Making Valuation Count for National Accounting

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Introduction

- Main question: how to value ecosystem services and natural capital and bring these values into the national income and wealth accounts

Introduction

- Ecosystem services: integrated ecology and economics
  - Ecological production function
  - Economic valuation
- National accounts: ACCOUNTING – related but not the same as economics

National Accounts

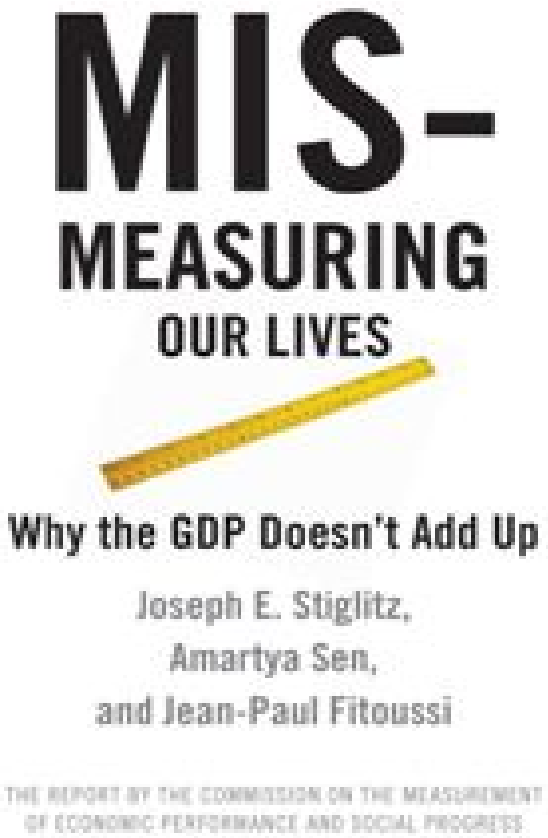
- Prior to the 1930s there were was no systematic accounting of the state of the economy
- First estimates of national income were developed in the 1930s
- First national income accounts, including Gross Domestic Product (GDP), were published in the 1940s

The System of National Accounts (SNA)

- First version of the System of National Accounts (SNA) was published in 1953
- Most recent version of SNA published in 2008
- SNA adopted by the United Nations Statistical Divisions as the international standard for compiling national accounts statistics
  - Income Accounts (GDP)
  - Wealth Accounts

Need for new measures

- GDP was designed for a specific purpose: to measure flow of activity in the market economy
- GDP is NOT a measure of welfare or a measure of sustainability
- Ignores all non-market values (most ecosystem services)



Clouded vision

- We lack the right set of measures and economic accounts to judge the full consequences of our actions
- Distorted views leads to distorted decisions

System of Environmental-Economic Accounts (SEEA)

- SEEA adopted as an international standard by the United Nations Statistical Commission in 2012
  - "Framework for understanding the interactions between the economy and the environment, and for describing stocks and changes in stocks of environmental assets"
- SEEA is designed to be consistent with the SNA
- BUT: only includes the value of marketed commodities
- SEEA – EEA: Experimental Ecosystem Accounts
  - Tries to capture ecosystem services
  - Not consistent with SNA
  - Not a statistical standard

Ecosystem services and natural capital

	Biophysical	Monetary value
Flows	Quantitative measure of ecosystem services (e.g., tons of carbon sequestered)	Value of ecosystem services
Stocks	Quantitative measure of natural capital (e.g., tons of carbon stored)	Value of natural capital

Two general points

- Expanding the boundaries of accounts to include non-market values
  - Valuation approaches
- Focus on ecosystem services and natural capital not on ecosystem types or area

Ecosystem services and natural capital in income and wealth accounts

- SEEA Central Framework provides guidance on the valuation of market goods and services but not on non-market goods and services
- “Full valuation of assets and flows related to natural resources and land beyond the valuation included in the SNA remains an outstanding issue.”

Non-market valuation

- Expanding the boundary of accounts to include non-market values
- Identified research need for SEEA: "Development of consistent valuation techniques beyond the SNA in the absence of market prices."
- Principle: "When market prices are not observable, valuation according to market price equivalents should be used to provide an approximation to market prices."

Non-market valuation

- Variety of methods from environmental economics: willingness-to-pay (analog to market price)
- Revealed preference methods
  - Hedonic models
  - Random utility (travel cost) models
  - Averting behavior
- Stated preference methods
  - Conjoint analysis
  - Contingent valuation

Non-market valuation

- Replacement cost: valid to use if
  - Alternative method provides an equivalent quality and quantity of the service
  - It is the lowest cost alternative method
  - People would be willing-to-pay the cost of this alternative method to provide the service

  (Shabman and Batie 1978)
- Example: NYC-Catskills water supply

Non-market valuation

- SNA Satellite Accounts: valuation of household labor
  - Alternative to household labor is to hire paid labor
  - Compute the wage cost for hired labor
- Wage cost is replacement cost for household labor

Valuation of ecosystem services and natural capital

- Corollary to income (flow value): ecosystem services (goods and services)
- Corollary to wealth (stock value): natural capital
- An ecosystem is not a good or service: it can be thought of as an asset that provides multiple goods and services (joint products)

Valuation of ecosystem services and natural capital

- Use of value per unit area of ecosystem type (wetlands, forests, grasslands…) can only be used if it closely maps to provision and value of ecosystem services
- The value ecosystem services depends on location
- Example: flood protection
  - How does action contribute to flood mitigation
  - How does flood mitigation lead to reduction in damage from flooding
- Non-ecosystem example: value of housing (location, location, location….)
- Some cases where area based valuation can work: carbon storage value

Three examples

- Renewable resource (fish) - provisioning service
- Coastal protection – regulating service
- Aesthetics – cultural service

Valuing ecosystem services: Renewable resource

- Value of commercial harvests already included in income accounts
- Subsistence (non-market) harvest:
  - Estimates of subsistence harvest (quantity)
  - Use market price of harvest (price)
  - Analogous to household labor case
- Recreational harvest:
  - Not really the harvest value but the experience
  - Payments for fishing guides/boats already in accounts
  - Use market price for guides/boats
  - For some recreational harvest there is no close market substitute: may need to use random utility model to estimate value

Valuing ecosystem services: Coastal protection

- Coastal ecosystems (marshes, dunes, seagrass beds…) can provide protection from storm surge, waves and wind from coastal storms for buildings and infrastructure located near the coast
- The value of protection afforded by coastal ecosystems does not show in income accounts (with some exceptions)

Valuing ecosystem services: Coastal protection

- If the coastal ecosystem were removed and coastal properties had increased risk, what value would be lost?
- Valuation methods:
  - Replacement cost: what would it cost to restore ecosystem or provide substitute means of protection (e.g., hardened shoreline)
  - Change in expected damages (per annum):
  - Value of insurance coverage
  - Hedonic property price model
  - Stated preference survey of willingness-to-pay to avoid risks

Valuing ecosystem services: Aesthetics

- Nature providing aesthetic value (e.g., beautiful views)
- Aesthetic values do not show up in income accounts (with some exceptions)

Valuing ecosystem services: Aesthetics

- If the natural amenities were removed and aesthetics were affected, what value would be lost?
- Valuation methods:
  - Replacement cost: what would it cost to restore ecosystem or provide substitute (Is it possible?)
  - Random utility model – travel to scenic places (note: travel expenses already are in the income accounts)
  - Hedonic property price model: good for value of amenities capitalized into property values but not necessarily for
  - Stated preference survey of willingness-to-pay

Valuing natural capital

- SEEA preferred approach to value assets – net present value formulation
- Range of approaches to calculate present value
  - Simplest: assume current conditions continue to hold in future (both quantities and prices), known discount rate
  - Harder (more realistic): model likely future conditions to predict both future quantities and prices, endogenous discount rates

Valuing natural capital

- Non-market valuation issues remain with natural capital – not really new issue
- Main issue with natural capital is getting a realistic prediction of future conditions (both prices and quantities)
- Fisheries example: future stocks depend on current harvests as well as environmental conditions

Valuing natural capital

- Simplest version is, well, simple (easy)
- Full/complete version is impossible to get fully correct (degrees of being accurate…)
- Statistical offices are reluctant to tackle harder version – “soft” realm of prediction rather than “firm” realm of income accounts

Conclusions

- Add non-market values to accounts
  - Attributional
  - Final total accounting
- Accounting for ecosystem services and natural capital in a rigorous but practical way
- Much work remains before this will be a reality