- Legros-Newman: "Competing for Ownership"
- Two types of production units: 1, 2
- Each with risk neutral manager and a continuum of assets
- Continuum of production units: type 1: $i \in I = [0,1]$
  type 2: $j \in J = [0,n]$
  - relatively scarce unit
- Standalone production gives 0 surplus
- "Cooperation" between one type 1 and one type 2 gives positive surplus
- Surplus depends on "planning decisions" in production, which are <u>never</u> contractible, but "who is allowed to plan" is contractible.
  - related to individual assets
  - planning decisions will involve private costs (effort)
- Each manager i has cash $l_1(i) \geq 0$ if type 1
  j has cash $l_2(j)$ if type 2
  - wlog, $l_1(i)$, $l_2(j)$ increasing
- assets in type 1 unit: $k \in [0,1)$
  type 2 unit: $k \in [1,2]$
- Their contribution to profits are proportional to planning decisions $q(k) \in [0,1]$
- Firm will succeed (implies revenue $R>0$) w/prob $p(q)$
  fail (implies zero revenue) w/prob $1-p(q)$
- $p(q) = \gamma \int_0^2 q(k)\,dk$
- productivity $A = \gamma R$

- private cost $c(q(k)) = \begin{cases} \frac{(q(k))^2}{2} & \text{for } k \in [0,1) \\ 0 & \text{for } k \in [1,2] \end{cases}$ for type I manager

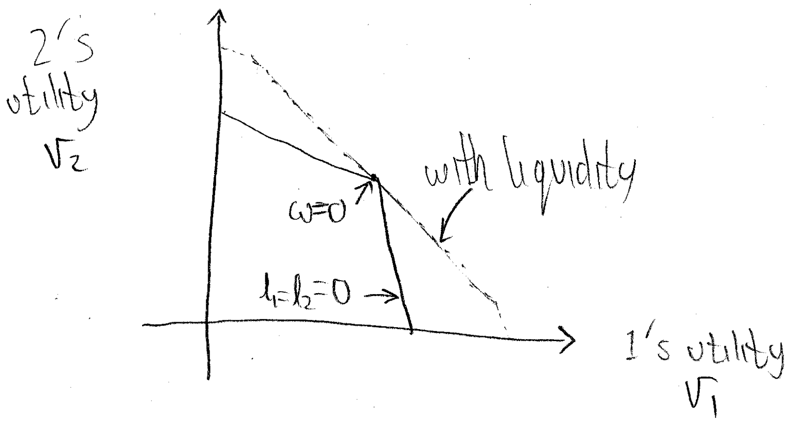
  $c(q(k)) = \begin{cases} 0 & \text{for } k \in [0,1) \\ \frac{(q(k))^2}{2} & \text{for } k \in [1,2] \end{cases}$ for type 2 manager
- There is an ex post moral hazard here.
- $C_1(q) = \int_0^1 c(q(k))dk$
- $C_2(q) = \int_1^2 c(q(k))dk$
- Contracts: decision q is never contractible
  - right to decide on q is contractible.

    $\rightarrow (\omega, \underbrace{t}_{\text{transfer}})$
    - type 1 "controls" assets in $[0, 1-\omega]$
      2 in $[1-\omega, 2]$ $\quad -1 < \omega < 1 \}$ $\omega = 0 \Rightarrow$ nonintegration

(*) why can't a third party control all the assets?

- $u_1(\omega, t) = \max\limits_{\substack{q(k) \in [0,1] \\ k \in [0, 1-\omega]}} \frac{A}{2} \int_0^2 q(k)dk - \frac{1}{2}\int_0^1 q(k)^2 dk - t$
- $u_2(\omega, t) = \max\limits_{\substack{q(k) \in [0,1] \\ k \in [1-\omega, 2]}} \frac{A}{2} \int_0^2 q(k)dk - \frac{1}{2}\int_1^2 q(k)^2 dk + t$
- assume $\omega > 0 \Rightarrow q(k) = \begin{cases} \frac{A}{2} & \text{for man 1 for } k \in [0, 1-\omega] \\ \frac{A}{2} & \text{for man 2 for } k \in [1, 2] \\ 1 & \text{for man 1 for } k \in [1-\omega, 1] \end{cases}$
- Payoffs: $u_1(\omega, t) = \frac{3A^2}{8} - \omega(2-A)^2/8 - t$

  $u_2(\omega, t) = 3A^2/8 + \omega(2-A)/4 + t$



- Determine type 1's willingness to pay:

$$\max_{(\omega,t)} U_2(\omega,t)$$

s.t. $U_1(\omega,0) \geq t$, $\underbrace{t \in [0, l_1]}_{\text{must be feasable}}$

solution: $(\omega,t) = \begin{cases} (0, \frac{3}{8}A^2) & \text{if } l_1 \geq \frac{3}{8}A^2 \\ \left(\frac{3A^2 - l_1}{(2-A)^2}, l_1\right) & \text{if } l_1 < \frac{3}{8}A^2 \end{cases}$