had not yet been matched), except that both firms and workers will be asked for their rank order lists.

The blue rectangle at the lower right hand corner of your screen is where you will enter your rank order list. First you are asked if you wish to make any offers in this round, and if so you enter Y. Then you enter the number of offers you wish to make. So, if you are going to submit a rank order list that includes all of your choices you enter the number 6 here. Then you will be prompted to enter your first choice (If you enter the wrong number you can erase it with “ backspace” key)

After you have entered your first choice it will appear on the rank order list, and you will be prompted for your second choice, third choice etc. After you have entered all choices you need to verify them by entering Y. (Note do not verify after each choice but verify after all choices are entered.) The following transparency shows how these will look like for a worker who has entered complete rank order list with the order that is matching to his/her preferences.

Note that this is round 0, your profit would equal to your payoff; there is no charge for matching.

Once everyone has submitted his or her rank order list, the centralized clearinghouse performs the match, results of which you will then see on your screen. For example on this transparency, you see the matches resulting when each firm and each worker has submitted complete rank-order list ranked in order of his/her preferences. Every firm and every worker is matched, as must happen when everyone submits a full preference list. The only way someone can be unmatched at the end of the centralized matching mechanism is either they have failed to list all of their options on their rank-order list, or if some of the options they did list did not list them. Also note that W1 is matched with his/her highest choice. This is not guaranteed but is very likely to happen with this centralized matching algorithm.

Remember, in the sessions we are about to begin, you will first have the opportunity to make an arrangement, if you wish in round -2, and then at round -1, just as in the earlier sessions. But, you must all fill a rank order list in round 0.

In case you match early, this will mean in effect that you and the person you have agreed to match are committed to listing each other first in the preference lists offered in round 0 (the computer will automatically list that person first in your rank-order list and vice versa). Recall that this makes it very likely, but does not guarantee that the centralized matching algorithm will match the two of you. As such, for security it is best to fill out a full list of preferences (with rankings that reflect your true preferences) to insure that you will be matched with someone even if you agreed for an early match. Further note that matching in round -2 will cost you \$2.00, and in round -1, will cost you \$1.00 as before. The cost for matching early in rounds -2 or -1 will not be imposed on either of you if the centralized matching algorithm does not match the both of you each other in round 0. Finally, as before, the firms that match early in round -2 will not be permitted to make any offers in round -1, and workers that match in round -2 who receive an offer in round -1 will have it automatically rejected just as before.

Are there any questions?

[Wait for program parameters entered]

OK. We will begin the next matching cycle, starting in round -2, in a minute or so. Please make sure to verify your decisions before the clock counts down. Firms and workers have 90 seconds to fill the rank order lists in round 0.

Thank you for your participation.

3 Appendix C: Utility Profiles Used in the Games - for the Inspection of the Referees

Utility Profiles Used in Decentralized Games:

Profile 1:

f_1	f_2	f_3	f_4	f_5	f_6
w_1 14.95	w_3 15.7	w_3 15.5	w_3 15.7	w_2 15.6	w_2 15.1
w_3 14.85	w_1 15.6	w_2 15.3	w_2 15.3	w_3 15.3	w_3 14.4
w_2 14.2	w_2 14.6	w_1 14.2	w_1 15.05	w_1 15.3	w_1 14.3
w_4 5.55	w_5 5.75	w_4 5.7	w_6 4.95	w_5 5.8	w_6 5.7
w_5 4.25	w_6 5.55	w_6 5.45	w_4 4.15	w_4 5.65	w_5 5.35
w_6 4.2	w_4 4.45	w_5 4.3	w_5 4	w_6 4.75	w_4 4.3
w_1	w_2	w_3	w_4	w_5	w_6
f_2 15.3	f_1 15.05	f_2 15	f_2 15.85	f_1 15.8	f_2 15.6
f_3 14.9	f_3 14.6	f_1 14.5	f_3 15.5	f_3 15.6	f_3 14.3
f_1 14.25	f_2 14.15	f_3 14.4	f_1 15.15	f_2 14.9	f_1 14.2
f_6 5.2	f_4 5.45	f_4 5.8	f_4 5.85	f_4 5.85	f_5 5.7
f_4 5.15	f_6 5.1	f_5 5.55	f_5 4.75	f_5 4.5	f_6 4.9
f_5 5.1	f_5 4.65	f_6 4.5	f_6 4.65	f_6 4.05	f_4 4.75

Profile 2:

f_1	f_2	f_3	f_4	f_5	f_6
w_1 15.1	w_3 14.95	w_2 15.6	w_1 15.75	w_1 15.8	w_2 15
w_2 14.2	w_1 14.8	w_1 15.1	w_3 14.8	w_2 15.8	w_1 14.6
w_3 14.1	w_2 14.35	w_3 14.7	w_2 14.4	w_3 15.3	w_3 14.3
w_4 6	w_6 5.65	w_4 4.95	w_4 5.55	w_4 5.85	w_6 5.85
w_6 5.55	w_4 4.45	w_6 4.85	w_6 4.75	w_6 5.75	w_5 5.55
w_5 4.5	w_5 4.25	w_5 4.15	w_5 4.7	w_5 5.6	w_4 5.2
w_1	w_2	w_3	w_4	w_5	w_6
f_1 14.85	f_1 15.45	f_2 15.2	f_3 15.15	f_2 15.3	f_1 15.7
f_3 14.15	f_3 15.05	f_3 15.1	f_1 14.85	f_1 14.6	f_3 15.6
f_2 14.1	f_2 14.7	f_1 14.4	f_2 14.75	f_3 14.5	f_2 15.3
f_5 5.8	f_5 5.8	f_5 5.95	f_4 5.55	f_5 5.25	f_4 5.6
f_6 5.35	f_6 4.85	f_4 5.85	f_6 5.3	f_4 4.75	f_5 5.25
f_4 4.35	f_4 4.6	f_6 4.1	f_5 4.25	f_6 4.35	f_6 5.15

Profile 3:

f_1	f_2	f_3	f_4	f_5	f_6
w_3 16	w_3 15.5	w_1 16	w_2 15.15	w_2 15	w_1 15.9
w_1 14.55	w_1 15.15	w_2 15.1	w_1 14.8	w_1 14.5	w_3 15.1
w_2 14.2	w_2 14.4	w_3 14	w_3 14.7	w_3 14.2	w_2 14.5
w_6 5.75	w_6 5.95	w_5 4.5	w_5 5.9	w_4 5.55	w_4 5.3
w_5 5.25	w_4 4.8	w_6 4.4	w_6 4.5	w_5 5.3	w_5 5.2
w_4 4.3	w_5 4.75	w_4 4.3	w_4 4.05	w_6 5.05	w_6 4.45
w_1	w_2	w_3	w_4	w_5	w_6
f_3 15.5	f_2 15.8	f_1 15.9	f_3 15.8	f_1 15.7	f_2 15.9
f_2 14.3	f_1 14.5	f_2 15	f_1 15.55	f_3 15	f_1 15.6
f_1 14.1	f_3 14.2	f_3 14.1	f_2 14.75	f_2 14	f_3 15.1
f_6 5.45	f_6 5.45	f_4 6	f_5 5.75	f_4 5.45	f_6 5.4
f_5 4.95	f_5 4.85	f_5 5.7	f_4 5.15	f_6 5.2	f_4 5
f_4 4.85	f_4 4.8	f_6 5.35	f_6 4.65	f_5 4.1	f_5 4.5

Profile 4:

f_1	f_2	f_3	f_4	f_5	f_6
w_3 15.3	w_3 15.05	w_1 14.2	w_2 15.45	w_3 14.7	w_1 16
w_1 14.8	w_2 14.85	w_3 14.2	w_3 15.45	w_1 14.2	w_2 14.9
w_2 14.2	w_1 14	w_2 14	w_1 14.9	w_2 14	w_3 14.7
w_4 5.85	w_5 5.85	w_5 5.8	w_5 5.8	w_4 5.3	w_4 5.25
w_6 5.85	w_6 5.7	w_4 5.55	w_4 5.3	w_5 4.45	w_5 5.05
w_5 4.2	w_4 5.15	w_6 4.35	w_6 5.1	w_6 4	w_6 4.8
w_1	w_2	w_3	w_4	w_5	w_6
f_2 15.9	f_3 15.9	f_2 15.8	f_2 15.45	f_1 15.8	f_3 16
f_1 15.65	f_2 15.75	f_3 14.7	f_1 15.05	f_3 15.4	f_1 15.4
f_3 14.1	f_1 14.45	f_1 14.5	f_3 14	f_2 14	f_2 14.4
f_5 5.95	f_4 4.95	f_4 5.65	f_4 5.75	f_6 5.35	f_6 5
f_6 5.2	f_5 4.7	f_5 4.7	f_6 5.25	f_4 4.75	f_5 4.75
f_4 4.75	f_6 4.15	f_6 4.55	f_5 4.4	f_5 4.65	f_4 4.15

Profile 5:

f_1	f_2	f_3	f_4	f_5	f_6
w_3 15.65	w_2 15.35	w_1 15.3	w_1 14.8	w_1 15.4	w_1 15.5
w_1 14.95	w_3 15	w_3 14.5	w_3 14.15	w_3 15.3	w_2 15.4
w_2 14.2	w_1 14.25	w_2 14.2	w_2 14.1	w_2 14.4	w_3 14.9
w_5 5.95	w_5 5.25	w_5 5.8	w_5 5.95	w_5 5.15	w_5 5.05
w_4 5.85	w_4 4.65	w_4 4.95	w_6 4.95	w_6 5.1	w_4 5.05
w_6 4.35	w_6 4	w_6 4.3	w_4 4.05	w_4 4	w_6 4
w_1	w_2	w_3	w_4	w_5	w_6
f_3 15.35	f_2 15.6	f_3 14.8	f_1 16	f_2 16	f_3 16
f_2 15.2	f_3 14.5	f_2 14.3	f_3 15.4	f_3 15.5	f_1 15.9
f_1 14.2	f_1 14.3	f_1 14.1	f_2 15.1	f_1 14.8	f_2 14.2
f_5 5.7	f_4 4.95	f_5 5.7	f_6 5.6	f_6 5.85	f_6 5.65
f_6 5.35	f_5 4.85	f_4 4.4	f_4 5.1	f_4 4.95	f_4 5.25
f_4 4.85	f_6 4.6	f_6 4.25	f_5 4.25	f_5 4.65	f_5 4.75

Profile 6:

f_1	f_2	f_3	f_4	f_5	f_6
w_1 14.75	w_2 15.65	w_3 15.1	w_3 15.6	w_2 15.8	w_3 15.8
w_3 14.3	w_3 14.9	w_2 14.9	w_2 15.2	w_1 14.4	w_1 15.2
w_2 14.2	w_1 14.6	w_1 14	w_1 14	w_3 14.2	w_2 14.7
w_5 5.75	w_5 5.6	w_5 4.9	w_4 5.45	w_6 4.55	w_4 5.1
w_4 4.8	w_6 4.95	w_4 4.7	w_5 5.35	w_5 4.45	w_6 4.9
w_6 4.4	w_4 4.75	w_6 4.55	w_6 5.1	w_4 4.35	w_5 4.2
w_1	w_2	w_3	w_4	w_5	w_6
f_3 15.95	f_2 15.85	f_1 15.4	f_1 15.05	f_3 15.3	f_2 15.8
f_2 15.4	f_1 14.7	f_2 14.9	f_3 14.9	f_1 15	f_3 14.8
f_1 15.3	f_3 14.05	f_3 14.8	f_2 14.45	f_2 15	f_1 14.1
f_6 5.6	f_4 5.15	f_4 4.35	f_4 5.75	f_6 5.45	f_4 4.65
f_5 4.35	f_5 4.65	f_6 4.2	f_5 5.65	f_5 5.15	f_6 4.45
f_4 4	f_6 4	f_5 4.15	f_6 4.5	f_4 4.1	f_5 4.1

Profile 7:

f_1	f_2	f_3	f_4	f_5	f_6
w_1 15.1	w_1 15.95	w_3 15.8	w_3 15.75	w_1 15.4	w_1 15.5
w_2 14.95	w_2 15.45	w_1 15.7	w_1 15.1	w_2 15.1	w_3 15.4
w_3 14.2	w_3 15.3	w_2 14.1	w_2 14.25	w_3 14.8	w_2 14.1
w_5 5.35	w_6 5.85	w_4 5.85	w_5 5.6	w_6 5.55	w_5 5.1
w_4 4.65	w_5 4.25	w_5 5.25	w_4 4.6	w_5 4.3	w_6 4.8
w_6 4.2	w_4 4	w_6 4.35	w_6 4.25	w_4 4.1	w_4 4
w_1	w_2	w_3	w_4	w_5	w_6
f_1 14.8	f_2 15.35	f_3 16	f_1 15.9	f_2 15.6	f_2 15.9
f_3 14.65	f_1 14.75	f_1 14.2	f_2 15.55	f_1 15.5	f_1 14.9
f_2 14.3	f_3 14.6	f_2 14.1	f_3 15.3	f_3 15.4	f_3 14.4
f_5 4.9	f_6 4.9	f_6 5.5	f_4 6	f_4 5.1	f_6 5.85
f_4 4.65	f_5 4.65	f_5 5.35	f_5 5.2	f_6 4.7	f_4 5.15
f_6 4.6	f_4 4	f_4 4.95	f_6 4.45	f_5 4.25	f_5 4.1

Profile 8:

f_1	f_2	f_3	f_4	f_5	f_6
w_3 15.75	w_3 16	w_1 15.7	w_1 16	w_1 16	w_3 15.6
w_2 15	w_1 15.2	w_2 15.6	w_3 15.6	w_2 15.1	w_2 15.5
w_1 14.2	w_2 15	w_3 14.7	w_2 14.9	w_3 14.5	w_1 14.2
w_5 5.45	w_6 5.1	w_5 5.7	w_6 5.65	w_5 5.55	w_6 5.3
w_4 4.5	w_4 4.7	w_4 4.85	w_4 5.5	w_6 5.2	w_4 5.2
w_6 4.25	w_5 4.3	w_6 4.75	w_5 4.05	w_4 4.8	w_5 4.15
w_1	w_2	w_3	w_4	w_5	w_6
f_3 15.55	f_2 15.5	f_1 15.8	f_1 15.1	f_3 15.6	f_1 15.8
f_2 15.3	f_1 15.25	f_3 14.5	f_3 15.05	f_2 14.7	f_3 14.5
f_1 14.45	f_3 14.05	f_2 14.1	f_2 14.1	f_1 14.3	f_2 14.2
f_6 5.8	f_5 5.75	f_5 6	f_6 6	f_6 5.6	f_5 5.4
f_4 5.1	f_6 5.65	f_6 4.7	f_5 5.6	f_4 5.25	f_4 5.3
f_5 4.25	f_4 4.65	f_4 4.35	f_4 5	f_5 4.8	f_6 4.1

Profile 9:

f_1	f_2	f_3	f_4	f_5	f_6
w_2 16	w_1 15.3	w_3 15.9	w_2 15.75	w_3 16	w_3 15.5
w_1 14.2	w_3 15.2	w_1 15.8	w_1 15.65	w_1 15.4	w_1 14.6
w_3 14.05	w_2 14.75	w_2 14.6	w_3 14.3	w_2 14.2	w_2 14
w_5 6	w_4 5.75	w_5 5.85	w_5 5.7	w_5 5.85	w_4 5.8
w_6 5.6	w_5 5.25	w_4 5.75	w_6 5.4	w_6 4.8	w_5 4.45
w_4 4.15	w_6 4.7	w_6 4.9	w_4 4.35	w_4 4.05	w_6 4.2
w_1	w_2	w_3	w_4	w_5	w_6
f_1 15.55	f_2 15.35	f_1 15.6	f_3 15.65	f_3 15.6	f_3 16
f_3 15.4	f_1 15.2	f_3 15.4	f_2 15.15	f_1 15.4	f_1 15.2
f_2 14.15	f_3 14.95	f_2 14.3	f_1 14.25	f_2 14.1	f_2 14.4
f_6 5.8	f_4 5.55	f_5 6	f_4 5.4	f_6 5.7	f_6 5.75
f_5 5.55	f_6 4.75	f_6 5.95	f_5 4.9	f_5 5.65	f_4 5.15
f_4 4.9	f_5 4.35	f_4 5.55	f_6 4.4	f_4 4.35	f_5 4.05

Profile 10:

f_1	f_2	f_3	f_4	f_5	f_6
w_1 15.35	w_2 15.45	w_3 15.9	w_1 15.6	w_2 15.3	w_2 15.3
w_3 14.35	w_3 15.1	w_1 15.7	w_3 15.5	w_1 14.7	w_1 14.5
w_2 14.2	w_1 15	w_2 14.5	w_2 14.7	w_3 14	w_3 14.3
w_6 5.55	w_4 5.05	w_4 5.6	w_6 5.95	w_5 5.95	w_6 5.65
w_4 5.3	w_6 5.05	w_6 5.25	w_5 5.95	w_6 4.45	w_4 4.4
w_5 4.25	w_5 4.1	w_5 4.95	w_4 4	w_4 4.25	w_5 4.35
w_1	w_2	w_3	w_4	w_5	w_6
f_3 14.35	f_2 14.95	f_3 15.8	f_3 15.6	f_3 15.1	f_1 15.8
f_1 14.15	f_3 14.4	f_2 15.6	f_1 14.5	f_2 15	f_2 15.2
f_2 14.05	f_1 14.25	f_1 14.7	f_2 14.4	f_1 14.5	f_3 15.1
f_6 5.8	f_6 5.8	f_6 5.9	f_5 5.95	f_6 4.7	f_4 5.85
f_5 5.7	f_4 4.8	f_5 4.85	f_6 4.65	f_4 4.4	f_6 4.85
f_4 4.05	f_5 4.5	f_4 4.1	f_4 4	f_5 4.05	f_5 4.65

Utility Profiles Used in Mixed Games:

Profile 1:

f_1		f_2		f_3		f_4		f_5		f_6	
w_3	15.05	w_1	15.9	w_3	15.9	w_2	15.25	w_2	15.8	w_1	15.7
w_1	14.5	w_3	15.6	w_1	14.9	w_1	14.35	w_3	15.5	w_2	15.5
w_2	14.2	w_2	14.55	w_2	14.1	w_3	14	w_1	15.1	w_3	14.9
w_5	5.25	w_4	5.15	w_5	5.4	w_6	5.6	w_6	5.25	w_6	4.75
w_6	4.8	w_6	5.1	w_4	4.75	w_4	5.25	w_4	4.95	w_5	4.3
w_4	4.5	w_5	4	w_6	4.05	w_5	5.2	w_5	4	w_4	4
w_1		w_2		w_3		w_4		w_5		w_6	
f_1	15.35	f_3	15.95	f_3	15.9	f_1	15.65	f_2	16	f_2	15.5
f_3	15.1	f_2	15.25	f_1	15.1	f_3	15.2	f_3	15	f_3	15
f_2	14.5	f_1	14.1	f_2	14.8	f_2	14.75	f_1	14.8	f_1	14.5
f_6	5.2	f_6	5.85	f_4	5.75	f_5	5.35	f_4	5	f_6	4.7
f_4	4.75	f_5	5.4	f_6	5.45	f_6	4.6	f_6	4.9	f_5	4.6
f_5	4.55	f_4	4.65	f_5	4.6	f_4	4.25	f_5	4.1	f_4	4.35

Matching under LP: $([f_1, w_4][f_2, w_6][f_3, w_3][f_4, w_5][f_5, w_2][f_6, w_1])$

Matching under priority: $([f_1, w_1][f_2, w_6][f_3, w_3][f_4, w_5][f_5, w_2][f_6, w_4])$

Matching under GS : $([f_1, w_1][f_2, w_2][f_3, w_3][f_4, w_5][f_5, w_4][f_6, w_6])$

Mismatched Agents priority: 2 LP: 4

Blocking Pairs priority: 3 LP: 5

Profile 2:

f_1		f_2		f_3		f_4		f_5		f_6	
w_2	15.8	w_1	15.4	w_2	15.6	w_1	14.8	w_3	15.9	w_2	16
w_1	15.3	w_3	15.4	w_1	15.1	w_2	14.75	w_1	15.3	w_1	15.8
w_3	14.2	w_2	15.25	w_3	14.9	w_3	14.05	w_2	14.8	w_3	14.8
w_6	5.35	w_5	4.9	w_6	5.8	w_6	6	w_4	5.95	w_5	6
w_4	5.3	w_6	4.7	w_5	4.7	w_4	5.9	w_5	5.35	w_6	5.7
w_5	4.8	w_4	4.05	w_4	4	w_5	5.85	w_6	5	w_4	5.1
w_1		w_2		w_3		w_4		w_5		w_6	
f_2	15.7	f_1	15.3	f_2	15.8	f_3	16	f_3	15.9	f_2	16
f_3	15.25	f_2	15.2	f_3	15.8	f_2	14.85	f_2	15	f_1	15.9
f_1	14.85	f_3	14.5	f_1	15.3	f_1	14.1	f_1	14.4	f_3	14.2
f_4	5.7	f_4	5.75	f_5	5.2	f_4	5.7	f_6	4.55	f_5	5.95
f_6	5.6	f_5	5.55	f_4	5.05	f_6	4.9	f_5	4.4	f_4	5.45
f_5	4.85	f_6	4.8	f_6	4.1	f_5	4.65	f_4	4.2	f_6	4.55

Matching under LP: $([f_1, w_2][f_2, w_1][f_3, w_4][f_4, w_6][f_5, w_3][f_6, w_5])$

Matching under priority: $([f_1, w_2][f_2, w_1][f_3, w_5][f_4, w_4][f_5, w_3][f_6, w_6])$

Matching under GS : $([f_1, w_2][f_2, w_1][f_3, w_3][f_4, w_6][f_5, w_4][f_6, w_5])$

Mismatched Agents priority: 2 LP: 2

Blocking Pairs priority: 3 LP: 3

Profile 3:

f_1	f_2	f_3	f_4	f_5	f_6
w_3 15.85	w_2 15.55	w_1 15.3	w_1 15.65	w_3 15.9	w_1 15.8
w_2 14.2	w_3 15.1	w_3 14.8	w_2 15.6	w_1 15.3	w_3 15.4
w_1 14.15	w_1 14.55	w_2 14.3	w_3 14.7	w_2 14.4	w_2 14.3
w_6 5.75	w_4 5.7	w_4 5.65	w_4 5.4	w_4 4.85	w_4 5.1
w_5 4.4	w_5 4.3	w_5 4.55	w_5 5.3	w_5 4.4	w_6 4.9
w_4 4.1	w_6 4	w_6 4	w_6 4.2	w_6 4.05	w_5 4.2
w_1	w_2	w_3	w_4	w_5	w_6
f_1 14.4	f_3 16	f_1 15.2	f_3 15.65	f_2 15.6	f_2 15.8
f_2 14.25	f_1 15.1	f_3 14.7	f_2 14.95	f_1 15.3	f_1 15.7
f_3 14.1	f_2 14.5	f_2 14.5	f_1 14.85	f_3 14.7	f_3 14.8
f_5 6	f_5 5.35	f_5 5.75	f_5 5.35	f_5 5.5	f_6 5.25
f_4 5.35	f_4 4.9	f_4 4.45	f_4 4.9	f_4 5.5	f_4 4.7
f_6 4.9	f_6 4.5	f_6 4.25	f_6 4.15	f_6 4.1	f_5 4.25

Matching under LP: $([f_1, w_3][f_2, w_5][f_3, w_2][f_4, w_1][f_5, w_4][f_6, w_6])$

Matching under priority: $([f_1, w_3][f_2, w_5][f_3, w_2][f_4, w_1][f_5, w_4][f_6, w_6])$

Matching under GS : $([f_1, w_3][f_2, w_2][f_3, w_1][f_4, w_5][f_5, w_4][f_6, w_6])$

Mismatched Agents priority: 2 LP: 2

Blocking Pairs priority: 4 LP: 4

Profile 4:

f_1	f_2	f_3	f_4	f_5	f_6
w_1 15.5	w_1 15.4	w_2 15.8	w_2 15.5	w_1 15.9	w_1 14.9
w_3 14.2	w_2 15.25	w_1 15.5	w_3 14.85	w_3 15.8	w_2 14.7
w_2 14.05	w_3 14.2	w_3 15.3	w_1 14.25	w_2 15.4	w_3 14.1
w_6 6	w_6 5.65	w_6 4.95	w_4 5.35	w_6 5.1	w_4 5.5
w_4 5.4	w_5 4.7	w_4 4.6	w_6 4.55	w_4 4.55	w_6 4.45
w_5 5.35	w_4 4.35	w_5 4.3	w_5 4.45	w_5 4.2	w_5 4
w_1	w_2	w_3	w_4	w_5	w_6
f_2 15.2	f_1 15.65	f_2 15.4	f_1 15.35	f_3 14.9	f_2 15.9
f_1 15.2	f_2 15.45	f_1 15	f_3 14.1	f_2 14.7	f_1 14.2
f_3 14.3	f_3 14.05	f_3 14.4	f_2 14.05	f_1 14.4	f_3 14.1
f_4 5.85	f_5 5.3	f_4 5.9	f_4 4.9	f_4 5.95	f_5 5.35
f_6 5.05	f_6 5.2	f_6 4.45	f_6 4.3	f_5 5.25	f_4 4.65
f_5 4.3	f_4 4.35	f_5 4.35	f_5 4	f_6 5.05	f_6 4.1

Matching under LP: $([f_1, w_4][f_2, w_1][f_3, w_5][f_4, w_3][f_5, w_6][f_6, w_2])$

Matching under priority: $([f_1, w_2][f_2, w_1][f_3, w_5][f_4, w_3][f_5, w_6][f_6, w_4])$

Matching under GS : $([f_1, w_3][f_2, w_1][f_3, w_2][f_4, w_4][f_5, w_6][f_6, w_5])$

Mismatched Agents priority: 2 LP: 4

Blocking Pairs priority: 4 LP: 7

Profile 5:

f_1	f_2	f_3	f_4	f_5	f_6
w_3 15.8	w_2 14.55	w_2 15.8	w_1 15.45	w_1 15.9	w_1 15.5
w_1 14.7	w_1 14.5	w_1 15.7	w_3 15.2	w_2 14.6	w_2 15.1
w_2 14.2	w_3 14.3	w_3 14.4	w_2 14.35	w_3 14.3	w_3 14.5
w_5 4.8	w_4 5.9	w_4 5.8	w_5 6	w_6 5.7	w_5 5.1
w_4 4.7	w_6 5.5	w_6 5.75	w_4 5.45	w_5 4.85	w_4 4.45
w_6 4.35	w_5 4.2	w_5 4.2	w_6 4.15	w_4 4.35	w_6 4.25
w_1	w_2	w_3	w_4	w_5	w_6
f_1 15.75	f_3 15.8	f_1 15.3	f_2 14.9	f_2 15.8	f_1 15.7
f_2 14.7	f_1 15.45	f_2 15	f_3 14.1	f_1 14.8	f_2 15.6
f_3 14.6	f_2 14.15	f_3 14.9	f_1 14	f_3 14.7	f_3 15.5
f_5 5.95	f_5 5.8	f_4 5.85	f_6 5.8	f_6 4.7	f_5 5.9
f_6 5.8	f_6 4.75	f_6 5.5	f_4 5.5	f_4 4.2	f_4 5.7
f_4 4.15	f_4 4.2	f_5 4.3	f_5 4.35	f_5 4.1	f_6 4

Matching under LP: $([f_1, w_3][f_2, w_4][f_3, w_2][f_4, w_1][f_5, w_6][f_6, w_5])$

Matching under priority: $([f_1, w_3][f_2, w_4][f_3, w_2][f_4, w_6][f_5, w_1][f_6, w_5])$

Matching under GS : $([f_1, w_3][f_2, w_1][f_3, w_2][f_4, w_4][f_5, w_6][f_6, w_5])$

Mismatched Agents priority: 2 LP: 2

Blocking Pairs priority: 1 LP: 3

Profile 6:

f_1	f_2	f_3	f_4	f_5	f_6
w_3 15.2	w_2 15.4	w_3 15.9	w_1 15.7	w_1 15.1	w_2 15.6
w_1 14.3	w_3 14.8	w_2 15.8	w_3 15.05	w_3 14.7	w_1 15.5
w_2 14.2	w_1 14.3	w_1 15.3	w_2 14.2	w_2 14.1	w_3 14.6
w_6 5.8	w_6 5.55	w_4 5.4	w_6 6	w_4 5.9	w_5 4.6
w_5 5.75	w_5 4.65	w_5 5.4	w_5 5.5	w_5 4.6	w_4 4.6
w_4 5.65	w_4 4.4	w_6 4.6	w_4 5.25	w_6 4.4	w_6 4.2
w_1	w_2	w_3	w_4	w_5	w_6
f_3 15.65	f_3 15.15	f_2 15.9	f_3 16	f_2 16	f_1 14.9
f_2 14.85	f_1 15	f_1 15.3	f_2 14.8	f_3 15.9	f_3 14.8
f_1 14.6	f_2 14.95	f_3 14.8	f_1 14.05	f_1 15.5	f_2 14.6
f_4 6	f_4 5.75	f_5 5.9	f_6 5.25	f_6 5.75	f_5 5.15
f_6 5.35	f_5 5.1	f_4 4.65	f_4 4.75	f_4 5.65	f_6 4.85
f_5 5.05	f_6 4.55	f_6 4.6	f_5 4.15	f_5 4.05	f_4 4.35

Matching under LP: $([f_1, w_6][f_2, w_5][f_3, w_4][f_4, w_1][f_5, w_3][f_6, w_2])$

Matching under priority: $([f_1, w_6][f_2, w_3][f_3, w_2][f_4, w_1][f_5, w_4][f_6, w_5])$

Matching under GS : $([f_1, w_1][f_2, w_3][f_3, w_2][f_4, w_6][f_5, w_4][f_6, w_5])$

Mismatched Agents priority: 2 LP: 6

Blocking Pairs priority: 1 LP: 9

Profile 7:

f_1	f_2	f_3	f_4	f_5	f_6
w_2 15.6	w_1 15.3	w_3 15.5	w_3 15.45	w_2 14.6	w_2 15.1
w_1 15.4	w_2 14.9	w_1 15.3	w_1 14.3	w_3 14.5	w_3 14.7
w_3 14.2	w_3 14.65	w_2 14.9	w_2 14.2	w_1 14.4	w_1 14.6
w_5 5.8	w_4 5.45	w_4 5.85	w_4 5.65	w_5 5.85	w_5 5.9
w_6 5.15	w_6 5.3	w_6 4.95	w_5 5.35	w_6 5.1	w_6 5.55
w_4 4.4	w_5 4.45	w_5 4.1	w_6 4.35	w_4 4.8	w_4 5.1
w_1	w_2	w_3	w_4	w_5	w_6
f_3 15.95	f_1 16	f_1 16	f_3 15.4	f_3 15.7	f_2 16
f_2 15.4	f_2 14.6	f_2 14.8	f_2 15.3	f_1 15.3	f_1 15.2
f_1 15.3	f_3 14.4	f_3 14.7	f_1 14.85	f_2 14.1	f_3 14.8
f_6 6	f_5 5.4	f_4 5.75	f_4 5.95	f_6 5.9	f_4 5.2
f_5 5.4	f_4 4.9	f_5 5.3	f_6 5.1	f_5 5.1	f_5 5.15
f_4 4.8	f_6 4.65	f_6 4.5	f_5 4.1	f_4 4.45	f_6 4.25

Matching under LP: $([f_1, w_2][f_2, w_1][f_3, w_4][f_4, w_3][f_5, w_6][f_6, w_5])$

Matching under priority: $([f_1, w_2][f_2, w_6][f_3, w_1][f_4, w_3][f_5, w_4][f_6, w_5])$

Matching under GS : $([f_1, w_2][f_2, w_1][f_3, w_3][f_4, w_4][f_5, w_6][f_6, w_5])$

Mismatched Agents priority: 2 LP: 2

Blocking Pairs priority: 3 LP: 2

Profile 8:

f_1	f_2	f_3	f_4	f_5	f_6
w_3 15.3	w_3 15.9	w_2 16	w_3 15.95	w_1 15.9	w_3 15.7
w_2 14.25	w_2 14.85	w_3 15.7	w_2 15.75	w_3 15.2	w_2 15.6
w_1 14.2	w_1 14.6	w_1 14.5	w_1 15.65	w_2 14.9	w_1 15
w_5 5.7	w_4 5.6	w_6 5.2	w_4 5.95	w_4 5.75	w_4 5.45
w_6 5.1	w_6 5.3	w_5 4.55	w_6 5.75	w_5 5.4	w_6 4.95
w_4 4.35	w_5 4.9	w_4 4.1	w_5 4.05	w_6 4.4	w_5 4
w_1	w_2	w_3	w_4	w_5	w_6
f_3 15.75	f_2 16	f_3 15.1	f_2 15.8	f_1 15.8	f_3 15.4
f_2 15.55	f_1 15.2	f_2 14.4	f_3 15.35	f_3 15.5	f_1 15
f_1 15.3	f_3 14.75	f_1 14.1	f_1 14.7	f_2 15.2	f_2 14.6
f_5 4.9	f_6 5.75	f_6 5.3	f_4 5.4	f_5 5.6	f_4 5.15
f_6 4.5	f_5 5.25	f_5 5.05	f_6 5.2	f_6 5.05	f_6 4.65
f_4 4	f_4 4.95	f_4 4.65	f_5 4.9	f_4 4	f_5 4.55

Matching under LP: $([f_1, w_5][f_2, w_2][f_3, w_6][f_4, w_4][f_5, w_1][f_6, w_3])$

Matching under priority: $([f_1, w_5][f_2, w_2][f_3, w_3][f_4, w_4][f_5, w_1][f_6, w_6])$

Matching under GS : $([f_1, w_1][f_2, w_2][f_3, w_3][f_4, w_4][f_5, w_5][f_6, w_6])$

Mismatched Agents priority: 2 LP: 4

Blocking Pairs priority: 1 LP: 5

Profile 9:

f_1	f_2	f_3	f_4	f_5	f_6
w_1 14.6	w_3 15.95	w_1 15.8	w_2 15.4	w_2 15.9	w_3 15.6
w_2 14.5	w_2 15	w_2 15.5	w_1 14.8	w_3 14.9	w_1 14.8
w_3 14.2	w_1 14.7	w_3 14.9	w_3 14.1	w_1 14.9	w_2 14.1
w_6 5.6	w_5 5.85	w_5 5.65	w_4 5.2	w_5 5.35	w_4 5.9
w_5 5.2	w_4 5.65	w_6 4.8	w_5 4.75	w_6 5.1	w_6 5.45
w_4 4	w_6 4	w_4 4	w_6 4.65	w_4 4.2	w_5 5.3
w_1	w_2	w_3	w_4	w_5	w_6
f_3 15.55	f_3 15.9	f_3 15.4	f_1 14.95	f_1 14.9	f_3 16
f_2 15.45	f_2 15.8	f_1 15.3	f_3 14.45	f_3 14.7	f_1 15.9
f_1 15.1	f_1 14.75	f_2 14.4	f_2 14.1	f_2 14.2	f_2 14.8
f_5 5.65	f_6 5.65	f_4 5.9	f_4 5.85	f_6 5.65	f_5 5.45
f_6 5.25	f_4 4.85	f_5 5.7	f_5 4.65	f_5 5.5	f_6 5.25
f_4 4.8	f_5 4.35	f_6 5.45	f_6 4.1	f_4 4.5	f_4 4.5

Matching under LP: $([f_1, w_5][f_2, w_2][f_3, w_1][f_4, w_4][f_5, w_6][f_6, w_3])$

Matching under priority: $([f_1, w_5][f_2, w_3][f_3, w_1][f_4, w_2][f_5, w_6][f_6, w_4])$

Matching under GS : $([f_1, w_2][f_2, w_3][f_3, w_1][f_4, w_4][f_5, w_5][f_6, w_6])$

Mismatched Agents priority: 2 LP: 2

Blocking Pairs priority: 4 LP: 5

Profile 10:

f_1	f_2	f_3	f_4	f_5	f_6
w_3 15.85	w_3 15.2	w_2 16	w_3 15.05	w_3 15.5	w_3 16
w_2 14.85	w_1 14.85	w_1 14.5	w_2 14.8	w_2 15.4	w_1 15.7
w_1 14.2	w_2 14.2	w_3 14.4	w_1 14.25	w_1 15.3	w_2 14.5
w_5 4.8	w_5 5.8	w_5 5.4	w_4 5.35	w_4 6	w_5 5.75
w_6 4.6	w_6 5.25	w_4 4.15	w_6 4.75	w_5 4.95	w_4 4.75
w_4 4	w_4 5.1	w_6 4	w_5 4.65	w_6 4.1	w_6 4.65
w_1	w_2	w_3	w_4	w_5	w_6
f_3 15.7	f_3 15.95	f_2 16	f_2 15.25	f_1 15.7	f_3 15.2
f_1 15.65	f_1 15.25	f_1 15.3	f_3 15.2	f_3 15	f_2 15.1
f_2 14.6	f_2 15.2	f_3 14.7	f_1 14.3	f_2 14.1	f_1 14.9
f_4 5.8	f_5 5.85	f_4 6	f_6 5.9	f_6 5.45	f_6 5.6
f_5 5.4	f_6 4.7	f_6 4.95	f_4 5.7	f_5 4.3	f_4 5.15
f_6 4.85	f_4 4.25	f_5 4.35	f_5 5.25	f_4 4.15	f_5 4.2

Matching under LP: $([f_1, w_5][f_2, w_3][f_3, w_1][f_4, w_4][f_5, w_2][f_6, w_6])$

Matching under priority: $([f_1, w_5][f_2, w_3][f_3, w_2][f_4, w_1][f_5, w_6][f_6, w_4])$

Matching under GS : $([f_1, w_1][f_2, w_3][f_3, w_2][f_4, w_4][f_5, w_6][f_6, w_5])$

Mismatched Agents priority: 2 LP: 2

Blocking Pairs priority: 1 LP: 3

Profile 11:

f_1		f_2		f_3		f_4		f_5		f_6	
w_2	15.15	w_3	15.45	w_3	15.8	w_3	15	w_2	15.7	w_2	15.5
w_3	15.1	w_1	14.9	w_1	14.5	w_2	14.45	w_3	14.6	w_1	15.3
w_1	14.2	w_2	14.35	w_2	14.1	w_1	14.35	w_1	14.2	w_3	15.1
w_4	6	w_6	5.9	w_5	5.6	w_4	5.45	w_6	5.6	w_6	6
w_6	4.65	w_4	5.75	w_6	5.45	w_5	4.95	w_4	5.3	w_5	5.15
w_5	4.1	w_5	4.65	w_4	5.1	w_6	4.9	w_5	4.95	w_4	4.45
w_1		w_2		w_3		w_4		w_5		w_6	
f_3	15.25	f_3	16	f_1	15.7	f_3	15.2	f_2	15.8	f_3	15.3
f_2	14.55	f_1	15.7	f_2	15.5	f_1	14.8	f_3	15.3	f_1	14.5
f_1	14.1	f_2	14.7	f_3	15.2	f_2	14.4	f_1	14.2	f_2	14
5.9	f_4	5.6	f_4	5.8	f_5	5.95	f_5	5.35	f_5	5.35	
f_4	4.6	f_6	4.4	f_6	5.6	f_6	5.15	f_4	5	f_4	4.3
f_6	4.45	f_5	4.1	f_5	5.45	f_4	4.95	f_6	4.25	f_6	4.25

Matching under LP: $([f_1, w_4][f_2, w_5][f_3, w_1][f_4, w_3][f_5, w_6][f_6, w_2])$

Matching under priority: $([f_1, w_3][f_2, w_5][f_3, w_1][f_4, w_4][f_5, w_6][f_6, w_2])$

Matching under GS : $([f_1, w_2][f_2, w_3][f_3, w_1][f_4, w_4][f_5, w_6][f_6, w_5])$

Mismatched Agents priority: 2 LP: 4

Blocking Pairs priority: 5 LP: 6

Profile 12:

f_1		f_2		f_3		f_4		f_5		f_6	
w_1	15.65	w_1	15.95	w_1	15	w_1	15.3	w_1	15.2	w_3	15.8
w_3	14.8	w_3	14.9	w_3	14.2	w_2	14.95	w_3	14.6	w_1	15.2
w_2	14.2	w_2	14.7	w_2	14.2	w_3	14.35	w_2	14.5	w_2	15
w_6	5.4	w_5	5.05	w_4	5.95	w_5	5.85	w_6	5.9	w_6	6
w_5	4.65	w_6	4.7	w_5	5.35	w_4	5.55	w_5	4.85	w_5	5.9
w_4	4.45	w_4	4.65	w_6	5.05	w_6	4.4	w_4	4	w_4	5.2
w_1		w_2		w_3		w_4		w_5		w_6	
f_1	15.65	f_3	15.95	f_1	15.9	f_1	15.4	f_2	15.9	f_3	15.8
f_3	15.3	f_2	14.75	f_2	15	f_2	15.1	f_3	15.8	f_1	15.1
f_2	14.95	f_1	14.2	f_3	14.9	f_3	14.5	f_1	14.5	f_2	14
f_6	5.9	f_5	5.5	f_6	5.15	f_6	5.5	f_6	5.4	f_5	5.45
f_5	5.05	f_4	4.9	f_5	4.2	f_5	5.45	f_4	5.05	f_4	5.05
f_4	4.75	f_6	4.85	f_4	4.15	f_4	4.4	f_5	4.8	f_6	4.8

Matching under LP: $([f_1, w_1][f_2, w_5][f_3, w_4][f_4, w_2][f_5, w_6][f_6, w_3])$

Matching under priority: $([f_1, w_1][f_2, w_5][f_3, w_2][f_4, w_4][f_5, w_6][f_6, w_3])$

Matching under GS : $([f_1, w_1][f_2, w_3][f_3, w_2][f_4, w_4][f_5, w_6][f_6, w_5])$

Mismatched Agents priority: 2 LP: 4

Blocking Pairs priority: 2 LP: 5

Profile 13:

f_1	f_2	f_3	f_4	f_5	f_6
w_2 15.35	w_1 15.85	w_2 14.9	w_1 15.65	w_3 15.8	w_1 15.8
w_1 14.4	w_3 15.2	w_1 14.8	w_3 15.55	w_2 15.6	w_3 14.7
w_3 14.2	w_2 14.9	w_3 14	w_2 14.35	w_1 14.6	w_2 14.5
w_5 5.95	w_4 5.5	w_6 5.4	w_6 5.7	w_4 5.55	w_5 5.5
w_4 5.6	w_6 5.3	w_5 5.35	w_4 5.25	w_6 4.75	w_6 4.95
w_6 5.5	w_5 5.05	w_4 4.1	w_5 4.35	w_5 4.5	w_4 4.05
w_1	w_2	w_3	w_4	w_5	w_6
f_2 15.6	f_3 14.75	f_2 15.6	f_1 15.9	f_1 15.9	f_1 15.7
f_1 15.5	f_2 14.15	f_1 14.4	f_3 15.8	f_2 15.2	f_2 15.4
f_3 15.25	f_1 14.05	f_3 14.3	f_2 14.25	f_3 14.4	f_3 14.3
f_4 5.5	f_6 5.9	f_6 5.85	f_4 5.8	f_6 5.4	f_4 5.5
f_6 5.45	f_5 5	f_4 4.4	f_6 5.15	f_5 4.7	f_6 4.55
f_5 4.8	f_4 4.15	f_5 4.2	f_5 4.6	f_4 4.05	f_5 4.4

Matching under LP: $([f_1, w_4][f_2, w_1][f_3, w_2][f_4, w_6][f_5, w_3][f_6, w_5])$

Matching under priority: $([f_1, w_5][f_2, w_1][f_3, w_2][f_4, w_6][f_5, w_3][f_6, w_4])$

Matching under GS : $([f_1, w_3][f_2, w_1][f_3, w_2][f_4, w_6][f_5, w_4][f_6, w_5])$

Mismatched Agents priority: 2 LP: 2

Blocking Pairs priority: 3 LP: 4

Profile 14:

f_1	f_2	f_3	f_4	f_5	f_6
w_3 15.7	w_1 14.55	w_1 14.3	w_3 15.95	w_2 15.8	w_3 15.2
w_1 15	w_2 14.2	w_2 14.3	w_1 15.25	w_3 15.4	w_2 14.6
w_2 14.2	w_3 14.1	w_3 14.1	w_2 14.75	w_1 14.3	w_1 14
w_4 5.95	w_5 5.75	w_6 5.95	w_4 5.7	w_6 5.6	w_5 5.45
w_5 5.05	w_6 4.35	w_4 4.9	w_5 5.65	w_5 4.95	w_6 4.95
w_6 5	w_4 4.05	w_5 4	w_6 5.55	w_4 4.3	w_4 4.5
w_1	w_2	w_3	w_4	w_5	w_6
f_2 15.8	f_1 15.7	f_3 15.8	f_1 15.15	f_1 15.6	f_3 15.3
f_1 15.2	f_3 14.5	f_1 15.3	f_2 15	f_2 15.5	f_2 14.1
f_3 15	f_2 14.4	f_2 15.1	f_3 14.65	f_3 14.4	f_1 14.1
f_5 5.45	f_4 5.15	f_5 5.95	f_4 5.9	f_6 5.4	f_5 5.65
f_6 5.05	f_6 5.05	f_4 5.3	f_6 5.5	f_4 4.3	f_4 5.55
f_4 5	f_5 4.4	f_6 4.65	f_5 5.3	f_5 4.2	f_6 4.85

Matching under LP: $([f_1, w_4][f_2, w_1][f_3, w_6][f_4, w_3][f_5, w_2][f_6, w_5])$

Matching under priority: $([f_1, w_3][f_2, w_1][f_3, w_6][f_4, w_4][f_5, w_2][f_6, w_5])$

Matching under GS : $([f_1, w_3][f_2, w_1][f_3, w_2][f_4, w_4][f_5, w_6][f_6, w_5])$

Mismatched Agents priority: 2 LP: 4

Blocking Pairs priority: 4 LP: 5

Profile 15:

f_1	f_2	f_3	f_4	f_5	f_6
w_1 15.25	w_2 15.55	w_2 15.8	w_2 15.45	w_1 15.2	w_1 16
w_2 14.9	w_1 15.55	w_3 15.7	w_3 15.25	w_2 14.8	w_3 14.4
w_3 14.2	w_3 15.2	w_1 15.3	w_1 14.35	w_3 14.7	w_2 14
w_5 5.25	w_5 5.95	w_5 5.2	w_5 5.7	w_5 4.95	w_5 5.95
w_6 4.9	w_4 4.95	w_4 5.1	w_6 4.9	w_4 4.65	w_6 4.55
w_4 4.45	w_6 4.8	w_6 4.2	w_4 4	w_6 4.4	w_4 4.35
w_1	w_2	w_3	w_4	w_5	w_6
f_2 15.15	f_3 15.6	f_2 15.9	f_2 15.15	f_1 15.3	f_1 15.2
f_1 14.95	f_1 15.2	f_1 15.2	f_3 14.75	f_2 14.8	f_2 15.1
f_3 14.55	f_2 14.3	f_3 15.1	f_1 14.6	f_3 14.3	f_3 14.5
f_6 5.5	f_6 5.7	f_6 5.05	f_6 5.55	f_4 4.85	f_6 5.7
f_5 4.95	f_5 4.4	f_5 4.85	f_5 5.35	f_6 4.45	f_5 5.55
f_4 4.05	f_4 4.1	f_4 4.5	f_4 4.8	f_5 4.05	f_4 4.8

Matching under LP: $([f_1, w_6][f_2, w_4][f_3, w_2][f_4, w_5][f_5, w_1][f_6, w_3])$

Matching under priority: $([f_1, w_5][f_2, w_1][f_3, w_2][f_4, w_6][f_5, w_4][f_6, w_3])$

Matching under GS : $([f_1, w_3][f_2, w_1][f_3, w_2][f_4, w_5][f_5, w_4][f_6, w_6])$

Mismatched Agents priority: 2 LP: 4

Blocking Pairs priority: 1 LP: 7

References

- [1] Dawid H (1999) Adaptive Learning by Genetic Algorithms. Second Edition. Springer-Verlag, Berlin-Heidelberg.
- [2] Duffy J (2004) Agent-Based Models and Human Subject Experiments. Judd KL and Tesfatsion L (eds) Handbook of Computational Economics vol. 2. Elsevier, Amsterdam, forthcoming.
- [3] Holland JH (1975) Adaptation in Natural and Artificial Systems. The University of Michigan Press, Ann-Arbor, MI.
- [4] Ünver MU (2001) Backward Unraveling over Time: The Evolution of Strategic Behavior in the Entry-Level British Medical Labor Markets. J Econ Dynam Control 25: 1039-1080.