Collaboration, Interdependency, and Transfer Pricing

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The objective of this project is to study the ability for agents to achieve a socially-optimal outcome for all interested parties of a collaborative/interdependency problem through the use of transfer pricing.

Motivation

- When an agent takes an action, other agents may benefit (or suffer) from the action
- Managing collaboration amongst rational players in interdependent contexts is difficult
- Faced with a collaborative / interdependency problem, agents to the problem often provide subsidies to peers for adoption of technologies

Cyberspace security implications of our research:

- Cloud computing
- Sharing of communications infrastructure
- Electronic personal health information exchanges
- Misc. interdependent security problems

Research Questions

- Are agents able to negotiate to achieve the socially-optimal outcome using transfer pricing?
- Do outcomes hold with symmetric / asymmetric uncertainty of outcomes?
- Do experience-based behavioral factors affect the ability to achieve socially-optimal outcomes in the presence of transfer pricing?

Social, behavioral, and economic sciences implications of our research:

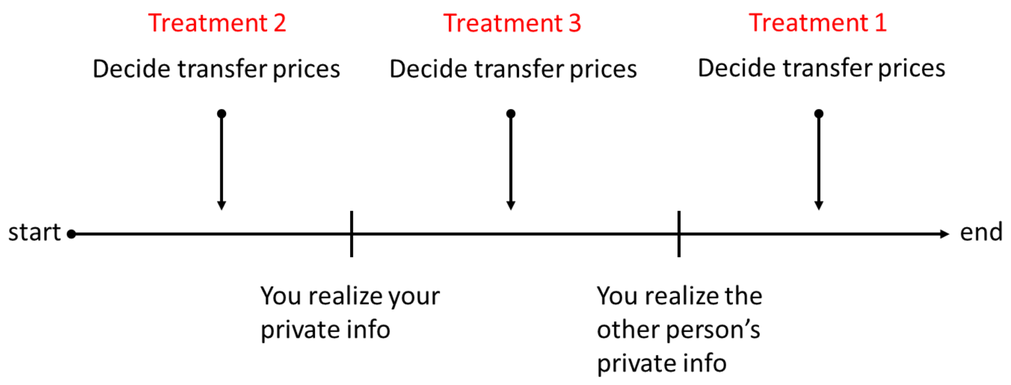
- Mechanism to understand and promote the socially-optimal outcome
- Effects of uncertainty of outcomes on negotiation
- Implications for risk, lying, fairness, reciprocity

Experimental Setup and Treatment Design

Special case from Tawarmalani et al. 2009

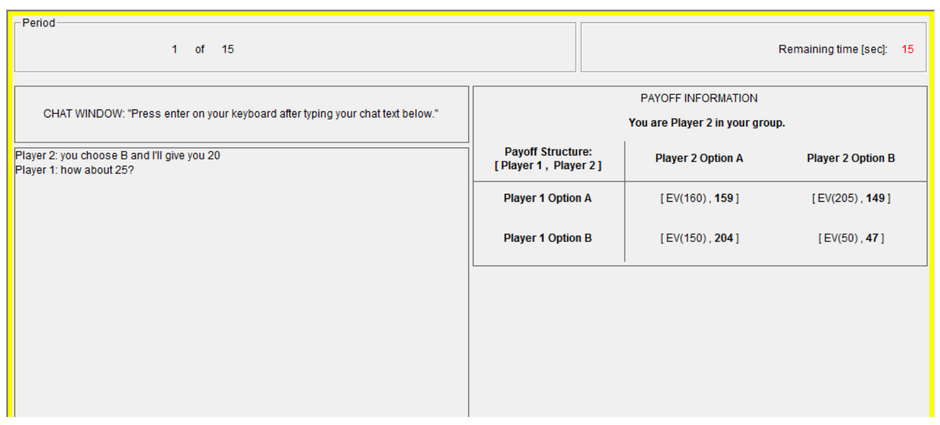
Player 1; Player 2	Option A		Option B	
Option A	160,	160	205,	150
Option B	150,	205	50,	50

The Nash Equilibrium is to play (A,A)
Socially-Optimal Outcome is (A,B) or (B,A)



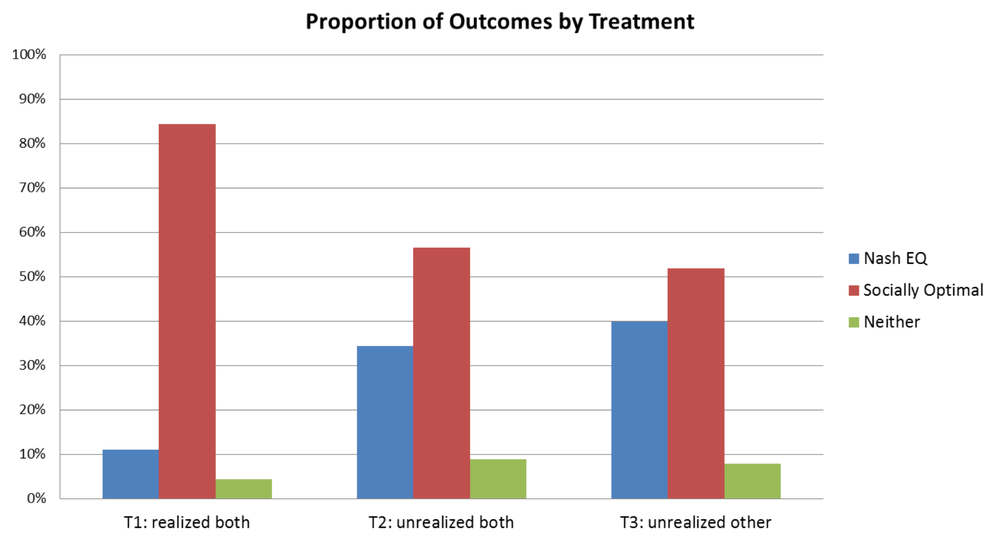
Implementation

- 15 rounds implemented using z-Tree 3.3.6
- Anonymous random grouping each period
- Roles randomly assigned each period
- Payoff matrix provided using expected values
- 60 seconds of negotiation time
- Simultaneous proposal of transfer prices
- Simultaneous and binding decisions



Group	Player	Message
3	2	ill giv u 25 tokens if u choose B
2	1	I choose A u choose B I give you 25
1	1	I'll give you 20 if you go B and I go A
4	2	choose b and i will transfer 14
3	1	what about 30
1	2	how about u go b and i go a
2	2	k
3	2	27
1	2	and i'll give you 25
4	1	pick option b, i give you 25
3	1	deal

Preliminary Results



Example Negotiation (T3: Unrealized Other)

Period	Player	Message		
3	2	hi		
	1	**hey**		
	1	**lets do [B,A] you give me 30 tokens**		
	1	**then were both at 170ish**		
	2	sounds good	**P1: 174**	P2: 171
4	**2**	**You do option B, ill do option A, ill give you 20 tokens**		
	2	**then we both get 175sih tokens**		
	1	you give me 30 tokens	P1: 170	**P2: 178**
11	1	ill giv u 25 tokens if u choose B		
	2	**and u choose A?**		
	1	yes		
	2	**make it 30 tokens**		
	1	k		
	2	**k**	P1: 178	**P2: 173**
14	**1**	**I choose A u choose B I give you 25**		
	2	k	**P1: 182**	P2: 173

Lying -- would have been 183

Interested in meeting the PIs? Attach post-it note below!

NSF Secure and Trustworthy Cyberspace Inaugural Principal Investigator Meeting
Nov. 27 -29th 2012
National Harbor, MD

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