Behavioral models of contracting

- Time inconsistency models ("naive"/"sophisticated")
- Fairness
- Bounded rationality (most ambitious)

Tirole (forthcoming, AER)

Is it possible to think about the costs of complexity rigorously?

- Buyer/Seller
- Trade:
  - Known design A (w/prob. $1-\rho$, it is the appropriate design: $v - c > 0$)
  - with prob. ρ, appropriate design is "A'": delivers v, while A delivers $v - \Delta < v$
    - foreseen payoffs
    - unforeseen action
  - If wait until learning that A' is appropriate, there is an adjustment cost a to go from A to A'.
    - $a \in [0, \Delta]$
  - If A' is identified at the contract stage, save a. (in expectation, save ρa)
  - assume $v - c - \rho a > 0$
  - Nash bargaining: $(\overbrace{\beta}^{\text{buyer}} + \overbrace{\sigma}^{\text{seller}} = 1)$
  - can become aware of A': think costs
    - for buyer: $T_B(b)$, for seller: $T_S(s)$, convex
    - if A' is the appropriate design, buyer learns w/prob b. S learns it w/prob s.

Bargaining powers = $(\beta\ \sigma)$

- $t=0$: $T_B(b)$ · learn A' or don't learn anything
- $t=1$: contract design + price
- $t=2$: seller produces design at cost c
- $t=3$: buyer takes possession and possibly learns appropriate design
- $t=4$: If A is not appropriate, renegotiate + adjustment

time

First best: $T_B'(\hat{b}) = \rho a$

- assume that β is "high enough," so that B has a pure strategy
- call b^* the equilibrium cognition - posterior on ρ:

$$\hat{\rho}(b^*) = \frac{\rho(1-b^*)}{(1-\rho)+\rho(1-b^*)} \text{ if haven't found } A'$$

$$= \Pr[A' \text{ is appropriate}]$$

- with a contract with a standard design, if it turns out A' is appropriate, seller captures: $h \equiv \sigma(\Delta - a)$
  buyer captures: $\beta(\Delta - a)$
  - both parties expect seller to get $\hat{\rho}(b^*)h$
- ex ante price $p(b^*)$ for contract with standard design A: $\sigma[v - c - \hat{\rho}(b^*)a] = p(b^*) - [c - \underbrace{\hat{\rho}(b^*)h}_{\text{holdup discount}}]$

$$\Rightarrow p(b^*) = c + \sigma[v - c - \hat{\rho}(b^*)\Delta]$$

- ex ante price if B learns A' is appropriate, (and B gets $\beta(v-c)$ rather than $\beta[v - c - \hat{\rho}(b^*)a]$)

Ex ante, buyer:

$$\max_b \Big[-T_B(b) + \rho b \beta(v-c) + \rho(1-b)[v - \overset{\text{buyer bears adjustment cost}}{a} - h - p(b^*)] + (1-\rho)[v - p(b^*)]\Big]$$

$$\max_b \left[-T_B(b) + \beta(v-c) + (1-\rho b)\hat{\rho}(b^*)\sigma\Delta - \rho(1-b)(a+h) \right]$$

$$\text{(b)}: \quad T'_B(b^*) = \underbrace{\rho a}_{\text{social benefit}} + \rho \overbrace{\left[\underbrace{h}_{\text{benefit of avoiding holdup}} - \underbrace{\hat{\rho}(b^*)\sigma\Delta}_{\downarrow \text{ bargained price with } A'} \right]}^{\sigma(\Delta - a - \Delta\hat{\rho}(b^*)) = \sigma(\Delta(1-\hat{\rho}(b^*)) - a)}$$

$> \rho a$ if $(1-\hat{\rho}(b^*)) > \frac{a}{\Delta}$ excessive cognition

$< \rho a$ if $\underbrace{(1-\hat{\rho}(b^*))}_{\text{posterior that } A \text{ is appropriate}} < \frac{a}{\Delta}$ free-riding effect