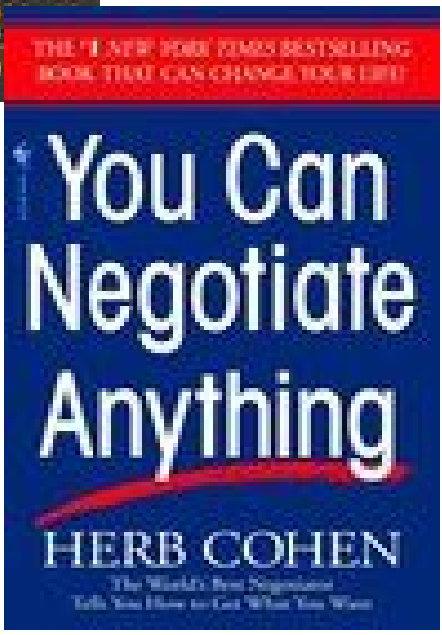
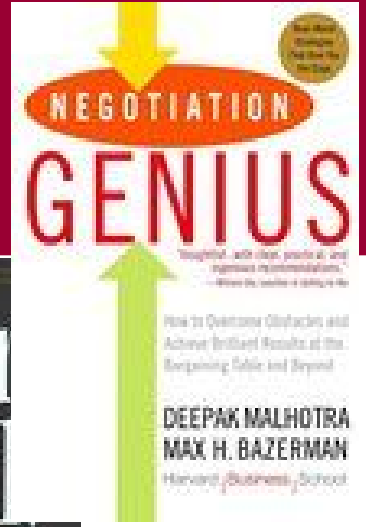
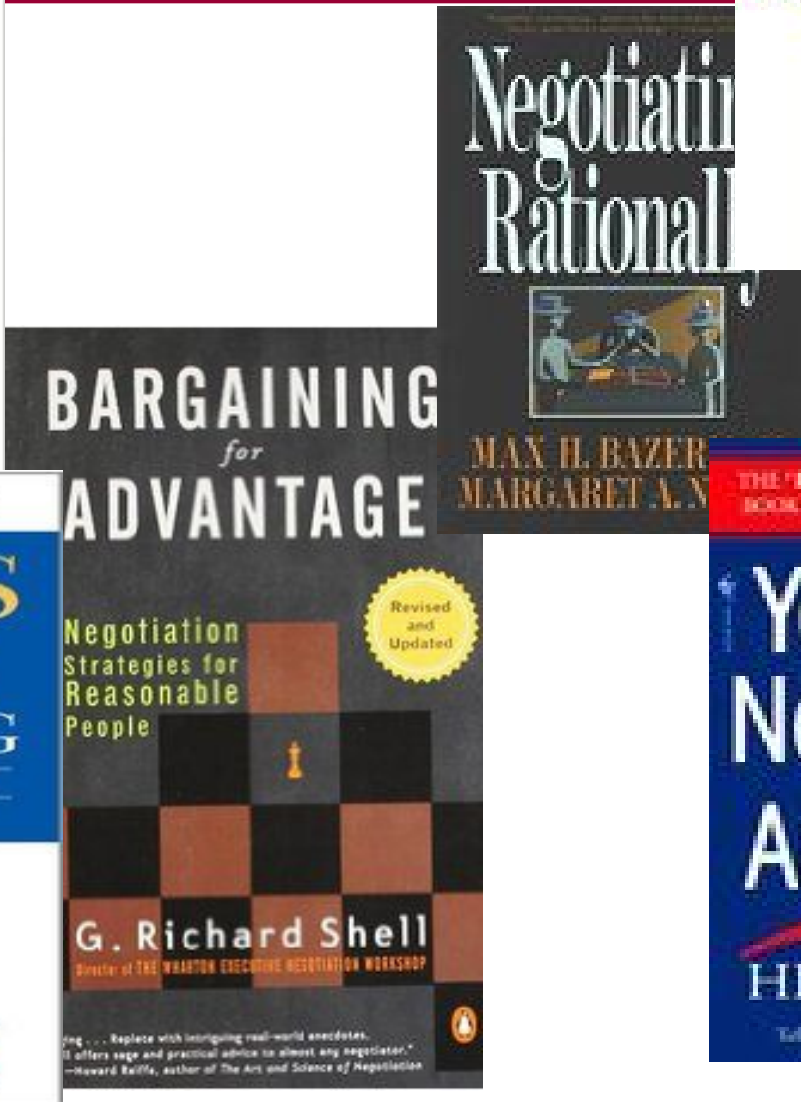
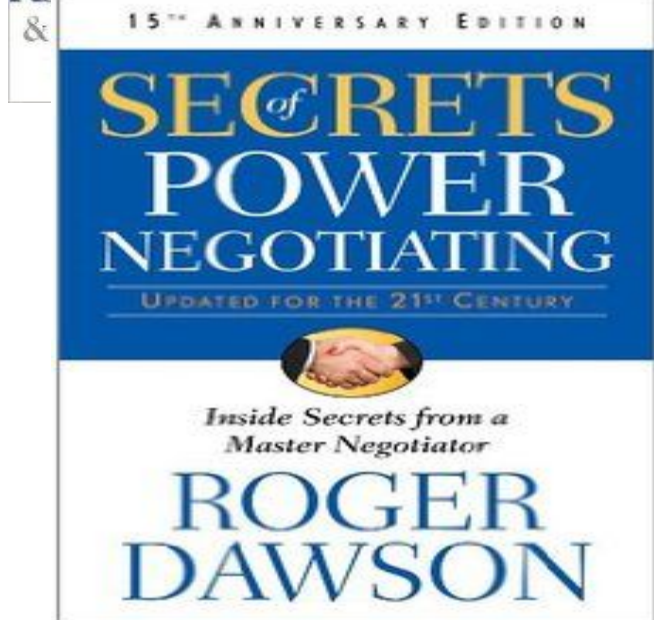
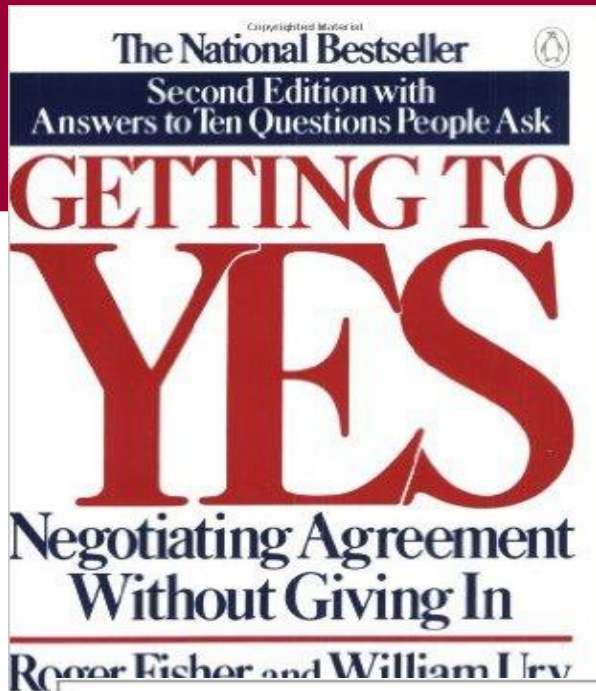


# Lecture 18

# Economics of Negotiations

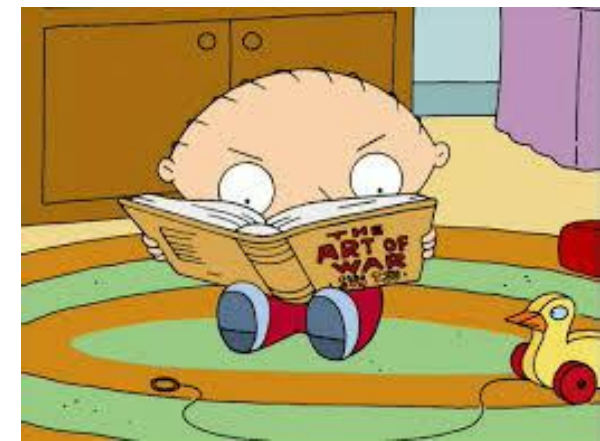
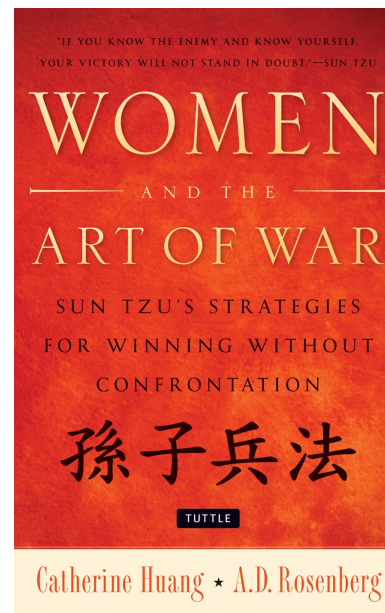
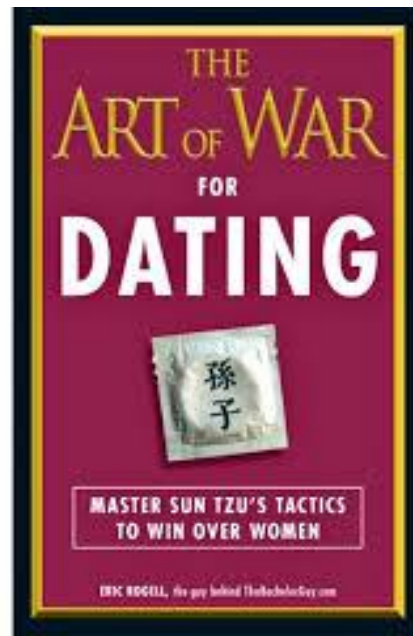
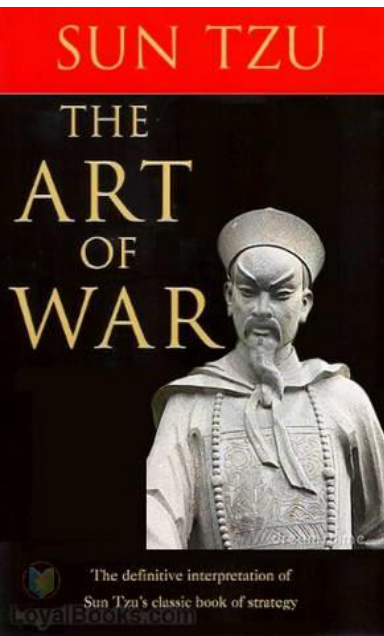


**15.011/0111 Economic Analysis for Business Decisions**  
**Oz Shy**



Do research and investigate the market as well as the structure of the firm you will be negotiating with!

1. If you **know others** and **know yourself**, you will not be imperiled in a hundred battles
2. if you **do not know** others **but know yourself**, you win one and lose one
3. if you **do not know others** and **do not know yourself**, you will be imperiled in every single battle



# Today

Economic perspective on **negotiations**

Will focus on two key issues:

1. **Creating value**  
(total additional gain to both parties generated by reaching a negotiated agreement)
2. **How to capture it**  
(how to share this value)

# Supply Negotiation Experiment



- You are a refrigerator manufacturer
- You procure compressors from a single outside vendor.  
Currently, you have a contract for 10,000 compressors per month and pay \$1,500,000 per month.
- Recently the demand for refrigerators has increased as the recession has eased and home building has picked up.
- Your gross profit (gross of compressor costs) with additional sales is:

Extra Units (1000s)	0	1	2	3	4	5	6	7	8
Gross Profit (1000s)	1900	2035	2160	2275	2380	2475	2560	2635	2700

# Negotiation Experiment (cont'd)

- To get more compressors you have to negotiate with your supplier
- Your supplier's **marginal cost** of additional compressors is **\$100/unit**

# Your Task (Experiment I)

1. Team up with the person next to you
2. **Make an offer to your supplier.** An offer has **two parts**:
  - a. A number of additional units (in 1000s):  
you can choose any integer between 0 and 8:
  - b. An extra payment
3. Write your offer on the offer sheet, then pass it on to the supplier (sitting next to you)

Note: Your offer is final, you will not be able to change it!

# Offer Sheet - Experiment I

Extra units (0,1,2,3,4,5,6,7,8) (in 1000s)	Extra Payment (in \$1000s)

Accepted?: YES or NO



# Your Task (You have 7 minutes)

1. Team up with the person next to you
2. **Make an offer to your supplier.** An offer has **two parts**:
  - a. A number of additional units (in 1000s):  
you can choose any integer between 0 and 8:
  - b. An extra payment
3. Write your offer on the offer sheet, then pass it on to the supplier (sitting next to you)

Supplier marginal cost  
= \$100/unit

Extra Units (1000s)	0	1	2	3	4	5	6	7	8
Gross Profit (revenue) (\$1000s)	1900	2035	260	2275	2380	2475	2560	2635	2700

# Second stage of experiment I: Supplier makes a decision (accept/reject)

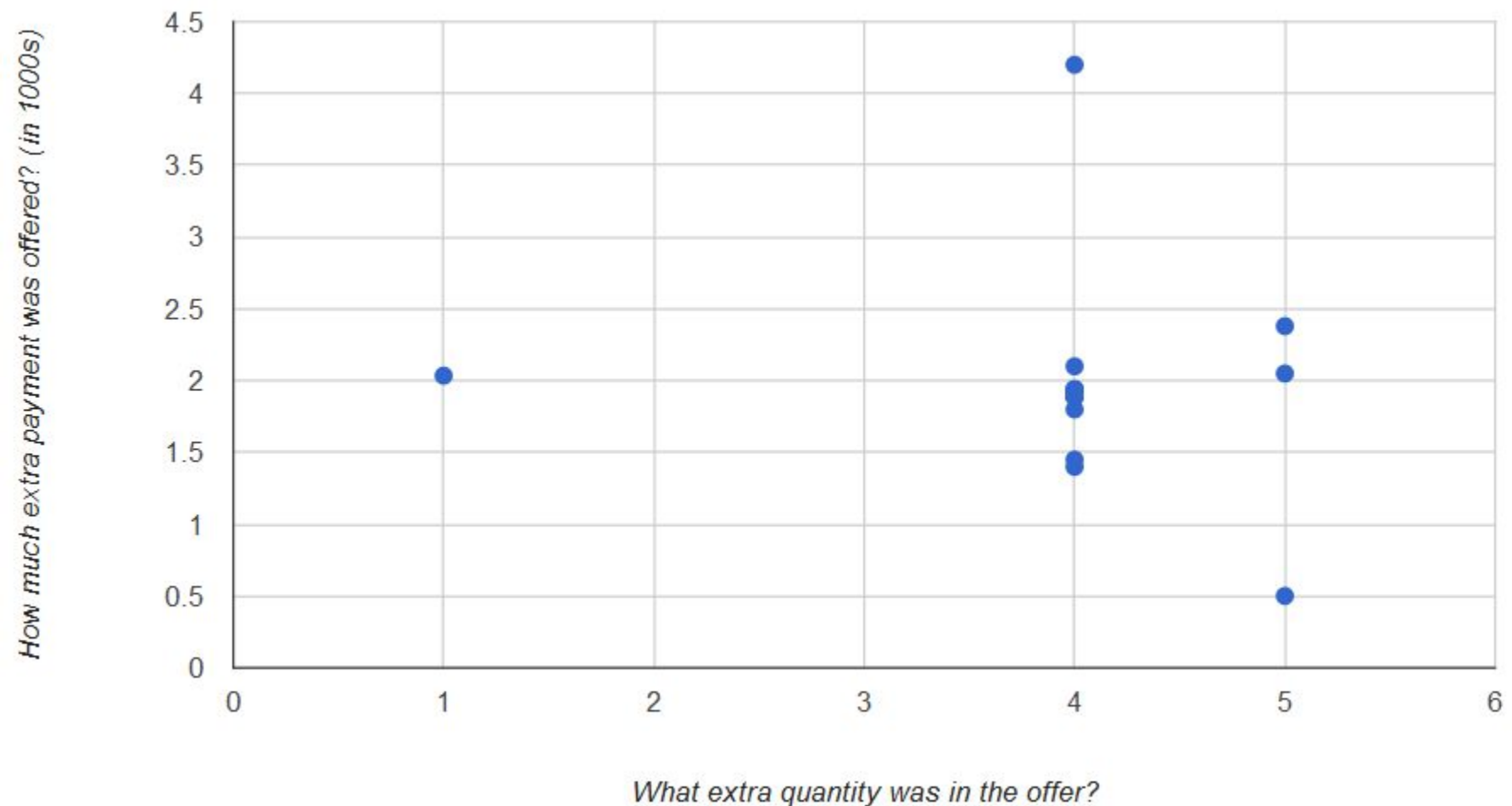
- Supplier: Now it is your turn!
- You need to decide whether to **accept** the offer or **not**.
  - Circle the relevant choice on the sheet.
- You have 5 minutes.
  - **Enter your information in the survey:**

<http://tinyurl.com/ShyNego1>

# Results of class experiment I: Offers made by the manufacturers

Horizontal axis: What extra quantity was in the offer?

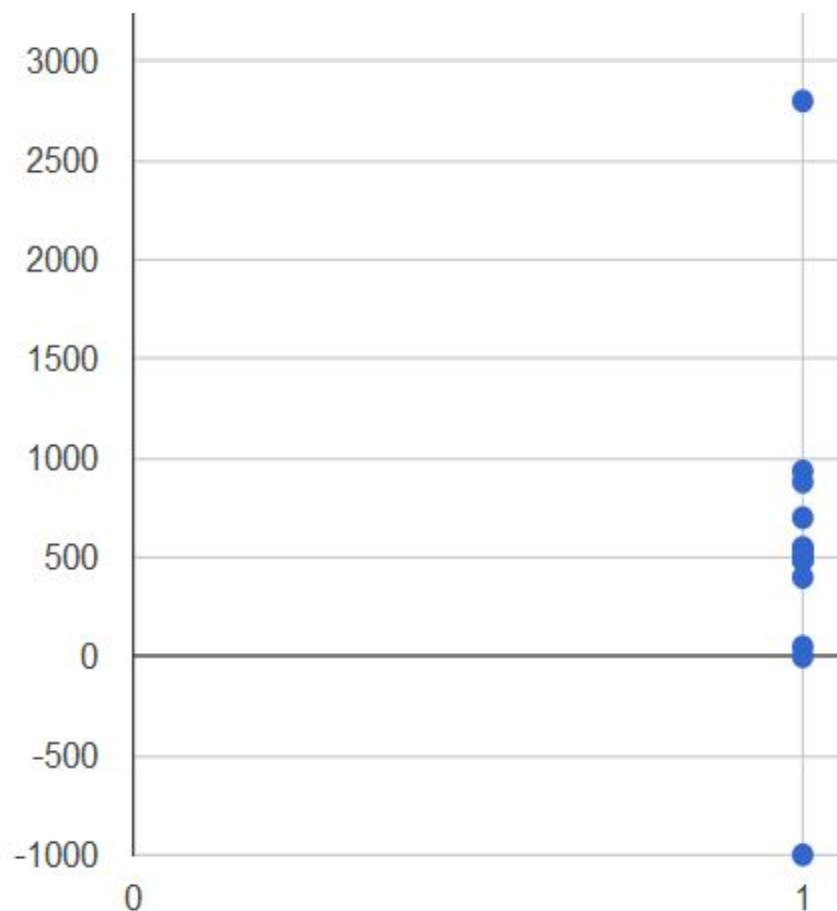
Vertical axis: How much payment was offered



# Results of class experiment I: Acceptance decisions made by suppliers

Horizontal axis: Offer was accepted (1) by the supplier, was rejected (0)

Vertical axis: supplier's profit



## Notes:

1. Offers yielding profit below 500 are below the supplier's BATNA payoff
2. In experiment I, all offers have been accepted (no zeros were entered)

# Analysis of Experiment I

## Step 1: Creating maximum value (maximize joint value of both parties)

Extra Units (1000s)	0	1	2	3	4	5	6	7	8
Gross Profit (1000s)	1900	2035	2160	2275	2380	2475	2560	2635	2700
Supplier cost	1000	1100	1200	1300	1400	1500	1600	1700	1800
Max surplus	900	935	960	975	980	975	960	935	900

- Both parties should compute which (extra) production level maximizes the **joint value** to both negotiating parties
- The above spreadsheet shows that 4 (in 1,000s) units maximize the **difference between gross profit (manufacturer's revenue) and production cost (borne by the supplier)**
- Hence, both parties could benefit by agreeing to negotiate the price of 4 (in 1000s) extra units

# Analysis of Experiment I

## Step 2: Capture value (negotiate how to share the captured value)

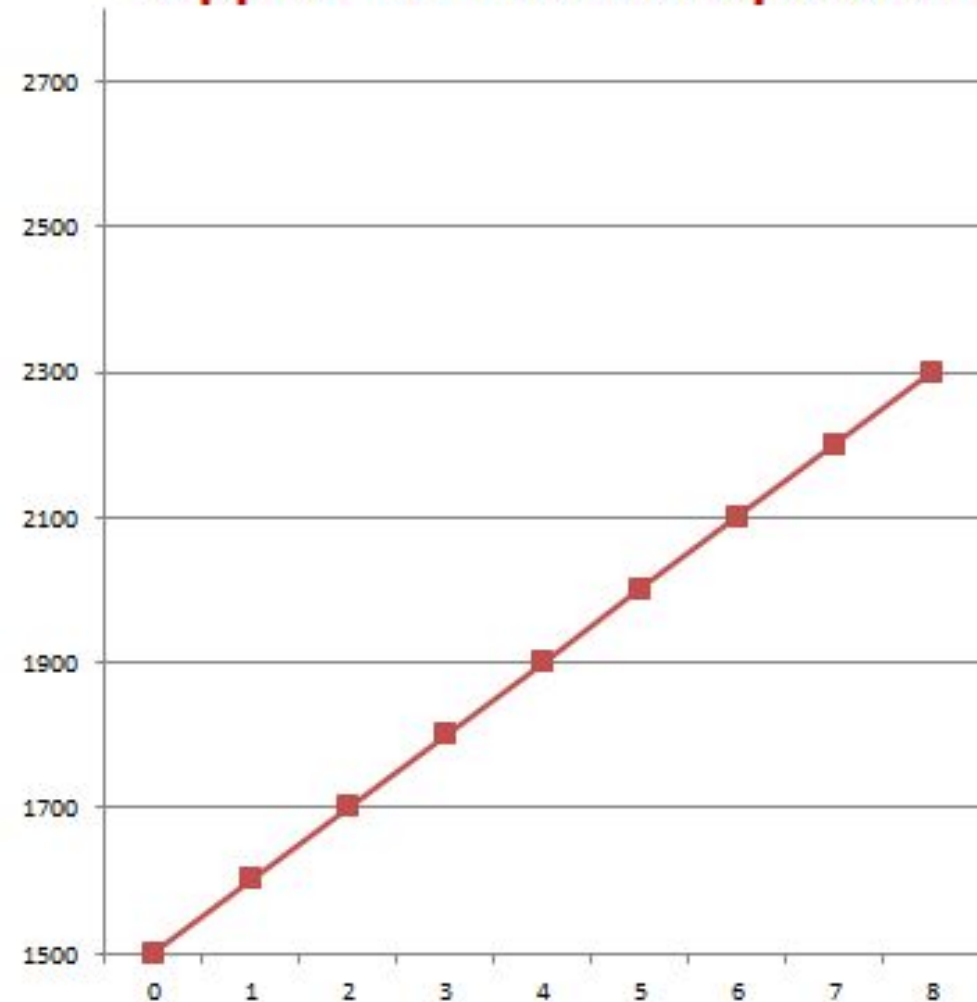
Extra Units (1000s)	0	1	2	3	4	5
Gross Profit (1000s)	1900	2035	2160	2275	2380	2475
Supplier cost	1000	1100	1200	1300	1400	1500
Max surplus	900	935	960	975	980	975
Supplier's min acceptable	1500	1600	1700	1800	1900	2000
Bargainable surplus	400	435	460	475	480	475

This is the minimum amount that the supplier may accept (see graph next slide)

# Analysis of Experiment I

## Step 2: Capture value: Supplier's minimum acceptable offer

### Supplier Minimal Acceptable Payment



Very important Remark:  
The supplier's minimum acceptable payment **exceeds** (in this case) the supplier's cost of production

Why is that?

Because the supplier can earn  $\$1500 - \$100 * 10$  by rejecting any offer!

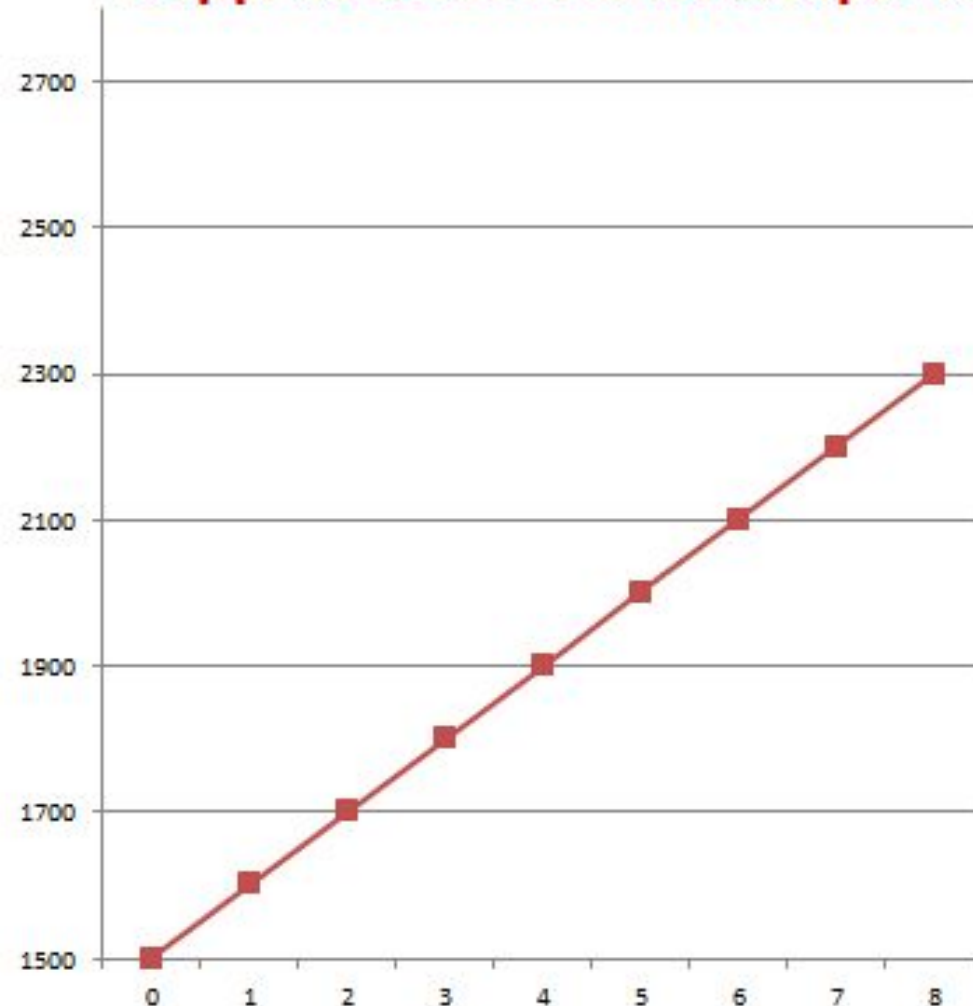
Therefore, (see next slide)

# Analysis of Experiment I

## Step 2: Capture value:

## Supplier's minimum acceptable offer (cont'd)

### Supplier's Minimum Acceptable Payment



Put yourself in your bargaining rival/partner's shoes!

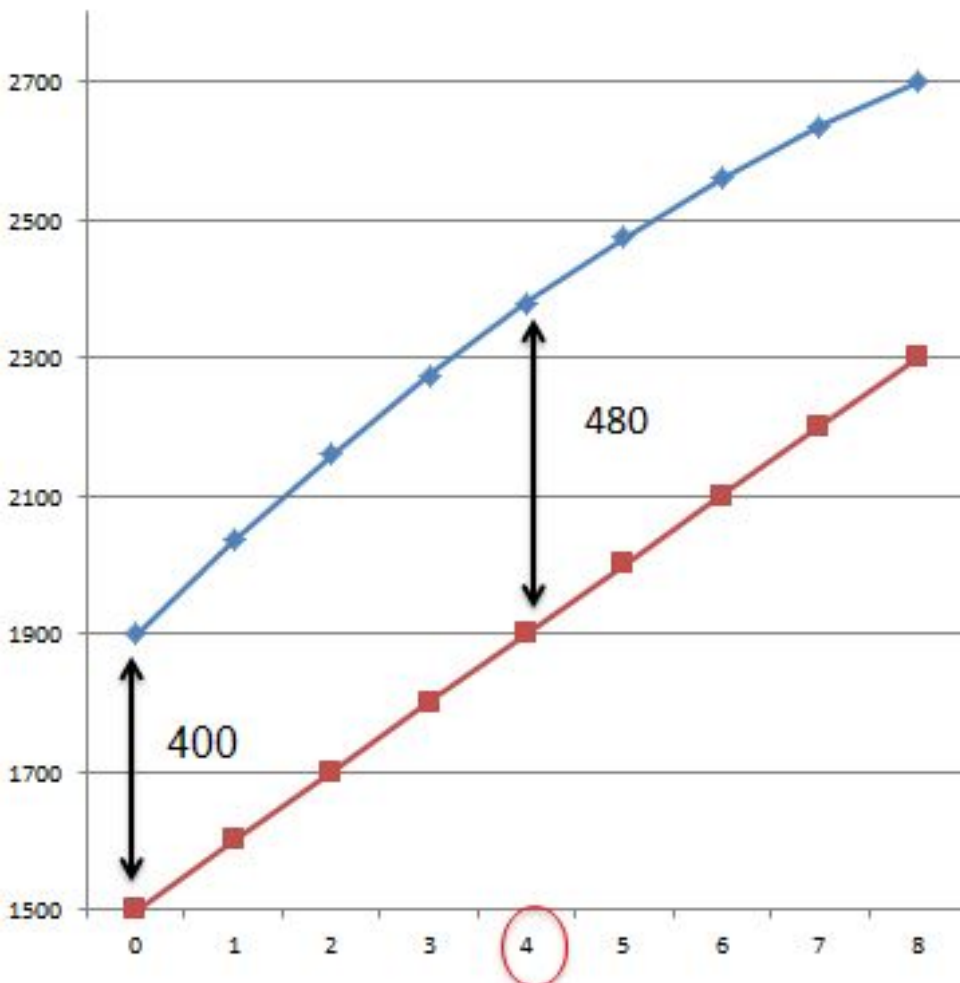
The supplier's minimum acceptable payment keeps his profit equal to his profit under the contract; i.e., it reimburses him for the extra cost



# Analysis of Experiment I

Step 2: Capture value: Best offer for the manufacturer that the supplier can accept

## The Value-maximizing deal



◆ Manufacturer Gross Profit

■ Supplier minimum acceptable payment

Best offer is 4 extra units and a total payment of 1900; i.e., an extra payment of 400.

It creates the most extra value and captures all of it!

# Creating value in multi-dimensional bargaining

- The same logic applies in cases where a deal has a number of dimensions
- How should the deal be structured to maximize value?
  - The efficient ‘deal’ will be the one that maximizes total surplus
  - If you can give up something you value relatively less in exchange for something you value relatively more, without making your rival worse off, then you are still able to “grow the pie”.

# Example of multilateral negotiations

- You are a pharma company forming a research alliance with a biotech company.
- You need to commit \$3M to start the project.
- The deal needs to set who has the right to market any drugs that come out of the alliance and what share of revenues each side will get.

## Should you insist on keeping the marketing rights?

*Answer:* Only if you value the marketing rights more than the biotech does – i.e., are you willing to give up more of the revenue % to get them than is the biotech?



*“Clearing Hurdles to Iran Nuclear Deal With Standoffs, Shouts and Compromise ,”* New York Times 7/15/15

“Over the 17 long days here in Vienna, the standoffs, trade-offs, shouts and confrontations — some real, some staged for negotiating advantage — sometimes obscured the fact that **the two countries were negotiating with entirely different agendas.**

Throughout the talks, [Obama] had one goal: to diminish the prospect that Iran could develop an atomic bomb

For the Iranians, this was a negotiation first and foremost **to get rid of what Mr. Zarif often called the “unjust sanctions” while trying to keep their nuclear options open.** And while they treasured their nuclear program, they treasured the symbolism of not backing down to American



# Supply Negotiation Experiment II

- Same as before with two changes: Pair up with pair next to you.
- You will bargain with your supplier in a **free form process**. You can first think about your bargaining strategy for 2 minutes. You will then be able to bargain for 2 minutes and then I will stop negotiations at a random time after that. If no deal yet, then no deal.

Extra Units (1000s)	0	1	2	3	4	5	6	7	8
Gross Profit (revenue) (\$1000s)	1900	2035	2160	2275	2380	2475	2560	2635	2700

# Offer sheet - Experiment II

Extra units (0,1,2,3,4,5,6,7,8) (in 1000s)	Extra Payment (in \$1000s)

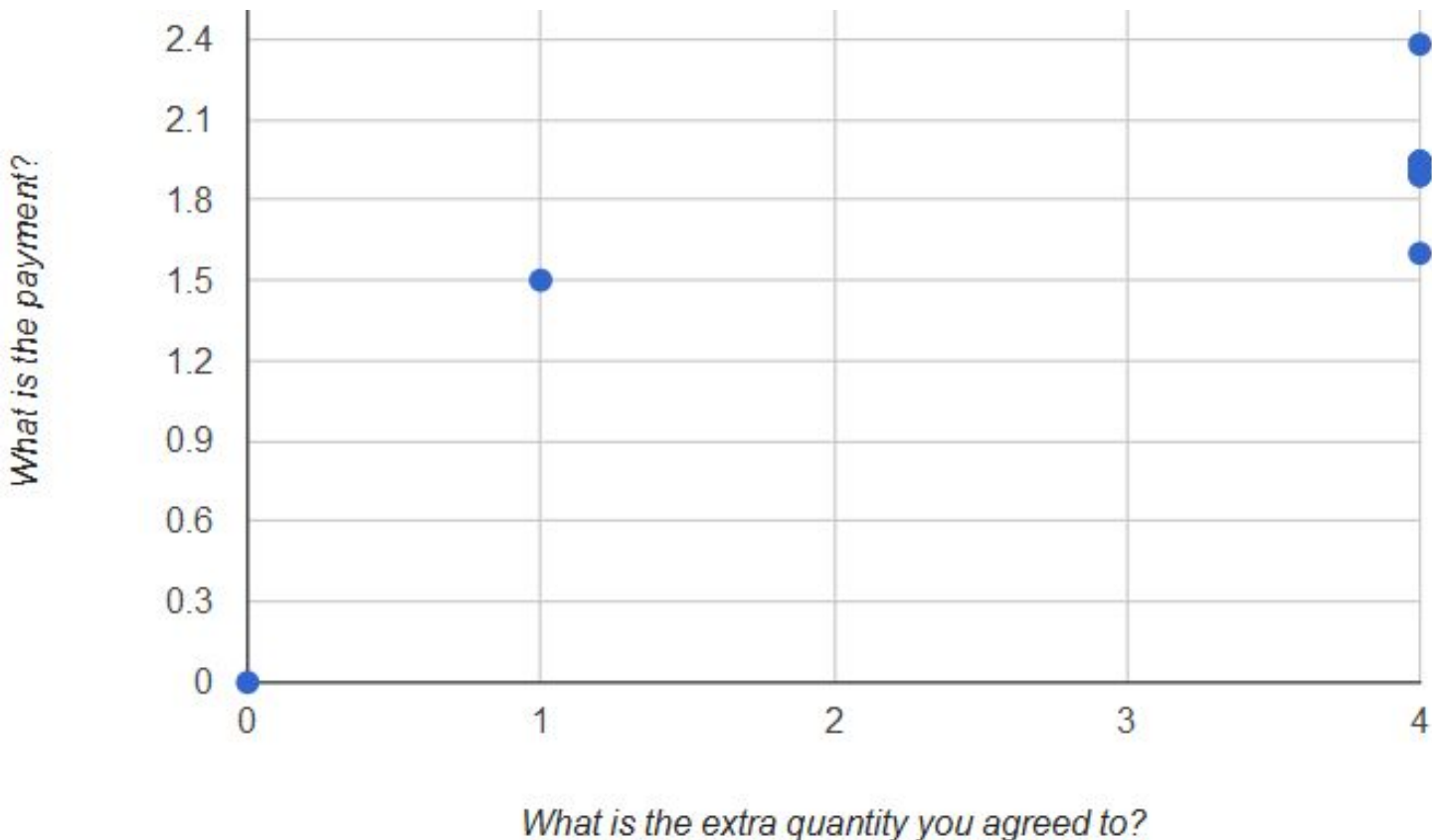
**Write (0,0) if no deal!**

<http://tinyurl.com/ShyNego2>

# Renegotiated contracts: Results of Experiment II

Horizontal axis: What extra quantity was in the offer?

Vertical axis: How much payment was negotiated?



# Capturing surplus: offers with precommitment

- Creating credible commitment to take-it-or-leave-it offers gives you more bargaining power
- Classic car dealer move (“My manager won’t go any lower”)

Note: The Internet has slightly changed this market as potential buyers can request quotes from dealers via email





# “Rite-Aid and Walgreens in Murky Deal to Clear Antitrust Hurdle”

*NYT 11/6/15*

- “The question is whether antitrust authorities in the United States will permit the deal to go forward... It is a concern that was clearly on the minds of the two companies, as they have negotiated certain rights in the merger agreement to deal with the government.”
- “Rite-Aid obtained agreement to a “hell or high water” provision that requires Walgreens to make certain dispositions of stores and other assets to satisfy regulators....Walgreens, however, negotiated **limitations** on how far the provision can go to obtain regulatory approval.”
- “First, Walgreens is **not required to dispose of more than 1,000 stores** of the combined entity”

The idea is that by **committing** Rite-Aid to dispose of up to a 1,000 stores, the deal makes it easy for the gov’t to require that, so it may not seek more, which would be costly.



# Split the gains-from-trade negotiations: The BATNA

BATNA = **Best Alternative to a Negotiated Agreement** (common term in business negotiations literature)

This “rule” suggests that the outcome of negotiations cannot make any negotiating party worse off relative to her best alternative (negotiation breakup, or no agreement)



# Split the gains-from-trade bargaining and the BATNA

Notation: (2 negotiating parties: i and j)

$V$  = total joint value created by the deal

$D_i$  = i's disagreement ("BATNA") payoff

$\Pi_i$  = i's payoff under the negotiated agreement

The following formula provides a split based on players' BATNAs:

$$\Pi_i = D_i + \frac{1}{2} [V - (D_i + D_j)]$$

Joint gain from agreement



Each player receives her BATNA payoff PLUS half of the joint gain from the agreement

# The split formula and our experiment

$$\pi_i = D_i + \frac{1}{2} [V - (D_i + D_j)]$$

Total (joint) value of negotiating an agreement with extra 4 (1000s)  $V = 2380 - 14 \cdot 100 = 980$

Supplier's BATNA profit (disagreement payoff) = profit from sticking to the old contract is:  $D_S = 1500 - 100 \cdot 10 = 500$

Manuf's BATNA profit (disagreement payoff) = profit from sticking to the old contract is:  $D_M = 1900 - 1500 = 400$

$$\pi_S = 500 + \frac{1}{2}(980 - 500 - 400) = 540$$

$$\pi_M = 400 + \frac{1}{2}(980 - 500 - 400) = 440$$

Conclusions: Manf. should pay 1940 = 1400 + 540 (= cost + profit) to supplier

## Interpreting the Split Formula

$$\Pi_i = D_i + \frac{1}{2} [V - (D_i + D_j)]$$

We can rewrite it as:  $\Pi_i = \frac{1}{2}V + \frac{1}{2}D_i - \frac{1}{2}D_j$

So:

- You gain \$50 for every \$100 increase in  $V$  (joint value under the agreement)
- You gain \$50 for every \$100 increase in  $D_i$  (your BATNA payoff)
- You lose \$50 for every \$100 increase in  $D_j$  (competitor's BATNA payoff)

# Capturing surplus: improve your BATNA!

- Suppose by investing in making its products attractive to an alternative buyer, the supplier can get the alternative buyer to pay \$120/unit for the 4,000 units/month, instead of \$110/unit.
- How much should the supplier be willing to invest to do this?

Answer:

1.  $D_s$  will increase by  $\$10 \times 4000 = \$40,000$
2. The formula implies that you gain 0.5 of this value
3. Now, compute the present discounted value of \$20,000/month

# “Rite-Aid and Walgreens in Murky Deal to Clear Antitrust Hurdle”

*NYT 11/6/15*

- “The question is **whether antitrust authorities** in the United States **will permit** the deal to go forward... It is a concern that was clearly on the minds of the two companies, as they have negotiated certain rights in the merger agreement to deal with the government.”
- “Rite-Aid obtained agreement to a “hell or high water” provision that requires Walgreens to make certain dispositions of stores and other assets to satisfy regulators....Walgreens, however, negotiated limitations on how far the provision can go to obtain regulatory approval.”
- “First, Walgreens is **not required** to dispose of **more than 1,000** stores of the combined entity”



# Bargaining with asymmetric information

- Why does asymmetric information lead to breakdowns/delay?
  - Those making offers don't know what bargaining partner/rival will accept.
  - The higher the offer, the greater the likelihood of acceptance.
- Those receiving offers may reject to try to “signal” (i.e., deceive) about their true willingness to accept an offer.





## Example: Ford and Kiekert

In 1998 Ford and Kiekert negotiated the renewal of a long-running exclusive supply contract.

- They disagreed about the price: **Kiekert suspected that Ford was making more profits than in the past and demanded a higher price.** Ford denied making more profits and wanted to pay a lower price.
- During the negotiations **Kiekert stopped supplying car locks for a week and Ford incurred a turnover loss of \$100m.**
- Kiekert's failure to supply was widely interpreted as part of their bargaining strategy and not a technical problem (as they claimed).
- Eventually Ford and Kiekert agreed on a new exclusive supply contract.

# Summary

## **Value Creation:**

- Put yourself in your bargaining partner/rival's shoes
- Trade off marginal benefits/marginal costs across different dimensions

## **Value capture:**

- Precommitment can improve bargaining power
- Take actions to raise your BATNA

## **Role of private information/signaling**

**Consider as well “behavioral” elements (e.g., rejections out of spite; framing of offers,...)**

