- Recitation Friday 10:30a
- N types of widgets: one "special" one: value $v > c_H > c_L$
  - $Pr[c_L] = i$ (costs $\varphi(i)$)
  - others "generic" (no value), costs $c_n^g = c_L + \frac{n}{N}(c_H - c_L), n=1,\dots,N$
- First best:

$$\max_i \; i(v-c_L) + (1-i)(v-c_H) - \varphi(i)$$

- No contract
  - $i=0$ if full bargaining power for buyer
  - otherwise: $\max_i \; i(p_L - c_L) + (1-i)(p_H - c_H) - \varphi(i)$

$t=0$: contract
$t=1$: investment
$t=2$: messages
$t=3$: renegotiation
$t=4$: trade

- seller can make a TIOLI offer. If buyer declines, no trade
  - can achieve FB if assume away renegotiation
- Hart-Moore: if cannot commit not to renegotiate, value of contract goes to zero as $N \to +\infty$.

State of nature: cost level H or L, and allocation of costs to widget "names"

Widget	1 (special widget)	2	3	...	N
state (L,τ)	$\underline{c_L}$	$c_L + \frac{1}{N}\Delta c$	$c_L + \frac{2}{N}\Delta c$		$c_L + \frac{N-1}{N}\Delta c$
state (H,τ^*)	$c_L + \frac{1}{N}\Delta c$	$c_L + \frac{2}{N}\Delta c$	$c_L + \frac{3}{N}\Delta c$	...	$\underline{c_H}$ (special widget)

Equilibrium strategies: $\begin{cases} m^B(L,\tau) & m^B(H,\tau^*) \\ m^S(L,\tau) & m^S(H,\tau^*) \\ p(L,\tau) & p(H,\tau^*) \end{cases}$

IC: in (H, τ^*), seller should not play $m^S(L, \tau)$ (a)

in (L, τ), buyer should not play $m^B(H, \tau^*)$ (b)

assume buyer has full bargaining power in renegotiation

Both unilateral deviations imply messages $(m^B(H, \tau^*), m^S(L, \tau))$

- call starting point of renegotiation $\hat{p}$ and trade of widget n w/pr x_n. No trade w/pr $1 - \sum_{n=1}^{N} x_n$

(a) implies: $\underbrace{\hat{p} - \sum_{n=1}^{N} x_n \left[c_L + \frac{n}{N}(c_H - c_L)\right]}_{\text{pre-bargaining payoffs when deviating, which equal post renegotiation payoffs since B has bargaining power}} \leq p(H, \tau^*) - c_H$

(b) Seller should not lose:

$$\hat{p} - \sum_{n=1}^{N} x_n \left[c_L + \frac{n-1}{N}(c_H - c_L)\right] \geq p(L, \tau) - c_L$$

Combining these, we get:

$$p(H, \tau^*) - p(L, \tau) \geq c_H - c_L - \sum_{n=1}^{N} \frac{x_n}{N}(c_H - c_L)$$

$$\geq \frac{N-1}{N}(c_H - c_L)$$

True for every pair τ, τ^*. Since all have same likelihood, will have $\Delta p \geq \frac{N-1}{N}(c_H - c_L) \rightarrow c_H - c_L$

- price allows buyer to capture seller's surplus, but we want seller to capture the gains from investment

Describability: assume that there is no uncertainty (i.e. special widget is always the same)

- can have FB, even with renegotiation (price = v)
- if undescribable: as above. Widgets have numbers that mean nothing!

Hart-Moore (1988): Incomplete Contracts and Renegotiation

- not really mentioned in the Clarendon Lectures
- partially contractible actions (contracting at will)
  - everyone presses button. If someone doesn't press it, no trade.