Lecture 18: Auctions, Tenders, and Bidding In Competition

(See McMillan Ch.11)

1. More than two parties. ✓
2. Understanding bidding behaviour. ✓
3. Open English auctions. ✓
4. Sealed-bid auctions & tenders. ✓
5. The Winner's Curse. ✓
6. The Spectrum Auctions.
7. Sellers' strategies. ✓
8. Price and value.
9. Procurement competitions.
10. Anglo-Dutch auctions.
11. Conclusions ✓

Sealed Bids for the Jar of 5¢ Coins

1. I'll pass around a jar of coins stuffed full of (only) 5¢ coins.
2. If you wish, write your name and a bid on a piece of paper (secretly) and hand it in, when I ask.
3. The high bidder takes the jar and pays the bid.
4. (I'll pay in paper if the coins are inconvenient.)
5. Remember how you derived your bid.

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It seems that another oil company has gone bankrupt and is forced to sell off some of the land it has acquired for future oil exploration. There is one plot in which Acne is interested.

Until recently, Acne expected that only three firms would bid for the plot, and Acne intended to bid $10 million. Now they have learned that seven more firms would be bidding, bringing the total to ten.

The question is: should Acne raise or lower its (sealed) bid?

What advice would you give?

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What advice would you give? Raise? Hold? Lower? (Write down your answer.)

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So far only two players (Burt & Sally). But negotiations often include three or more participants.

One of the main sources of bargaining power is the ability *to exploit competition.*

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One of the main sources of bargaining power is the ability *to exploit competition.*

- How to *take advantage* of bidding competition among your potential trading partners.
- How to *compete* in a bidding competition.
- (How *conspiracies* of bidders can seek to suppress competition among themselves.)

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- Competition can be used to *generate incentives* for productive effort

  Tournaments: high rewards for pop stars, sports champions, CEOs.

New market mechanisms.

Can design new auction-based competitive mechanisms: e.g. electronic markets, when other markets work poorly, because of:

- **idiosyncratic and differentiated goods and services**
- **multiple goods and synergies**
- **ill-behaved buyers' preferences**
- **need to match buyers and sellers.**

e.g. electromagnetic spectrum rights

Designer Markets

New auction-based markets designed for:

- allocating spectrum licences
- trading electricity and gas
- selling gambling licences
- allocating environmental services
- devising long-term contracts for the supply of industrial chemicals.
- designing railway timetables
- allocating CO_2 emissions permits in a cap-and-trade ETS scheme

Further new auction-based markets:

➢ **B2B, ie, firms buying inputs from other firms**

the procuring firm could use a simultaneous auction mechanism to allow each seller to bid by component, and so reveal its economies of scope by the bundle of components for which it bid.

➢ **sale of a multidivision firm**

simultaneous auction allows division-by-division bidding, with synergies or separate spin-offs.

Competition v. bargaining.

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Why?

A good bargainer is like an artificial competitor: his/her main power (the threat of witholding) in negotiation is similar to another bidder.

So a *real* bidder trumps a mediocre bargainer ...

∴ **A real bidder is better.**

But a real bidder is more effective:

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∴ competition economises on:

- **knowledge,**
- **bargaining time, and**
- **commitment abilities.**

Auctions (or Tenders).

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- **Quickly sell the item (or buy if a tender)**

Different kinds of auctions:

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- **spectrum auctions**
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- **Klemperer's Anglo-Dutch auction**
  — (See section 10 below)

A Typology of common auctions (bidders buy)

	Open	*Closed*
1st Price:	Dutch $\downarrow$	Sealed Bid
2nd Price:	English $\uparrow$	Vickrey

(I'll explain below what I mean by "1st Price" and "2nd Price".)

Two Auctions for *Multiple* Identical Items

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The seller specifies the starting bid and the exact number of items for sale at that price.

The bidders bid at or above the minimum price for the number of items they want. At the end of the Dutch auction, the highest bidders can buy those items at the minimum successful bid.

http://www.youdontknowauctions.com/com_sect_1.php

Example … 25 widgets being sold at $75.

If 45 bidders bid for one widget each, at $75, only the first 25 people will buy successfully.

What if one of those people bids $100 for one widget? Since his bid is highest, he will be one of the bidders to get his item. (Dutch: at $75, Yankee: at $100)

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If fewer than 25 people bid, only that number of widgets will be sold (Dutch: at the opening price of $75).

For the selling price to increase past the opening price, there must be a excess demand. In our Dutch example, the selling price would only increase if 24 or more widgets were bid on, no matter what the amount of each bid.

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- Sally sets the rules that establish who gets it and for how much.
- Essence of bidding: the bidders value the item for sale differently, but no-one knows exactly how highly anyone else values it.
- If you, as one of the bidders, knew exactly how your rivals valued it, then your decision would be easy;

  if Sally knew which bidder valued the item most highly and for how much, she could bargain directly with that bidder.

Two sources of uncertainty: private value ...

Two sources of uncertainty about bidders' valuations:

1. ***private-value case,*** **inherent differences among bidders, such as people bidding for an item (a bottle of 1892 Para port for drinking) for their own use, with no thought of reselling;**

… and common value.

2. *common-value case,* when the item has a single, true value: winning would turn out to be equally rewarding for all, although just how rewarding is uncertain to any of the bidders at the time of bidding.

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   e.g. Speculators for the ’92 Para port might want to estimate its resale price when they’re deciding how high to bid.

   In these cases, the bidders are trying to guess the same number — the true value of winning — with different pieces of incomplete info.

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- **with *private value*, each bidder knows what the item is worth to him or her, but knows too that its worth to others is likely to be different;**
- **with *common value*, each bidder guesses the one, true value, in ignorance of the others’ guesses.**

  & With hindsight, all would agree on the value.

Corporate takeovers and the two sources of uncertainty: disciplinary, and …

Two kinds of takeovers:

1. **the target of a *disciplinary* takeover: not realising its profit-making potential because of inefficient management; the raider believes that firings and new hirings and/or by altering the managers' incentives will improve the firm's profits and share price.**

   ***Common value,* with incomplete information.**

… synergistic

2. in a *synergistic* takeover, the raiding firm sees idiosyncratic gains — complementarities — from merging with the target firm: marketing, R&D, monopoly position, tax advantages: *Private value.*

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   The most obvious is when a neighbour is bidding for a block of land: it may be more valuable for her than for an outsider. Is it in the neighbour's interest to conceal her interest in the property? Why?

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Of interest too to Sally: in designing her selling strategy, she must put herself in the bidders' shoes: look forward and reason back.

The seller's alternatives.

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➢ **Exercise: Consider something you've sold or wanted to sell recently. Write down how you might have sold it differently.**

3. Open English Auctions — (2nd-price)

3.1 Private-Value Auctions

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***Best strategy:* remain in the bidding until the high bid rises to your valuation, and drop out at higher bids, lest you pay more than the land is worth to you. This is *A simple dominant strategy*, which disappears with a sealed-bid.**

In general Burt the winner makes a windfall, because pays less than the item is worth to him.

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Because of the private valuations, Sally can't extract all of the gains from trade by offering it to the highest valuer with a take-it-or-leave-it.

The second-highest bid?

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- **The greater the number of bidders, the smaller the difference between the highest and the second-highest, on average. So the more, the higher.**
- **The greater the spread of bidders' (private) valuations, the greater the difference between the highest and second-highest, on average. If there is wide disagreement about the item's worth, then the winner may get it cheaply.**

  Does this argue for the seller to reveal what she knows? — private value, remember.

3.2 Common-Value Auctions

What if the bidders are speculators for resale later? All bidders are trying to guess the same number: the future market value. The *common-value* case.

Different information $\rightarrow$ different values. Factors as above, but more complicated.

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Burt's rule: stay in the bidding until the high bid reaches your valuation, apparently as in the private-value.

But in a common-value auction Burt can learn from others' bids, which provide lower bounds of others' valuations.

Valuable information.

Any extra information is useful to Burt:

- how aggressively others bid
- how many remain in the bidding
- when others apparently drop out of the bidding

∴ may enable Burt to revise his estimate of the land's worth.

But if Burt wins, then he learns that no-one else thinks the land is worth at least what he is paying.

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A reality check: Before he raises his bid, would he still value the item at the bid he's considering even if no-one else thought it was worth that much?

4. Sealed-Bid Auctions — (First-price)

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1. **the risk of bidding much higher than the second-highest bid,**
2. **the risk of losing a profitable opportunity by ending up having bidded below at least one other bidder: sealed bids,**
3. **(in a common-value auction) the risk of bidding more than the item turns out to be worth.**

(See sealed-bids to *sell* (in procurement auctions) in section 9 below.)

Sealed bids.

e.g. A single round of sealed bidding to buy exclusive rights to patent a new computer chip, when bidding firms differ in their value-added from using the chip.

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1. **Assume Burt knows his opponents' values.**

If his valuation is highest, then his best bid is slightly above the second-highest valuation: Burt guarantees winning with a windfall, at a bid less than his valuation.

Ignorance of rivals' valuations.

2. More realistically, none of the bidders knows his competitors' valuations. What is Burt's lowest successful bid?

Burt begins by assuming his valuation is highest. (If not, then the presumption is costless because losing bidders pay nothing.)

Burt doesn't know just how much lower the second-highest valuation is, but he can estimate its most likely value, given the numbers of competitors and their range of valuations. (This is a skill.)

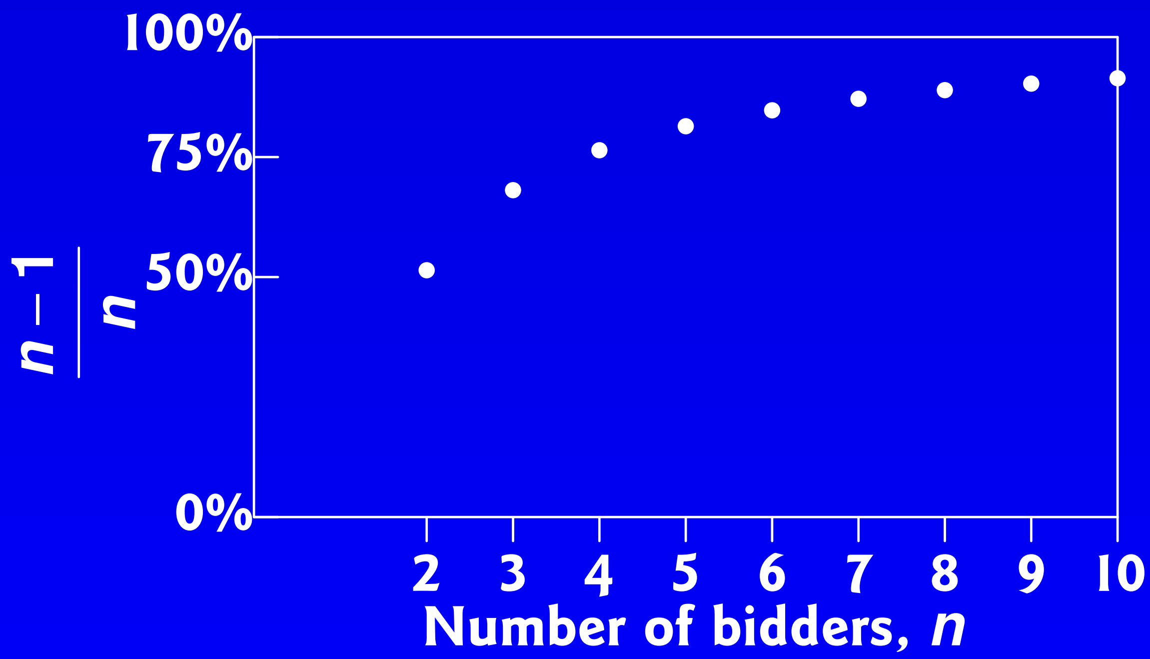
The best bid.

Burt submits a bid equal to the estimated second-highest valuation: for bidding higher risks forgoing a windfall, and bidding lower risks not winning.

e.g. If Burt knows that each of his rivals values the chip rights at between zero and \$10 million, with uniform distribution in this range, and Burt's rivals each perceived Burt's valuation lying in this range:

How competition matters.

In this case, McMillan shows that Burt should shade his bid, by bidding $\frac{n-1}{n} \times$ (his valuation), where n is the total number of bidders, including Burt.



As the number of bidders rises, Burt's bid approaches his valuation.

Competition matters.

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Note:

the	Vickrey, second-price auction
$\rightarrow$	truth-telling
$\therefore$	the seller makes more revenue than when the bidders understate their values.
$\therefore$	answer to your friend, Acne's chair?

The Good news and the Bad.

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The *good* news: you've won!

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The *good* news: you've won!
The *bad* news: you've paid too much!

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Congratulations!

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You're a victim of *the Winner's Curse!*

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Congratulations!

You’re a victim of *the Winner’s Curse!*

(First described by a trio of oil engineers in 1970: in bidding for off-shore oil leases — who survived? and who went bankrupt?)

5. The Winner's Curse

"I paid too much for it, but it's worth it." —Sam Goldwyn
(See Landsburg in the Readings.)

A possibility in sealed-bid, common-value auctions.

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A possibility in sealed-bid, common-value auctions.

e.g. Rights to drill in offshore oil leases: the winning bids can be huge, and much higher than the losing bids:

In March 1990, US$590 million was bid in Gulf of Mexico. One single lease attracted a winning bid of US$11.1 million; two losing bids over US$8 million, and a third bid of US$6 million. Much uncertainty: firms must consider: geological surveys, oil price forecasts, other tracts for bidding.

Anticipate the Winner’s Curse.

Burt could anticipate the Winner’s Curse’s effects beforehand, by presuming his is the highest estimate and so will win.

When incorrect, this presumption costs nothing since another bidder wins; when correct, the Winner’s Curse is avoided.

What to do?

In the face of the Winner's Curse, rational bidding requires discounting one's own estimate.

The Winner's Curse is especially likely when the item or contract being bidded for has no special value to any bidder (when it has a *common value*).

Holds too for less artificial auctions. Any actual common-value auction is more complicated.

What to do?

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Holds too for less artificial auctions. Any actual common-value auction is more complicated.

To avoid the Winner's Curse, anticipate it!

Shade your bid below your expected value (when buying), to avoide the bad news.

When selling, beware of asking too little in your sealed bid tender.

Nothing ventured, nothing gained.

5.1 Winner’s curse as explanation of 1980s’ takeovers?

The share market as one “bidder”, setting a going price; the takeover raider as the second bidder. Inexperienced raiders may have put too much weight on their own valuations and not enough on the market’s.

Winner’s curse when no competition:

the Alaskan oil pipeline, estimated at US$900 million in 1970, had cost US$7.7 billion in 1977; nuclear power stations; other large projects? (Olympics?)

Routine construction: cost estimates uncertain, especially with new technologies.

The Winner's Curse is pervasive (not just in formal bidding).

The tendency for cost overruns if the decision-maker doesn't understand the Winner's Curse:

- **A project will be accepted if the estimated PV of ($B - C$) is positive, and rejected otherwise, so a project with underestimated costs C is more likely to go ahead, and cost overruns are likely.**
- **Likewise with overestimates of revenues R.**

Is the Winner's Curse real?

Do people sometimes lose by overestimating values?

Yes, but repeated auctions will allow bidders to learn from experience, or exit.

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Yes, but repeated auctions will allow bidders to learn from experience, or exit.

e.g. Oil companies have a powerful incentive not to make systematic errors in bidding, and evidence suggests a normal rate of return from offshore oil tracts.

To play a computer simulation of the Winner’s Curse on-line, go to

`http://www.gametheory.net/Mike/applets/WinnerCurs`

6. The Spectrum Auctions

After several false starts (see the 1993 simultaneous, single-round, sealed-bid auction for satellite-television licences in Australia), the FCC chose

a simultaneous ascending auction.

Proposed by game theorists.

- **Multiple licences are open for bidding at the same time, and remain open so long as there is some bidding on any of the licences.**
- **Bidding occurs over rounds, with the results of each round announced to the bidders before the start of the next round.**
- **By computer, on-line.**
- **Many detailed rules (130 pages); most importantly, the activity rule.**

Why simultaneous ascending auction?

The licences are interdependent: substitutes or complements.

Efficiency (assigning the licences to the firms most willing to use them) requires buying of multiple licences — the aggregation is determined by the competition.

Ascending bids allow bidders to see how highly their rivals value each licence and which aggregations they seek. Diminishes the Winner's Curse, leading to high bids.

Simultaneous bidding allows bidders to switch to back-up aggregation in the light of others' higher valuation.

Australian spectrum auctions, see
http://www.acma.gov.au/WEB/STANDARD/pc=PC_300171
NZ:
http://www.rsm.govt.nz/cms/policy-and-planning/spectrum-auctions

7. The Seller's Strategies

Sally the seller must use the game-theoretical trick of putting herself in the bidders' shoes and understand how they would respond to alternative selling schemes.

Sally too must make decisions without full knowledge: she doesn't know exactly what the item is worth to the bidders, or who values the item most highly.

How can Sally make the bidding as competitive as possible? (For her, the more competition the better.)

Making bidding more competitive:

1. Encourage *extra bidders* to enter.
2. What about a minimum (reserve) price?
3. Open or sealed-bid auction?
4. Should Sally release any information she has relevant to valuing the item?

➢ The risk of a *minimum (reserve) price* is that all bids will fall short and the item will not sell,

➢ But a reserve price may force a bidder, Burt, to bid above what otherwise would have been necessary from the competition.

The expected gain from a higher bid can offset the risk of no sale.

Open auctions are informative.

From the Winner's Curse discussion, provided there is a common element to bidders' valuations:

> on average the winning bid in *an open auction* will be higher than in a sealed-bid, because of learning and revision of valuations.

In a pure private-value open auction, it should make no difference, since bidders' valuations will not be revised given knowledge of others', irrelevant, valuations.

The more information Burt has, the less he rationally distrusts his own information, and so the less the Winner's-Curse correction he should apply in shading his bid below his valuation.

Open auctions are the most common.

Open auctions are the most common: up to 75% of the auctions in the world.

Is the US government using the wrong method for auctions offshore oil rights, if its aim is to maximise its return from the sales?

Open auction, or several rounds of a sealed-bid auction, with release of all bids each round?

Hence the Spectrum Auction
— with full information.

The seller's information.

In a common-value auction, the better the bidders' information, the more aggressive their bidding, and the less they fear the Winner's Curse.

∴ Sally should *reveal her information* about the true value of the item, to get higher bids on average.

Sometimes, Burt's valuation will fall with Sally's information, but on average it should rise, since he is more confident in his valuation and so less concerned about the risk of a Winner's Curse.

Sally must release all information, not just value-enhancing information. Establish her credibility.

The Revenue Equivalence Theorem.

Under certain conditions, sellers can anticipate the same expected average revenue from any of the four primary types of auction: English, Dutch, first- and second-price sealed bid.

These conditions are:

- bidders are risk-neutral, and there is no wealth effect;
- bidders' estimates about the value of the object for sale remain independent of each other,
  $\therefore$ no Winner's Curse;
- the population of bidders does not vary with the kind of auction; and
- there is no entry fee to bid.

In practice, these conditions may not hold, which might explain why different kinds of items have traditionally been auctioned differently.

8. Does Price Measure Value?

"A cynic knows the price of everything and the value of nothing," (Oscar Wilde, *Lady Windermere's Fan*).

For auction markets, as we have seen, bidders understate their valuations, so auction prices understate value.

The greater the number of bidders, the closer the bids to valuations, so with sufficient bidding competition, the winning bid is close to the highest valuation.

So auction prices are very close to value.

But auctions: price $\rightarrow$ value.
With smooth competition, price is value.

Auctions and value.

Remember: Auctions are a way of doing two things:

- establishing the values of unique objects
- determining the new owners (the highest valuers, if efficient)

The 1892 Para port's value? Subjective opinions of self-acknowledged œnological experts? Or auction prices recently? Measuring the quality of a wine by what people are willing to pay for it produces different rankings from those announced by the wine columnists.

8.1 Airport Slots

Airport "slots" are necessary for planes to pick up and discharge passengers.

A shortage at busy airports, so slots are valuable, but how valuable?

With no market for slots when airport authorities used to bestow slots on persuasive airlines, no market measure of value.

How to value bankrupt Eastern's slots?

Valuing the slots.

Bankruptcy judge held an auction, cancelling previous agreements.

Uncontested negotiations had yielded total offers of US$155 million.

But auction prices totalled nearly US$260 million.

Three gates at LAX went for US$21.7 million (to Delta) after an initial offer of $6 million (from United).

The auction prices were higher because:

➢ the auction ensured that the high bidder was the airline that most highly valued the slot (efficient), and

➢ the presence of competing bidders meant that the winning bidder could not bid much less than the valuation of the highest bidder (see graph above).

9. Procurement Competition

With simple changes (substituting selling for buying, production cost for valuation, lowering price for raising it, and so on) the previous analysis (section 4, on sealed bids) becomes a model of a procurement competition, with a single buyer Burt and competing potential sellers.

The government wants to buy a new computer system from one of several qualified contractors; or a car manufacturer wants to source some of its components to another firm.

Procurement:

- Similar to the private-value case with bidding firms' production costs differ because of differences in wage rates, capital stocks, managerial expertise, etc.
- Similar to the common-value case since the firms are guessing about, say, a new technology that the winner will have to implement.

Conclusions

Replace Sally by Burt and the previous conclusions follow: Burt the buyer can stimulate competition by making it easy for new bidding firms to compete in selling.

Burt the buyer can also promote competition by narrowing any inherent differences in production costs by, for example, helping the selling bidders to adopt best-practice technology.

Burt the buyer can mitigate the sellers' risk of Winner's Curse — if there are common-value aspects — by accepting open bids and by releasing any information he has that would help predict production costs.

Further evidence: one US study comparing production contracts for various items of military hardware that had first been awarded on a sole-source basis and were later opened up to competitive bidding found that the prices fell by an average of one eighth ($\frac{1}{8}$).

Quality of performance may matter

The procurement game is more complicated than the selling games above: an antique is the same no matter who wins the bidding, but a computer from IBM is not the same as one from Fujitsu/Facom.

In procurement, competition is often over quality of service or design as well as price: the *identity* of the winning bid matters, which means it is no longer a simple matter to compare bids, since the buyer must consider several *attributes,* not just price.

(McMillan, Chapter 13, considers the Japanese case of a network of subcontractors.)

10. Anglo-Dutch Auctions

Devised by Paul Klemperer at Oxford, see

`www.nuff.ox.ac.uk/economics/people/klemperer.htm`

An ascending English (open) auction to determine the highest and second highest bidder; followed by one round of a sealed bid auction.

Why? To prevent

- **collusive behaviour,**
- **predatory behaviour, and**
- **entry-deterring behaviour.**

Ascending (open) and uniform-price auctions are particularly vulnerable to those problems.

The Anglo-Dutch auction (a hybrid of the sealed-bid and ascending auctions) may often (but not always) perform better.

11. Summary of Bidding

Can extend the recommendations beyond the case of formal auctions: since most business negotiations include competition, either explicitly or implicitly, and there is usually some alternative trading partner for one to turn to.

Extend to informal negotiations: open v. sealed-bid auctions becomes whether to inform the parties competing for your business of each other's best offer.

Stimulate competition.

Competition among your potential trading partners is a potent source of bargaining power: *stimulate competition*:

- **by increasing the number of bidders, or**
- **by reducing the inherent differences among them (informing)**
- **informing bidders of their rivals' bids and releasing any information the seller has of the true value of the items**

And finally …

From the bidders' perspective, rational bidding involves remaining in the bidding until the price reaches the the bidder's own valuation (open auction), and guessing the valuation of the next-highest bidder and bidding this amount (sealed-bid auction).

The winning bidder earns a windfall from the difference between his or her own valuation and the next-highest valuation.