Production and financial policies under asymmetric information

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Economic Theory 2007

Sargent's Reading Group
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- Outline: the model; symmetric info; asymmetric info; efficiency; examples; active funds.

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- Each firm j: input y_0^j, output $y_{\mathbf{1}}^j$.
- Each firm initially owned by one consumer; each consumer owns at most one firm: $s_h^h = 1$ and $s_j^h = 0$ for $j \neq h$.

Symmetric Information

- Problem of consumer h, owner of firm h:

$$\max_{x^h,\theta^h,y^h,\zeta^h} u^h(x^h) \quad s.t.$$

$$x_0^h + \sum_j \left(q^j + y_0^j\right)\theta_j^h = \omega_0^h + \left[-\left(1-\zeta^h\right)y_0^h + q^h\zeta^h\right]$$

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- Modigliani-Miller:

$$x_0^h + \sum_{j\neq h} \left(q^j + y_0^j\right)\theta_j^h = \omega_0^h + \left(q^h + y_0^h\right)\left(\zeta^h - \theta_h^h\right) - y_0^h$$

$$x_s^h = \omega_s^h + y_s^h - \left(\zeta^h - \theta_h^h\right)y_s^h + \sum_j \neq h y_s^j\theta_j^h, \quad s \in S$$

If $\zeta^h = 0.5$ and $\theta_h^h = 0$, same as $\zeta^h = 1$ and $\theta_h^h = 0.5$. Therefore, wlog, set $\zeta^h = 1$.

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- MM does not hold here: ζ^h and θ_m^h not perfect substitutes.
- CE: given $(q_0, q^1, \ldots, q^M)$ and $(r_0^1, \ldots, r_0^M; r_s^1, \ldots, r_s^M, \forall s)$
  - Individual optimality of $(x^h, \theta^h, y^h, \zeta^h)$;
  - For all m, $r_s^m = \sum_{j\in m} \frac{\zeta^j y^j}{\sum_{j\in m}\zeta^j}$ if $\sum_{j\in m}\zeta^j > 0$. Note: $r_0^m \leq 0$;
  - Markets clear: for all m, $\sum_{j\in m}\zeta^j = \sum_h \theta_m^h$.

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  - **Interpretation:** i) Asymmetric information, e.g. the firm does not know investors' preferences; ii) Firms behave competitively, taking price and return of their fund as given.

Example 1 - Productive inefficiency

- Two firms: $j = L, H$.
  - Production in s: $\phi_s f^j$; f^j strictly concave.
  - L is the lemon: $\phi_s f^L(\cdot) = \phi_s \alpha f^H(\cdot) = \phi_s \alpha f(\cdot)$, with $\alpha < 1$.

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- Efficiency:

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- Competitive equilibrium:
  - $r_s^m = \frac{\zeta^H \phi_s f(y_0^H) + \zeta^L \phi_s \alpha f(y_0^L)}{\zeta^H + \zeta^L}$;
  - Each owner j chooses ζ^j and y_0^j so that:

$$\zeta^j : \qquad \partial u_0^j(y_0^j)(y_0^j + q_m) - \sum_s \partial u_s^j \phi_s f^j(y_0^j) = 0$$

$$y_0^j : \qquad (1 - \zeta^j) \left[\partial u_0^j - \sum_s \partial u_s^j \phi_s \frac{\partial f^j(y_0^j)}{\partial y_0^j} \right] = 0$$

implying:

$$\sum_s \frac{\partial u_s^j}{\partial u_0^j} \phi_s = \frac{y_0^j + q^m}{f^j(y_0^j)} = \frac{1}{\partial f^j(y_0^j)/\partial y_0^j} \qquad \Rightarrow \qquad y_0^H = y_0^L$$

Example 2 - Financial inefficiency

- CAPM economy:
  - Preferences: $u^h\left(E(x_1), Var(x_1)\right)$;
  - Two firms $j = L, H$; for all j, fixed investment $y_0^j = 1$ and return y_1^j with mean μ^j, variance σ and covariance c;
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- Efficiency: $\zeta^j = 1$ for all $j \Rightarrow r_s = \frac{1}{J}\sum_j y_s^j$. Also $\theta^j = 1$ for all j.
- Competitive equilibrium:
  - Time 0 budget constr.: $\theta_0^j = (q+1)(\zeta^j - \theta^j)$
  - Time 1 budget constr.: $x_1 = (1-\zeta^j)y_1^j + r_1\theta^j + (q+1)(\zeta^j - \theta^j)$.
  - Marginal financial reallocation: $d\zeta^H = d\theta^H$ (implies $d\theta_0^H = 0$):

$$\left.\frac{du^H}{d\zeta^H}\right|_{\zeta=\theta=1} < 0$$

  - At equilibrium: $\frac{\zeta^H}{\sum_j \zeta^j} < \frac{1}{2}$, i.e. the lemon L overrepresented in the fund.

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- Introduce active funds, who:
  - can vote on the production plan of every firm j; now the objective of the firm is to choose a production plan in order to maximize a weighted average of the marginal valuations of the firm owner and the fund owners for that production plan.
  - can choose a transfer τ^j, such that $q^j = q^m + \tau^j$, for the financing of j.

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- Assumptions about the funds:
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- Under these assumptions, the competitive equilibrium is constrained efficient and the CPO allocation can be decentralized.