

# Measuring Non-Marketed Capital

Robert D. Cairns, McGill University

&

Graham Davis, Colorado School of Mines

# Profit?

- Do firms make “profits” (NPV > 0)?
- NO: competed away → gain risk-adjusted ROR
- YES: investment timing → NPV of order of investment
- Competitive advantage:
  - strategic assets
  - intellectual assets
  - intangible capital*

# Intangible?

- Intangible increasing in importance
- Improved empirics
- *Non-marketed* also increasing

# Types of Capital

	<b>Tangible</b>	<b>Intangible</b>
Marketed	Buildings, machines	Advice, software
Non-Marketed	Environmental capital	Organization, reputation

# Analytic Distinctions

- Usual: tangible vs intangible
- Both can be traded, have prices
- ...Or not
- Pertinent: marketed vs non-marketed
- (Another: continuously measurable or not, units)

# Special Cases in an Un-Assuming Analysis

- Physical aggregation of capital
- Ability to measure all capital and contributions
- Appreciable substitutability of assets
- Constant returns
- Convexity
- Competition
- Optimization
- Equalization of margins
- Uniqueness of user costs & depreciation

# Subject: Rent

- Source: not marketed capital: earns quasi-rent at rate  $r$
- Source: *non-marketed* capital  $\rightarrow$  firm more productive
- Underlying asset is project or firm; NPV,  $V_t, t \geq 0$
- Why  $V_0 = \sum_{t=1}^T \frac{f_t}{(1+r)^t} > 0$  and why, empirically,  $q > 1$
- Links option value, underlying asset, investment,  
*Before, at, & after* investment decision

# Before

- Different capabilities → project value specific to firm
- Firm follows a *resource-allocation mechanism* (RAM)
- Not necessarily optimal: option value  $G(V)$  typically rises
- Invest when  $V$  hits boundary  $V_0$  (“value matching”)

$$G(V_0) = V_0 - I > 0$$

smooth pasting? not necessarily

- Positive NPV  $G(V_0)$



At

- Expect that  $V_0 = \frac{\beta}{\beta-1} I > I$
- $V_0 = I + J, J > 0$
- “Across” time 0,  $I + G(V_0) = V_0 = I + J$
- $J = G(V_0) > 0$ ; typically of the order of  $I$
- Ex-post rent  $J =$  ex-ante option value  $G(V_0)$  under RAM

# After

- At  $t = 0^+$ , cash flows begin
- Uncertainty: may be bad decisions or stochastic realizations
- Has market value if  $V_0 = \sum_{t=1}^T \frac{f_t}{(1+r)^t} > 0$
- May be bad enough that firm cannot recover (sunk) value  $I$
- Salvage values of marketed  $I$  if negative

# Non-Marketed Capital

- At  $t = 0$ ,  $J = G(V_0) > 0$ : present (capitalized) value of rent
- Marketed (tangible & intangible)  $I$  to be fully recovered
- Propose: *capitalized rent  $J$ , as value of non-marketed capital*
  1. A residual,  $V_0 - I$ ; cf Solow (1957), Laffont & Tirole (1993)
  2. Sources of rent confounded in residual,  $J = G(V_0)$
  3. A sunk asset: has (non-unique) user costs, depreciation, income under certainty

# Properties

1.  $I$  and  $J$  are sunk: user costs not unique
2. Since option value  $G(V_0)$  a composite, so is  $J$ : no “own” returns
3. Most assets in  $J$  (& some in  $I$ ) not measured  $\rightarrow$  no marginal value
4. Wealth,  $V_0 = I + J$ :  
PV of consumption = value of capital stock

# Implications

6. Marginal analysis of limited use in capital theory
7. Rent  $J$  is shared with stakeholders through negotiation  
Is a “stake” a share of rents?
8. Rate of return to comprehensive capital is market rate;  
internal rate redundant
9. Tobin’s  $q \equiv 1$  if capital measured comprehensively
10. Have to rethink multifactor productivity