Faustmann and the Alternative Test Approach

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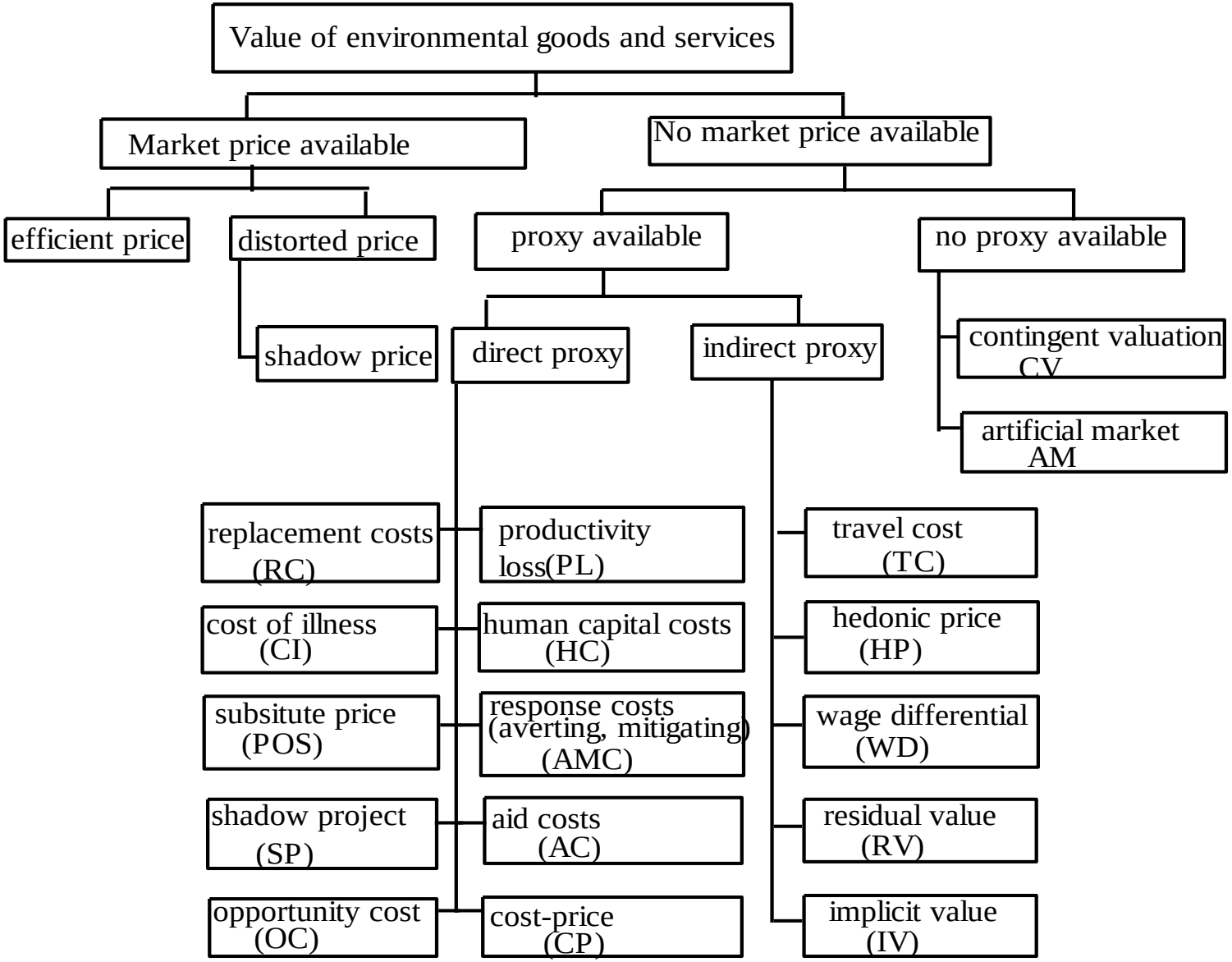
Introduction

- New Forest Cash Flows
- The Alternative Test (ALT)
- ALT and the Faustmann Formula
- ALT in a Dynamic World:
- Changes in policies,
- in the socio-economic context,
- and in the environment market
- Conclusions

New Forest Cash Flows

Steps in Project Analysis	EIA Not Included	EIA Included
1. I/O of the project	Direct production	Production function plus an Environmental Assessment (expand the physical analysis in space & time)
2. Valuation	Market prices or shadow prices correcting mostly for policy failures	Shadow prices rectifying for Policy but also Market and Institutional failures or when no market exists.
3. B/C	Use NPV, IRR, B/C criteria together with risk analysis	Mostly NPV kind of criteria, but also cost effectiveness, often with an unlimited time span, together with uncertainty analysis
4. Decision Making	Mostly efficiency objective	Efficiency plus social and environmental objectives balanced through public participation


Value of environmental goods and services
Market price available
No market price available
efficient price
distorted price
proxy available
no proxy available
shadow price
direct proxy
indirect proxy
contingent valuation CV
artificial market AM
replacement costs (RC)
productivity loss(PL)
travel cost (TC)
cost of illness (CI)
human capital costs (HC)
hedonic price (HP)
subsitute price (POS)
response costs (averting, mitigating) (AMC)
wage differential (WD)
shadow project (SP)
aid costs (AC)
residual value (RV)
opportunity cost (OC)
cost-price (CP)
implicit value (IV)

The Alternative Test

The ALT compares the best estimated Net Present Worth (NPW) of the forest cash flows for the remaining years of the project with its Abandonment Value (AV). The AV of a project is defined as the net future benefits estimated today of the alternative investment if the project is terminated or replaced. The ALT is run every control period based upon expectation at that time.

Steps of the ALT

- 1. Start with the last year of the project's economic life and discount the net cash flows in that year, including any salvage value, back one year
- 2. Compare the resulting discounted cash flow with the AV available at the beginning of that period

Steps of the ALT

- 3. Add the greater of the two figures to the project's cash flow in that period and discount that sum back one year
- 4. Repeat steps 2 and 3 until the future cash flows have been discounted to the current period

Monitoring Forestry Projects – The Alternative Test

The tree plantation project (US$)

(a) ALT applied in the sixth year of the project:

Appraisal years	6	7	8	9	10
Remaining years	0	1	2	3	4
Cash flows	0	0	0	0	9000
AV's	5500	6000	7000	8000	2000 (1)
NPW with ALT	7513	8264	9090	10000	

(b) ALT applied in the seventh year of the project:

Appraisal years	7	8	9	10
Remaining years	0	1	2	3
Cash flows	0	0	0	9000
AV's	9500	11000 (2)	12000 (2)	4000 (1)
NPW with ALT	10000	10903	11818	

(1) The market value of bare land.

(2) The AV's are higher than the precedent discounted cash flows. The AV's are the relevant figures to be discounted, together with the cash flows in that year.

ALT and the Faustmann Formula

$$Se = \max\left[(PS(t)e^{-rt} - C_0\right]/(1 - e^{-rt}) \quad \cdots\cdots (1)$$

$$PS'(t) - rPS(t) - rSe = 0 \quad \cdots\cdots (2)$$

$$\frac{PS'(t)}{PS(t)} = r\left(1 + \frac{Se}{PS(t)}\right) \quad \cdots\cdots (3)$$

$$NPW_a = \sum_{t=0}^{a} \frac{C_t}{(1+r)^t} + \frac{A_a}{(1+r)^a} \quad \cdots\cdots (4)$$

$$NPW = [PS(t) + A(t)]e^{-rt} - C_0 \quad \cdots\cdots (5)$$

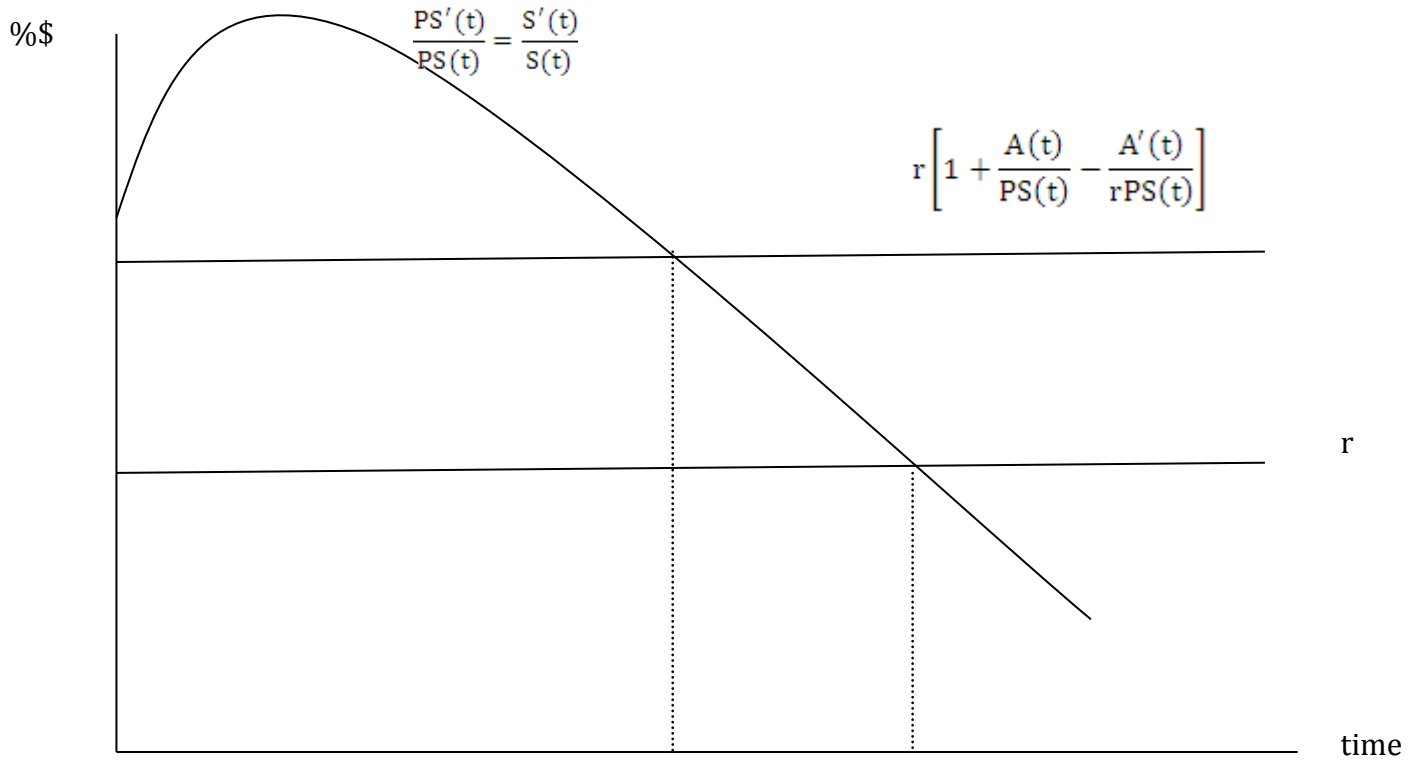
ALT and the Faustmann Formula

$$PS'(t) + A'(t) = r[PS(t) + A(t)] \quad \cdots\cdots (6)$$

$$\frac{PS'(t)}{PS(t)} = \frac{rPS(t) + rA(t) - A'(t)}{PS(t)} = r\left(1 + \frac{A(t)}{PS(t)} - \frac{A'(t)}{rPS(t)}\right) \quad \cdots\cdots (7)$$

$$\frac{PS'(t)}{PS(t)} = r\left(1 + \frac{A(t)}{PS(t)}\right) \quad \cdots\cdots (8)$$

Optimal harvest with and without AV



ALT and Changes in Forest policies

- New afforestation public program in Taiwan
- Depressed stumpage prices with globalisation of the economy
- Abandonment of forestry for other uses with environmental consequences
- New incentives over 20 years for afforestation: around $16,000 /ha

ALT and Changes in Forest policies

- AV= 16,000 forced many forest owners to short their rotation in order to benefit from the new incentives
- This resulted in other environmental problems
- The project ended under the pressure of environmentalist and budget constraints

ALT and Changes in the socio-economic context

- Australian forest cy. Abandon their forest resources to focus on the industrial forest sector given the low price of stumpage, and so low book value, but increased forest values for non-timber uses
- ENSO sell their timber lands in Wisconsin to focus on pulp and paper production
- Fear of take over by financial institutions of Cies with forest assets

ALT and Changes in the environment market

- A Danish Pension Fund invest in a timberland cy who bought the land from a pulp mill with a conservation easement purchased by the Nature Conservancy; the forestland will continue to supply pulpwood and provide various recreation and environmental goods and services

Conclusions

- Abandonment and adaptation of the initial forest investment has become the norm in a more dynamic world
- The constancy surrounding forest investment is not an appropriate assumption anymore but the Faustmann formula stays relevant when the ALT is used

Conclusions

- The AV needs to be considered on a global scale and will justify in some cases international transfers to rich forest ecosystems in poor countries