SEEA-CF Asset Valuation Methods

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Overview

- Valuation principles in general
- Valuation of mineral and energy assets
- Valuation of timber and other assets
- Valuation based on royalties

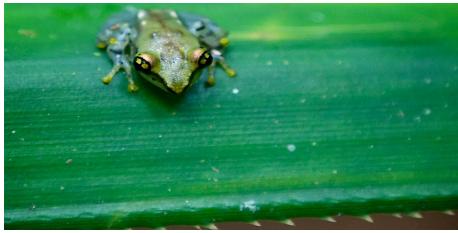
Valuation of environmental assets

- In principle, all benefits delivered by environmental assets can be valued in monetary terms
- However, consistent with the SNA, the scope of valuation in the SEEA is limited to the benefits that accrue to economic owners
  - ***An economic owner is the institutional unit entitled to claim the benefits associated with the use of an asset in the course of an economic activity by virtue of accepting the associated risks***
- The benefits underlying the definition of economic assets must be economic benefits
  - ***Economic benefits reflect a gain or positive utility arising from economic production, consumption or accumulation***

Valuation of mineral and energy assets

- Five key aspects:
  - the measurement of resource rent
  - the determination of the expected pattern of resource rents based on expected extraction profiles and prices
  - the estimation of asset life
  - the selection of a rate of return on produced assets
  - the choice of discount rate

Resource rent



- *Rent* is the annual income theoretically receivable by the owner of sub-soil assets for putting the assets at the disposal of another institutional unit (usually an extraction company) for use of the asset in production
- Rent exists because, in extractive activities, the environment represents a factor of production
  - That is, there is a return to the environment just as there is a return to labour and produced capital
- Because the environment does not "demand payment", its share of the return goes to the owners of the resource assets – usually the government
  - Governments collect this rent through royalties charged to extraction companies
  - Very often, royalties are set to be lower than rent, meaning that a portion of the rent remains with the extracting unit

Estimating resource rent

- In a normal production process, the surplus generated under conditions is just sufficient to cover the entrepreneur's expected return on his investment
- In extractive processes, there is "extra" surplus generated because the environment is a factor production that demands no payment
- This extra surplus can be measured as follows:

  Resource rent = Total revenue from resource sales less labour/material costs less costs of produced capital

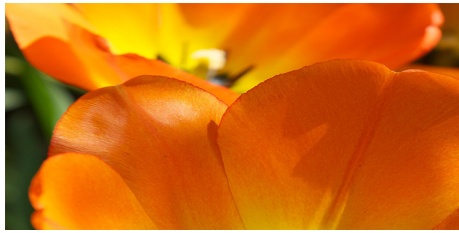
$$RR = TR - C - (r_i K + \partial)$$

RR = Resource rent
TR = Total revenue from sales of extracted resources
C = Wages, supplies, materials, fuel
r_i = Rate of return to produced capital
K = Produced capital used in extraction process
∂ = Depreciation of produced capital

Expected pattern of resource rent flows

- Normally, it is assumed that current resource rent will remain constant for the life of the asset
- Alternatively, assumptions can be made about revenues, costs, discoveries and extraction rates in future years to estimate a varying stream of rent over the asset's life
- Both amount to making assumptions about the future and neither is "correct"
  - The assumption of constant rent is usually made since it doesn't require decisions to be made about the future

Estimating asset life



- This is easily calculated by dividing the current size of the asset stock by the current rate of extraction
  - Assuming that both of these will remain stable over time, asset life can be calculated as follows:

Asset life = Stock size / current rate of extraction

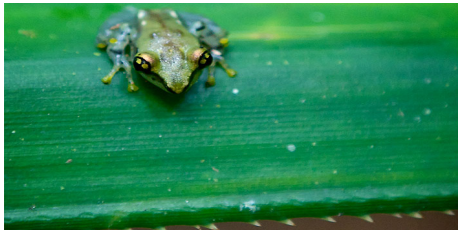
$$T = S / Q$$

T = asset life in years

S = Asset size

Q = Annual rate of extraction

Selection of a rate of return on produced capital



- The SEEA recommends using an “exogenous” economy-wide rate of return perhaps based on government bond rates where these exist
- In all cases a real (inflation-adjusted) rate of return should be used
- While exogenous rates of return are unlikely to be perfect proxies for rates of return on individual produced assets, it is likely that they provide a reasonable reflection of normal returns for the derivation of estimates using the net present value approach

The choice of discount rate

- The discount rate can be interpreted as the expected rate of return on the resource assets
- In theory, this should be the same as the expected rate of return to produced capital
  - Therefore, the SEEA recommends that a market-based discount rate equal to the assumed rate of return on produced assets should be used
- At the same time, there is also support for the use of social discount rates, which are generally lower, in the valuation of environmental assets
  - The rationale is that environmental assets are of broad and long term value to society as a whole and should be valued in that light rather than solely in relation to their value to a present day extractor

Calculating the net present value

Once all of the above has been decided, the value of the asset can be calculated as the net present value of the discounted stream of resource rent over the life of the asset:

$$V = \sum_{t=1}^{T} \frac{RR}{(1 + r_g)^t}$$

Where:

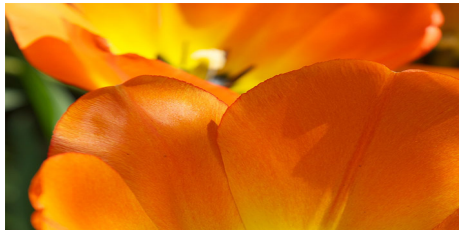
V = Net present value of the asset

RR = Resource rent (as defined in Slide 4)

T = Asset life in years

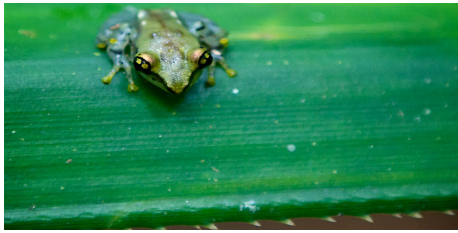
r_g = Discount rate

Valuation of timber assets



- Valuation of timber assets proceeds as for mineral and energy assets with one difference
  - Since forests are (in principle) renewable, the asset life for timber resources is assumed to be infinite (that is, harvest is assumed to be sustainable)
  - Under this assumption (which may not apply in all countries or to all types of timber), the formula for valuation simplifies to: $V = RR/rg$
  - If timber harvests are known not to be sustainable, then timber should be considered non-renewable and the valuation approach for energy and mineral assets should be applied

Valuation of other assets



- Valuation of privately owned ***land assets*** (such as farmland and urban land) is typically straightforward, as market prices are normally available
  - Valuation of other land assets (such as wilderness) is more complex and is treated as an element of ecosystem valuation
- Valuation of ***water assets*** is, in principle, possible but is made more difficult by distortions in water markets caused by government provision of water at prices below what the market would charge
  - Valuation of water assets that are privately owned (such as hydroelectric or irrigation reservoirs) is more feasible
- Valuation of ***marine and other biological assets*** is also possible in principle but is generally made more difficult by lack of data on the revenues and costs of extraction

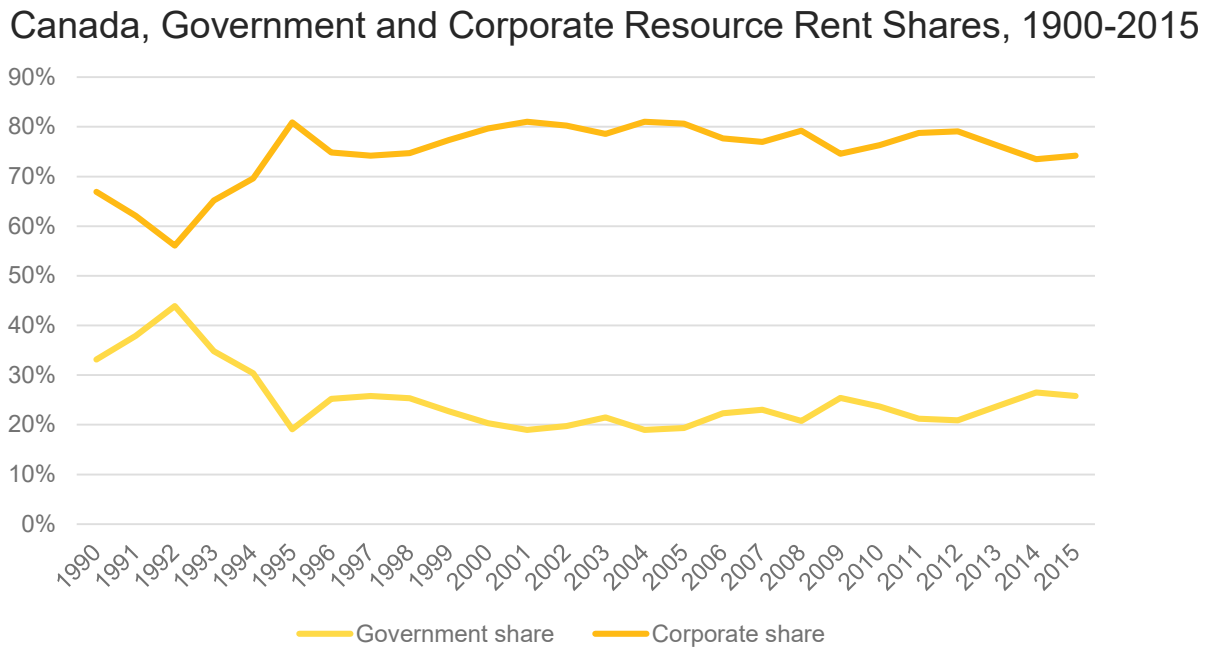
Valuation based on royalties

- An alternative is to base valuation on the resource royalties collected by governments
  - Royalty-based valuation applies to both non-renewable and renewable resources
- In theory, as the owner of natural resources, governments should collect 100% of the rent generated by their extraction
  - In that case, the total value of resource royalties collected should be equivalent to resource rent (avoiding the need to calculate rent from revenue and cost data as in Slide 4)
- Either the net present value or net price method can then be applied to the total value of royalties to calculate the asset value

$$V = \sum_{t=1}^{T} \frac{Royalties}{(1 + r_g)^t} \quad \text{or} \quad V = (Royalties) * T$$

Valuation based on royalties

- The assumption that governments collect 100% of rents through royalties does not hold in many countries, as governments often set royalty rates lower that they could in order to attract resource company investment
- In Canada, for example, evidence suggests that about 25% of resource rent is captured by government royalties



Source: Statistics Canada, National Balance Sheet Accounts, CANSIM Table 378-012 (http://www5.statcan.gc.ca/cansim/a01?lang=eng)

Thank you

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