Measuring the Wealth of Nations and Its Components

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Total Wealth
Produced Capital
Natural Capital
Intangible Capital
Net Foreign Assets
Machinery, Equipment, Structures
Urban Land
Subsoil Assets
Agricult-ural Land
Timber, Non-timber
Protected Areas
Social, Human Capital
Total Assets - Total Liabilities

Measuring Wealth

TOTAL WEALTH	Estimated as the stock that generates a stream of sustainable consumption	
PRODUCED CAPITAL	Machinery and Equipment	Estimated directly
	Urban Land	Estimated directly
NATURAL CAPITAL	Minerals & Energy (11 minerals, 4 energy resources)	Estimated directly
	Agricultural land (crop land, grazing land)	Estimated directly
	Forest land (timber, NTFP, other services)	Estimated directly
	Protected Areas	Estimated directly
NET FOREIGN ASSETS		Data obtained from External Wealth of Nations Mark II
INTANGIBLE CAPITAL	Human and Social capital: Not directly observed; estimated as a residual	

Total Wealth

2 possible approaches, which , if accurately measured, should be the same:

- "Bottom-up" approach by summing the value of all the components→ IFF all components of wealth can be independently & accurately measured
- "Top-down approach, under the assumption that **sustainable consumption is a return on total assets**

We take the top-down approach, since all components of wealth cannot be independently measured

Total wealth can be calculated as

$$W_t = \int_t^{\infty} C(s) \cdot e^{-r(s-t)} ds$$

where Wt is the total value of wealth, or capital, in year t ;
$C(s)$ is consumption in year s; and
r is the social rate of return to investment.

The social rate of return to investment is expressed as

$$r = \rho + \eta \frac{\dot{C}}{C}$$

where ρ is the pure rate of time preference and η is the elasticity of utility with respect to consumption.
Assuming that $\eta = 1$ and that consumption grows at a constant rate, the total wealth can be expressed as

$$W_t = \int_t^{\infty} C(t) \cdot e^{-\rho(s-t)} ds$$

Calculating Total Wealth frm Sustainable Consumptoin

Step 1: Calculate total final consumption: Private + Public Consumption

Step 2: if adjusted net savings is negative then subtract this figure from total final consumption to arrive at **sustainable consumption**.

Step 3: Smoothing volatility: take a five year lagged average of sustainable consumption (in constant prices) for a given year.

Step 4: Total Wealth: Using the 5-yr average sustainable consumption, calculate the net present value of consumption summed over a 25 year period using a discount rate (World Bank uses a discount rate of 1.5%)

Data Needed for Total Wealth

Gross National Income

Private Consumption (households + NPISH)

Public Consumption

Adjusted Net Savings

Assumptions:

- time horizon
- discount rate

Calculating Produced Capital

1. Buildings, machinery and equipment
   a. Country statistical office regularly calculates capital stock
   b. For countries that do not provide capital stock, we use the standard Perpetual Inventory Method based on a time series of Gross Fixed Capital Formation

   We assume a 20-year life span with constant geometric depreciation

$$K_t = \sum_{i=0}^{19} I_{t-i}(1-\alpha)^i$$

   Note: these assumptions are in line with recommendations in the SNA 2008

2. Urban Land: estimated as 24% of the value of produced physical capital

Data Needed for Produced Capital

- Capital stock
- Consumption of Fixed Capital (CFC)

Or,

- Gross Fixed Capital Formation (GFCF) for 20 years from first period (assuming 20 year lifespan)
- CFC

For country specific estimates of Produced Capital Stock, a time series of GFCF

- By type of capital (buildings/structures, machinery and equipment) so that different depreciation rates can be applied

Natural Capital – Subsoil Assets

1. **Net Present Value approach**: asset value is the Net Present Value of the stream of resource rents expected over the lifetime of the asset

$$W_{2000} = \sum_{t=2000}^{T} \frac{Rent_{2000}}{(1+0.04)^t}$$

2. Asset value includes only **Proven reserves**
3. Assume **constant real unit rent and extraction** over the remaining lifetime of the resource (unless other information available)
4. **Reducing volatility**: The 5-yr lagged average of observed annual unit rents is used in the calculations

$$Rent_{2000} = \sum_{t=1996}^{t=2000} \frac{Q_{ti} * (P_t - C_{ti})}{5}$$

Note: these assumptions are in line with the UN recommendations in the SNA 2008 and the SEEA 2012

Data needed for Subsoil Assets

- Annual production
- Unit sales price, expected prices
- Unit costs of production including costs of fixed capital (from National Accounts)
- Total reserves, extraction path

Unit rent = Unit price – Unit production costs

Total Rent = Unit rent (averaged over 5 years) x Production

Adjusted Net Savings

ANS = Gross National Savings

- Depreciation (Consumption of Fixed Capital)

+ Expenditures for Education (Human Capital)

- Depletion of Natural Resources (subsoil assets, forests, fisheries)

- Air pollution damages

Implementing Wealth Accounting at the Country Level

World Bank can provide

- Excel spreadsheet tools to guide construction of wealth accounts, tailored to country data and assumptions
- Technical support and advice for using the tools