

Exercise session 3



Aalto University
School of Business

Claudia Troccoli

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Exercise 1

Golden Balls

1 a – Lucy & Tony

- Draw the game between Lucy and Tony as a game matrix when they care only about money.
- What do you think are their real preferences?

1a – Lucy & Tony

		Tony	
		SPLIT	STEAL
Lucy	SPLIT	33.5k; 33.5k	0; 67k
	STEAL	67k; 0	0; 0

What do you think are their real preferences?

- Lucy was lying about her intentions to split. She preferred having the whole money.
- Tony expressed his intentions to split the pot, but it is unclear whether he actually meant it. He eventually picked “steal” and justified his action by claiming that Lucy was clearly lying and going to steal too. It seems that he valued fairness and decided to punish Lucy for stealing.

1 b – Sarah & Steve

- What do you conclude about Sarah's and Steve's preferences?

1b – Sarah & Steve

		Steve	
		SPLIT	STEAL
Sarah	SPLIT	50k; 50k	0; 100k
	STEAL	100k; 0	0; 0

What do you conclude about Sarah's and Steve's preferences?

- Steve: he really wants the money (he thinks half of the jackpot is plenty) and feels like it is fair to share. He also claims people will judge him negatively if he steals.
- Sarah: she claims she is going to share, but eventually steals. As she says in her interview afterwards, she had lost all trust after being cheated on, and did not want to be made a fool of again. She felt absolutely ashamed afterwards and shocked that Steve had been truthful – she was expecting him to be lying.

1 c,d – Ibrahim & Nick

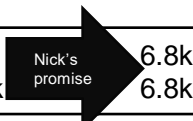
Nick wants to convince Ibrahim that part of the game matrix is no longer relevant.

How would this affect Ibrahim's optimal strategy?

Listen to the interview. Comment on what you learn from the case with Ibrahim and Nick.

1c,d – Ibrahim & Nick

		Nick	
		SPLIT	STEAL
Ibrahim	SPLIT	6.8k 6.8k	0; 13.6k
	STEAL	13.6k 0	0; 0



Nick wants to convince Ibrahim that part of the game matrix is no longer relevant. How would this affect Ibrahim's optimal strategy?

Stealing is not a dominant strategy for Ibrahim anymore, as he knows that Nick will never pick “split”.

Ibrahim now has the option of either choosing “steal”, which for sure will end up in him getting no money at all, or choosing “split”, which might end up with him getting half of the money, if Nick keeps his promise of sharing afterwards. If Ibrahim trusts Nick, splitting becomes a dominant strategy.

Comment on what you learn from the case with Ibrahim and Nick.

(Credibly) committing to playing a certain action is a good way to influence other players' choices.

Exercise 2

Common Pool Problems

All families have free access to pasture land for sheep to graze.

Families own the sheep and sell the wool.

The more sheep graze this year, the more damaged the land will be in the future
and the less production will be in future years.

2 a

Assume that one single family owns all the sheep and decides how large a flock to have.

- What is the benefit from adding a sheep?
- What is the relevant opportunity cost of adding another sheep to the flock?

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- What is the benefit from adding a sheep?
This year's larger production of wool and income from selling it.
- What is the relevant opportunity cost of adding another sheep to the flock?
By adding another sheep to the flock, fewer sheep will be able to graze on the land in the future. Therefore, future production of wool and income will also be lower.

2 b

10 families own their own sheep flock and share the common pasture. They all decide simultaneously how many sheep to have.

- How do the benefits and costs from adding a sheep change relative to the case of a single family?

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How do the benefits and costs from adding a sheep change relative to the case of a single family?

- Today's added income for family F (the extra income from adding one more sheep) stays the same whether they are the sole owners of the land or if they share it with 9 other families.
- Future production will be lower if any of the other 9 families adds sheep to their flock, even if family F does not add one.
- Additionally, the future cost from adding one sheep to the flock is spread among the 10 families, therefore the individual cost for each family is much smaller.

2 c

Explain carefully why the situation gives rise to a social dilemma.

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- Today's benefits accrue to the individual.
- Costs are paid in equal shares by everyone in the future, even those that haven't obtained any benefits today.
- For any single family, today's benefits are much larger than tomorrow's costs, therefore there is an incentive to add sheep to their own flock.
- However, as this incentive exists for every family, if they all add sheep to their flock, the future costs will outweigh today's benefits.
- For everyone to not pay costs in the future, they should agree not to get any benefits today. But then each family has an incentive to break the agreement.

- (Similar to CO₂ emissions problem)

Exercise 3

Division of \$1

3 a

What are the strategies of the players?

What are the outcomes?

3 a

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$$D_A = [0,100]; D_B = [0,100]$$

What are the outcomes?

- the money is shared according to the proposed splits if the demands sum up to maximum 100;
nobody gets anything if the demands sum up to more than 100.

3 b

Suppose that each player only cares about the amount of money they receive in each outcome.

Give a description of the monetary payoffs to the players.

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- Give a description of the monetary payoffs to the players.

$$P_A = \begin{cases} D_A & \text{if } D_A + D_B \leq 100 \\ 0 & \text{if } D_A + D_B > 100 \end{cases}$$
$$P_B = \begin{cases} D_B & \text{if } D_A + D_B \leq 100 \\ 0 & \text{if } D_A + D_B > 100 \end{cases}$$

3 c

What are the Pareto efficient outcomes if the players only care about the monetary outcome?

3 c

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- All outcomes in which $D_A + D_B = 100$ are Pareto efficient, as nobody can be made better off without making the other player worse off.

3 d

Are there any dominant strategies in the game with monetary payoffs?

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- There are no dominant strategies, as the action of one player always depends on the action of the other player.

3 e

Are there any Nash equilibria in the game with monetary payoffs?
What would you choose if you played this game and how would you reason about your choices?

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What would you choose if you played this game and how would you reason about your choices?

- Any split that is PE is also NE. If we are already getting the amount demanded and that sums up to 100, any deviation from the current demand of one player will result in a lower payoff to that player: by increasing the demand, the payoff will go to 0 (as the sum of the two demands would exceed 100 cents); by decreasing the demand, the payoff will be lower than before.
- One possible demand is exactly 50 cents. Without knowing anything about the other player, I would expect them to demand that amount.

3 f

If you played this game yourself, would your preferences be the ones given by your monetary payoffs?

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By demanding 50 cents, I* would combine my preference for the monetary payoff with that for fairness. Since I expect the other person to demand around 50 cents too (I find it a reasonable request), I think that with such demand my chances of getting the money will increase. Additionally, if they demanded more I would be happy to punish them for being greedy, even if that meant that I would not get any money either. And if they demanded less than half, I would still be happy to take 50, which I consider a reasonable amount.

*Here the answer is personal so any answer works but needs to be motivated.

Exercise 4

Externalities

4a - How valuable is a phone...

- ...if you are the only owner of it?
- ...if more people own a phone?

Consider the simultaneous decision of whether to purchase a phone.

- Do players have dominant strategies?
- Will there be many different Nash equilibria?

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Consider the simultaneous decision of whether to purchase a phone. Do players have dominant strategies? Will there be many different Nash equilibria?

- Let's ignore that a phone nowadays is useful for many things, and let's assume that its sole purpose is communicating. If you are the only owner, a phone is extremely useless. As more people acquire the phone, then having a phone becomes more and more valuable.

In a game as shown in the matrix, there are no dominant strategies. The Nash Equilibria are (Acquire, Acquire) and (Don't acquire, Don't acquire).

		B	
		Acquire phone	Don't acquire
A	Acquire phone	15; 15	-5; 0
	Don't acquire	0; -5	0; 0

4b – Will you subscribe to a dating web site...

- ...as its only user?
- ...if it has a large numbers of subscribers?
- Discuss the implications for opening a new site with possibly a superior matching algorithm and more user friendly interface.

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...as its only user?

...if it has a large numbers of subscribers?

Discuss the implications for opening a new site with possibly a superior matching algorithm and more user friendly interface.

- Clearly, there is no value in being the only user of a dating website, or if the website has very few users, as the purpose of the website is to meet new people.
As the website acquires more and more users, it becomes more likely to get any benefit out of the service.

In order to attract more and more subscribers, the website needs to build a large customer base. This is a difficult step since, as we discussed, getting more subscribers requires having already enough subscribers.

One strategy could be to offer the service free of charge for a certain period of time / for the first x customers, together with marketing strategies that highlights the superiority of their algorithm.

Once the website becomes popular enough, users will be willing to subscribe for a charge.

4c – A new restaurant...

You get information about the quality of a new restaurant from friends that have dined there.

- Will you be the first to go or would you rather wait?
- What can the restaurant owner do about this?

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Will you be the first to go or would you rather wait?

What can the restaurant owner do about this?

- Some people might enjoy trying out something new that very few people have experienced, whereas others might prefer having first enough information about the restaurant before going.
Similarly to the example above, if the restaurant owner is sure about the quality of their product, they should make introductory offers / organize events to make their product known to the public, so that enough people will go and try it and pass on the word that it is worth going to.

Exercise 5

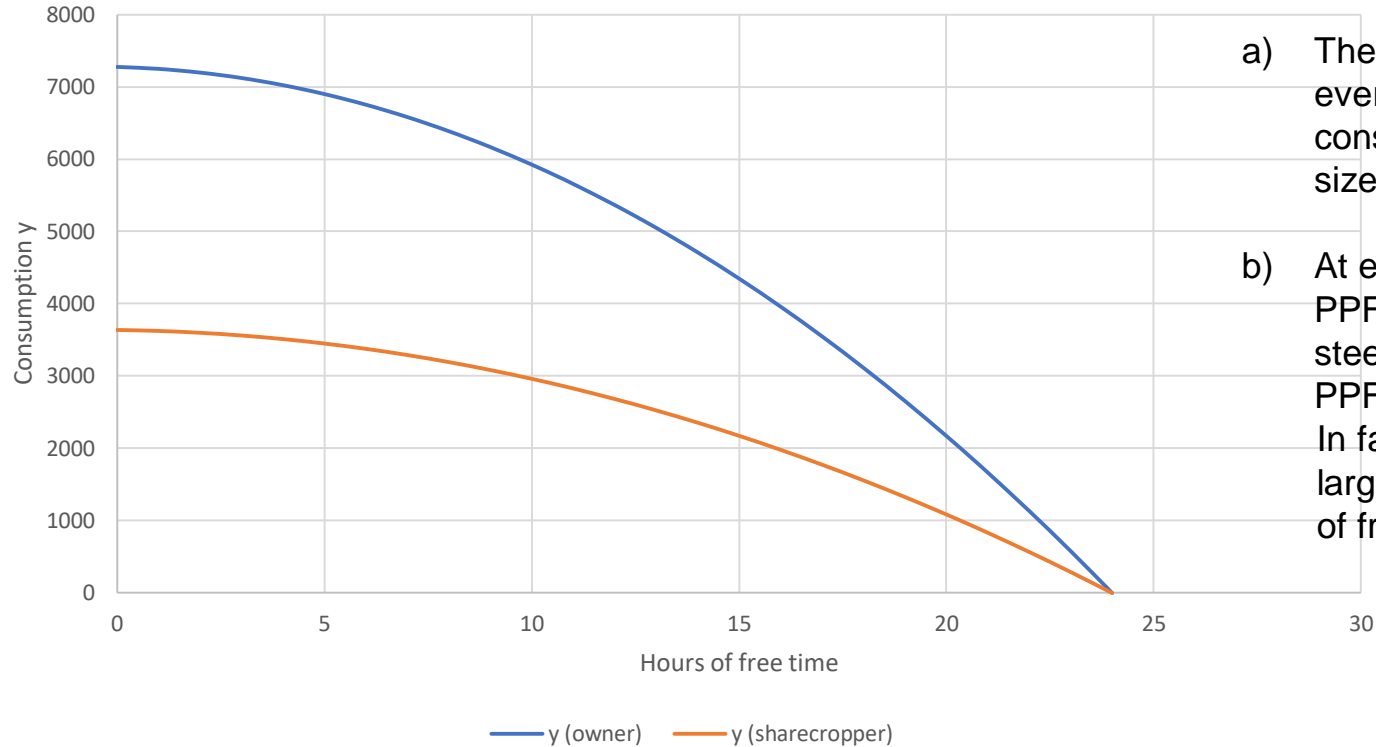
Sharecropping

5 a-b

Barry is a landowner and Alex works on that land. Under sharecropping, Alex pays half of the output to Barry.

- a) Draw the production possibility frontier for Alex's grain consumption in this case (taking into account that Barry takes his half).
- b) Compare the MRT at each level of working hours to the case where Alex owns the farm by himself.

5 a-b



- a) The PPF has flattened: for every hour of work, consumption is now half the size.
- b) At every point, the MRT of the PPF(Ownership) is much steeper than of the PPF(Sharecropping). In fact, $MRT(O)$ is twice as large as $MRT(S)$ at every level of free time.

5 c

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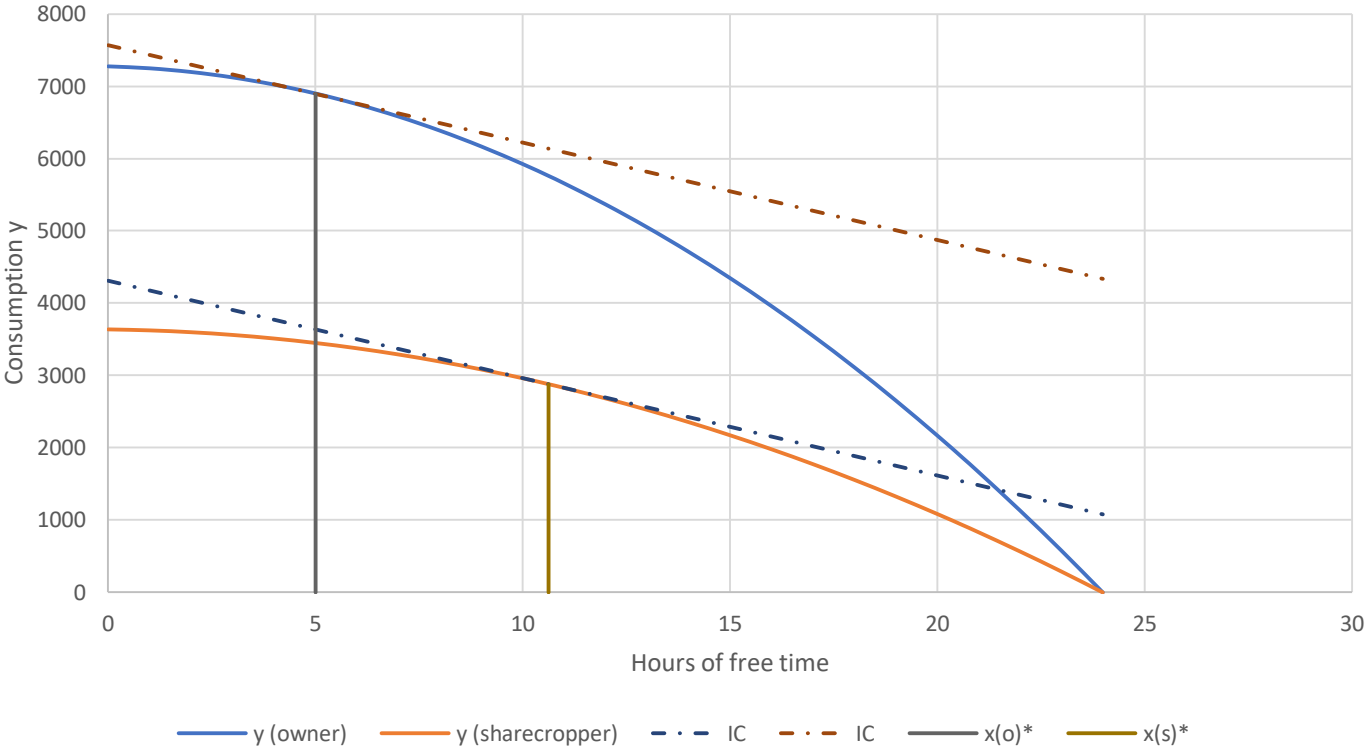
Will Alex work more or less as a sharecropper when compared to what he would do as an independent farmer?

5 c

The optimal amount of free time is where $MRT=MRS$.
 In part b, we said that at every level of free time,
 $MRT(O)=2*MRT(S)$.

So we can say for sure that the optimal point under sharecropping will be at a higher level of hours of free time compared to the optimal point under ownership.

Alex will work less and produce less when sharecropping.

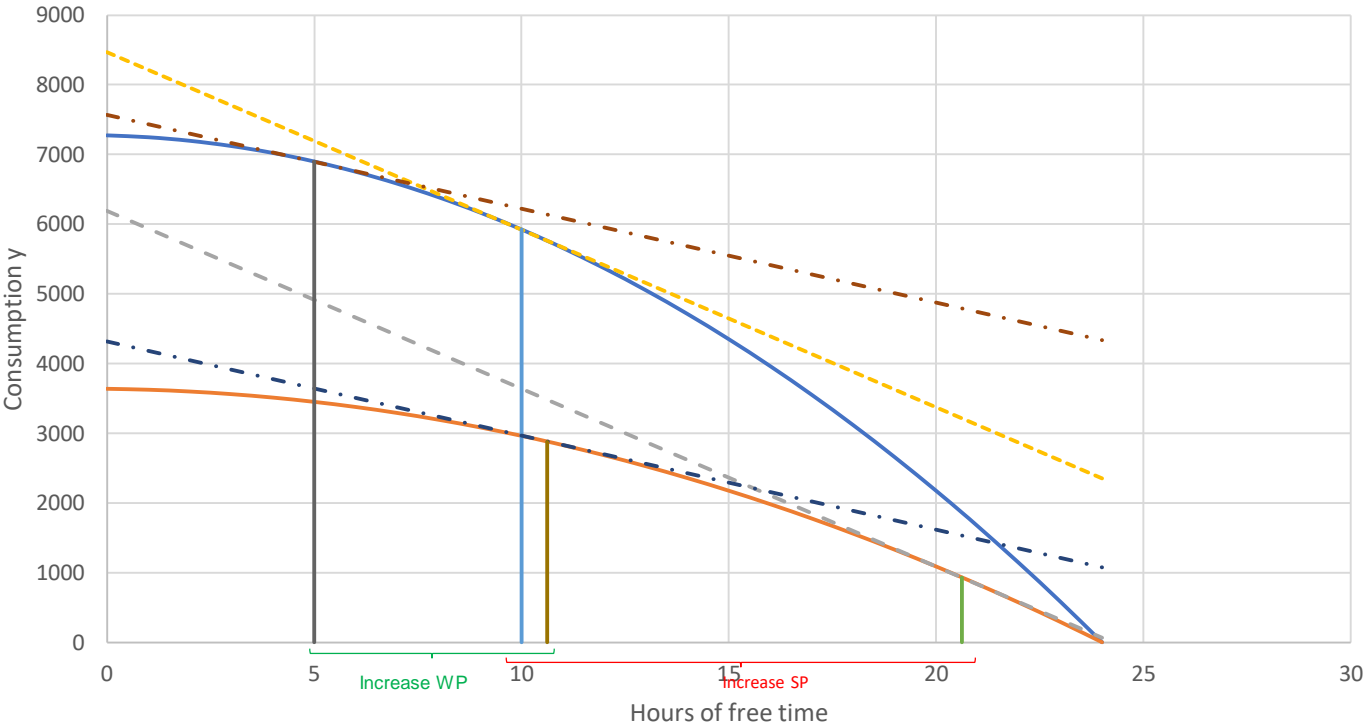


5 c

Will Alex work more or less as a sharecropper when compared to what he would do as an independent farmer?

Depending on Alex's preferences for free time vs consumption, the increase in hours of free time will be larger or smaller. For flatter indifference curves (if Alex has a "weaker preference" for hours of free time), the difference between optimal amount of hours of free time under sharecropping and under full ownership is much smaller than for steeper indifference curves (if Alex has a "stronger preference" for hours of free time). -

5 c



- y (owner)
- y (sharecropper)
- IC (strong preference for free time)
- · - IC (strong preference for free time)
- · - IC (weak preference for free time)
- · - IC (weak preference for free time)
- $x^*(s)$ strong preference
- $x^*(s)$ strong preference
- $x^*(s)$ weak preference
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Can you think of any real world advantages to explain the emergence of an institution such as sharecropping?

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Can you think of any real world advantages to explain the emergence of an institution such as sharecropping?

- For farmers that cannot afford to buy their own land, sharecropping can be beneficial. Advantages for the landowner, as they can farm large extensions of land.
- Franchising is a modern version: the main company gives a brand and established practices instead of land and the franchise will pay some share of profits.