A Theoretical Foundation for the Stakeholder Corporation

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Cowles GE Conference
Corporate objective: Shareholders or Stakeholders

Under which of the following assumptions is a large company in your country managed?

1. **Shareholder** interest should be given the first priority.
2. A firm exists for the interests of all stakeholders.

*Question to a sample of firms’ managers (Yoshimuri (1995))*

![Figure 1: Whose Company Is It?](image)

- **Japan**: 3%
- **Germany**: 17%
- **France**: 22%
- **United States**: 24%
- **United Kingdom**: 29%

- All stakeholders.
- The Shareholders.
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Shareholder market value maximization does have a theoretical foundation—the Arrow-Debreu theory applied to production economies (under uncertainty) and the two theorems of welfare economics.

This perhaps explains its predominance as the paradigm in economics and corporate finance.
We propose an alternative probability model of a stochastic economy with production which provides a foundation for stakeholder view of the corporation.
Models to Support Different Views

- We propose an alternative probability model of a stochastic economy with production which provides a foundation for stakeholder view of the corporation.

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Hopefully the next presentation will give opportunity to discuss the difference between this model and the standard “state of nature model” and when each model is most appropriate.
Probability Model of Production

- One firm, two periods $t = 0, 1$
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For the seminar, most of the time no labor: $f_g(l) = y_g$, $f_b(l) = y_b$, $\forall l \geq 0$. 

\[\pi_g = \pi(a) \quad y_g \quad f_g(l)\]
\[\pi_b = 1 - \pi(a) \quad y_b \quad f_b(l)\]
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\[ \pi_g = \pi(a) \]
\[ \pi_b = 1 - \pi(a) \]

\( y_b < y_g, \ \pi(a) \) increasing concave in \( a \).
Agents

- Two classes of agents
  - continuum (mass 1) of risk neutral investors:
    - endowment: \((e_0^i, e_1^i)\) and equal share of ownership of the firm.
    - Preferences
      
      \[ U_i^i(m) = m_0^i + \delta \sum_s \pi_s m_s^i \]
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- aggregate endowment: \(e_0 = e^i_0 + e^c_0, \quad e_1 = e^i_1 + e^c_1\)
Market Value Maximizing Equilibrium

- Markets:
  - at date 1: spot market for produced good; price $p_g$ if normal supply, price $p_b$ if accident. Competitive pricing.
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  - Pricing is risk neutral:

$$\frac{1}{1 + r} = \delta, \quad q_e = \sum_s \pi_s(a) \frac{p_s y_s}{1 + r} - a$$

where $a$ is chosen by the firm.
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- Budget constraint of investors
  \[ m_i^0 + \frac{1}{1 + r} \sum_s \pi_s(a) m_s^i = e_i^0 + \frac{1}{1 + r} e_i^1 + q_e \]
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  \]

- Investors want the firm to maximize $q_e$ (p.v. of profit) and are indifferent among all $m$ satisfying the budget constraint.
Consumers: Budget constraint

\[ m^c_0 + \frac{1}{1 + r} \sum_s \pi_s(a)(m^c_s + p_s c_s) = e^c_0 + \frac{1}{1 + r} e^c_1 \]
Market Value Maximizing Equilibrium (ctd)

- Consumers: Budget constraint

\[ m_0^c + \frac{1}{1 + r} \sum s \pi_s(a)(m_s^c + p_s c_s) = e_0^c + \frac{1}{1 + r} e_1^c \]

- Consumers maximize utility under b.c. FOC: \( u'(c_s) = p_s \)
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- Firm maximizes market value

\[
\begin{align*}
a_E &= \arg\max \sum_s \pi_s(a) \frac{p_s y_s}{1 + r} - a \\
&\implies \sum_s \pi'(a) \frac{p_s y_s}{1 + r} - 1 = 0
\end{align*}
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\[ a_E = \text{argmax} \sum_s \pi_s(a) \frac{p_sy_s}{1 + r} - a \quad \implies \sum_s \pi'_s(a) \frac{p_sy_s}{1 + r} - 1 = 0 \]

- Markets clear: \( c_s = y_s, \ s = g, b \) (Walras Law +indifference on timing of money consumption \( \implies \) money market clear)
Consumers: Budget constraint

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Summary: \( a_E \) determined by the equation

\[ \pi'(a_E)\left(u'(y_g)y_g - u'(y_b)y_b\right) = 1 + r \]
Optimal Investment

- $a^*$ maximizes Social Welfare $W(a) = e_0 - a + \delta(\sum_s \pi_s(a)u(y_s)) + \delta e_1$
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\[
\pi'(a^*)(u(y_g) - u(y_b)) = 1 + r
\]

- Concavity \( \Rightarrow u(x) - u'(x)x \) increasing (derivative \(-u''(x)\)) \( \Rightarrow \)

\[
u(y_g) - u(y_b) > u'(y_g)y_g - u'(y_b)y_b
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**Theorem**

*There is under-investment at MV equilibrium: $a_E < a^*$*
Inefficiency in NPV maximization

- **Market value** maximization by “capitalist” firm gives FOC

\[
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- **Social welfare** maximization requires FOC

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**Inefficiency in NPV maximization**

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- which can be written as

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  \pi'(a^*) \left( \left[ u(y_g) - u'(y_g)y_g \right] - \left[ u(y_b) - u'(y_b)y_b \right] + \left( u'(y_g)y_g - u'(y_b)y_b \right) \right) = 1 + r
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The social objective takes into account

- **consumer surplus** \( u(c_s) - u'(c_s)c_s \)
- **profit of shareholders** \( p_s y_s \)

Market-value maximization omits consumer surplus.
Solving Externality Problem

- Inefficiency of profit max comes from external effect of firm’s action $a$ on consumers

$$U^c(c, m) = m_0 + \sum_s \pi_s(a)(m_s + u(c_s))$$
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  - government intervention (quantity regulation or tax/subsidy)
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  1. government intervention (quantity regulation or tax/subsidy)
  2. internalization through larger entity: integrate parties involved in externality
  3. create tradeable property rights (Coase)
Since externality only concerns agents associated with the firm, it seems natural to try second approach: enlarge the boundary of the firm to include consumers (and workers).
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**Definition:** \((c^*, a^*, p^*)\) is a (reduced form) **stakeholder equilibrium** if

- \(c^* = \arg \max_{c \geq 0} \{u(c) - p_s^* c\}, \quad s = g, b\)
- \(a^* = \arg \max_{a \geq 0} \left\{ \frac{1}{1+r} \sum_s \pi_s(a) \left( CS(p_s^*) + R(p_s^*) \right) - a \right\}\)
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Changes the objective of firm from max of NPV of profit to max of net p.v. of stakeholder surplus.
Stakeholder Equilibrium

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**Theorem**

A stakeholder equilibrium is Pareto optimal
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Theorem

A stakeholder equilibrium is Pareto optimal

Gives precise content to the “stakeholder corporation”, already advocated in the final chapter of Berle and Means (1932) “The new concept of the corporation.”
Implementing Stakeholder Equilibrium

Three problems for implementing stakeholder equilibrium
Implementing Stakeholder Equilibrium

- Three problems for implementing stakeholder equilibrium
  - information: how to find out consumer surplus $CS(p^*)$
Implementing Stakeholder Equilibrium

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Our proposal: introduce a market for consumer rights (c-rights) on which agents trade “right to buy” from the firm
Implementing Stakeholder Equilibrium

Three problems for implementing stakeholder equilibrium

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Holders of c-rights are given voting rights in the decisions of the firm.
Implementing Stakeholder Equilibrium

Three problems for implementing stakeholder equilibrium

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Holders of c-rights are given voting rights in the decisions of the firm.

**Definition**

In a “Coasian equilibrium” management is instructed to maximize the total value of equity + consumer rights (+ worker rights)
equity shares
give right to profit
investors: initial holding of equity
c-rights

equity shares
give right to profit
investors: initial holding of equity

c-rights
give right to buy from firm
consumers: initial holding of c-rights
c-rights

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Equity and c-rights traded on markets.

c-rights
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consumers: initial holding of c-rights
c-rights

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  - investors: initial holding of equity
- c-rights give right to buy from firm
  - consumers: initial holding of c-rights

- Equity and c-rights traded on markets.
- What is the value of a c-right on the market?
c-rights

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- Equity and c-rights traded on markets.

- What is the value of a c-right on the market?

- Suppose a quantity $\eta \leq 1$ of rights exist. If $\eta < 1$ not all consumers have rights and demand changes: spot prices $(p_g(\eta), p_b(\eta))$. 

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c-rights

- Equity shares give right to profit for investors: initial holding of equity.
- C-rights give right to buy from firm: initial holding of c-rights.

- Equity and c-rights traded on markets.
- What is the value of a c-right on the market?
- Suppose a quantity $\eta \leq 1$ of rights exist. If $\eta < 1$ not all consumers have rights and demand changes: spot prices $(p_g(\eta), p_b(\eta))$.
- Equilibrium value of c-rights: $q_c(a, \eta) = \delta(\sum_s \pi(a)C'S(p_s(\eta)))$. 

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c-rights

- **equity shares** give right to **profit** investors: initial holding of equity
- **c-rights** give right to **buy** from firm consumers: initial holding of c-rights

- Equity and c-rights traded on markets.

- **What is the value of a c-right on the market?**

- Suppose a quantity $\eta \leq 1$ of rights exist. If $\eta < 1$ not all consumers have rights and demand changes: spot prices $(p_g(\eta), p_b(\eta))$.

- Equilibrium value of c-rights $q_c(a, \eta) = \delta(\sum_s \pi(a)C'S(p_s(\eta)))$

- If there is “scarcity” of consumer rights, then the value of a consumer right is the **consumer surplus**.
**c-rights**

- equity shares
  - give right to *profit*
  - investors: initial holding of equity
- c-rights
  - give right to *buy* from firm
  - consumers: initial holding of c-rights

- Equity and c-rights traded on markets.
- What is the value of a c-right on the market?
- Suppose a quantity \( \eta \leq 1 \) of rights exist. If \( \eta < 1 \) not all consumers have rights and demand changes: spot prices \((p_g(\eta), p_b(\eta))\).
- Equilibrium value of c-rights
  \[
  q_c(a, \eta) = \delta(\sum_s \pi(a)CS(p_s(\eta)))
  \]
- If there is “scarcity” of consumer rights, then the value of a consumer right is the *consumer surplus*.
- if \( \eta \rightarrow 1 \), \( q_c(a) \rightarrow \delta \sum_s \pi_s(a)CS(p_s^*) \) (since \((p_g(\eta), p_b(\eta)) \rightarrow (p_g^*, p_b^*)\))
c-rights

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c-rights
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- Equity and c-rights traded on markets.
- What is the value of a c-right on the market?
- Suppose a quantity $\eta \leq 1$ of rights exist. If $\eta < 1$ not all consumers have rights and demand changes: spot prices $(p_g(\eta), p_b(\eta))$.
- Equilibrium value of c-rights $q_c(a, \eta) = \delta(\sum_s \pi(a) CS(p_s(\eta)))$
- If there is “scarcity” of consumer rights, then the value of a consumer right is the consumer surplus.
- if $\eta \rightarrow 1$, $q_c(a) \rightarrow \delta \sum_s \pi_s(a) CS(p_s^*)$ (since $(p_g(\eta), p_b(\eta)) \rightarrow (p_g^*, p_b^*)$)

**Theorem**

*When $\eta \rightarrow 1$ the limit Coasian equilibrium is Pareto optimal.*
This result does not hold with heterogeneous consumers.
Heterogeneous consumers

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- Utility of consumer of type $\alpha$, $\alpha \in [0, 1]$
  $$U(m, c; \alpha) = m_0 + \delta \sum \pi_s(a)(u(c, \alpha) + m_s), \quad u_\alpha > 0, \quad u_{c\alpha} > 0,$$
- Distribution function $G$ over types.
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- Either some agents are excluded and this creates an inefficiency, or the price is low (valuation of the lowest type).
- In all cases the value of consumer rights does not reflect the full value of consumer surplus to all types.
Objective to be maximized (w.r.t. $a$, taking $\eta$ as given)

$$\eta q_c(p(\eta), a) + q_e(p(\eta), a)$$

or

$$\sum_s \frac{\pi_s(a)}{1 + r} \left( \eta c_s(p_s(\eta), \hat{\alpha}(\eta)) + p_s(\eta)y_s \right) - a$$
Coasian Equilibrium

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- Welfare at capitalist equilibrium $\overline{\mathcal{W}}$ (profit max)
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**Theorem: Coasian Equilibrium improves on Capitalism**

Either (i) \(\lim_{\eta \to 1} \mathcal{W}(\eta) > \overline{\mathcal{W}}\)
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**Theorem: Coasian Equilibrium improves on Capitalism**

Either (i) \( \lim_{\eta \to 1} \mathcal{W}(\eta) > \overline{\mathcal{W}} \)

or (ii) \( \lim_{\eta \to 1} \mathcal{W}(\eta) = \overline{\mathcal{W}} \) and \( \frac{\partial \mathcal{W}}{\partial \eta}(1) < 0 \), so that for \( \eta \) sufficiently close to 1, \( \mathcal{W}(\eta) > \overline{\mathcal{W}} \).
Why Result Different from Standard AD Efficiency Result?

- Every probability model has a state space representation (Kolmogorov Theorem)
- Does it suffice to write the model with the same characteristics on a state space and maximize profit expressed on this space to get Pareto optimality?
Reformulating Model with States of Nature

- Uncertainty represented by states of nature $\omega \in \Omega$ with exogenous probability $\mathcal{P}$

- $\omega$ represents the circumstances which “cause” the good outcome $y_g$.

Production function:

$$y(\omega, a) = \begin{cases} y_g & \text{if } \omega \in \Omega_g(a) \\ y_b & \text{if } \omega \in \Omega_b(a) \end{cases}$$
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Preferences:

\[
U^i(m^i) = m_0^i + \delta \int_{\omega \in \Omega} m^i_\omega d\mathcal{P}(\omega); \quad U^c(m^c, c) = m_0^c + \delta \int_{\omega \in \Omega} (m^c_\omega + u(c_\omega)) d\mathcal{P}(\omega)
\]
Arrow-Debreu Equilibrium

- Markets: Standard AD: all markets at date 0: agents buy and sell money for consumption at date 0 and at date 1 in all states $\omega$, consumers buy good for date 1 in state $\omega$, firm sell good in advance, buy investment $a$.
- Price of money at date 0 normalized to 1
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- Profit of the firm
  \[ \int_{\omega \in \Omega} \frac{p_\omega y(\omega, a)}{1 + r} dP(\omega) - a \]
- First Welfare Theorem: if AD equilibrium exists it is Pareto optimal.
Theorem

An Arrow-Debreu equilibrium does not exist.
Non-Existence of AD equilibrium

**Theorem**

An Arrow-Debreu equilibrium does not exist.

- Suppose \((a^*, (p_\omega)_{\omega \in \Omega})\) equilibrium
- \(\delta P(\omega)u'(c_\omega) = \delta P(\omega)p_\omega\) and \(c_\omega = y(\omega, a^*)\) imply
  
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- Firm has to check that \(\text{given prices } (p_\omega)_{\omega \in \Omega}\) there is no profitable deviation.
Profitable Deviation

- $a < a^*$
\[ a < a^* \]

\[
R(a) - R(a^*) = \frac{1}{1 + r} \left[ (\pi(a^*) - \pi(a))p_g(y_b - y_g) \right] - (a - a^*)
\]

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= \frac{1}{1 + r} \left[ (\pi(a) - \pi(a^*))p_g(y_g - y_b) \right] - (a - a^*)
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Profit maximum at $a^*$ requires $R(a) - R(a^*) \leq 0$ for all $a < a^*$

(A) \hspace{1cm} \lim_{a \to a^*} R'(a) \geq 0 \iff \frac{1}{1 + r} \pi'(a^*)p_g(y_g - y_b) - 1 \geq 0
Profitable Deviation

Same reasoning when $a > a^*$:
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- Profit max requires

$$(B) \quad \lim_{a \to a^*} R'(a) \leq 0 \iff \frac{1}{1 + r} \pi'(a^*) p_b (y_g - y_b) - 1 \leq 0$$
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$$p_b(y_g - y_b) \leq p_g(y_g - y_b)$$
Profits Deviation

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- Profit max requires

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(B) \quad \lim_{a \to a^+} R'(a) \leq 0 \iff \frac{1}{1 + r} \pi'(a^*) \pi_b(y_g - y_b) - 1 \leq 0
\]

- A and B require

\[
p_b(y_g - y_b) \leq p_g(y_g - y_b)
\]

- But \( p_g < p_b \): impossible. Because discontinuity of production function at \( a^* \) for \( \omega \) the profit has different right and left derivatives with a convex kink.
Two preconditions for valid theoretical foundation of stakeholder theory of the firm

1. decisions taken by the firms must have an external effect on stakeholders
2. these externalities must not be readily resolved by government intervention (regulation or taxation).
Conclusion

Two preconditions for valid theoretical foundation of stakeholder theory of the firm

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Such conditions are fulfilled if firms are large and influence the probability distribution of their outcomes.
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Another model with this characteristic: Allen-Carletti-Marquez (2009)
To obtain an operational stakeholder theory, three additional conditions must be satisfied:

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Otherwise, stakeholder concerns leave firms open to manipulation by management.

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“There is a danger that the endless list of stakeholders will make it easier for managers to rationalize their actions. ‘Stakeholder theory plays into the hands of managers by allowing them to pursue their own interests at the expense of the firm’s financial claimants and society at large....’ (Jensen, *Journal of Applied Corporate Finance*, 2001)
Theoretical answer to (1)

- profit = interests of shareholders
- consumer surplus = interests of consumers
- worker surplus = interest of workers
- objective: sum of profit, consumer and worker surpluses

However surpluses are difficult to evaluate

Hence the proposal for creating marketed consumer and worker rights which reveal surpluses