Environmentally Adjusted GDP

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Overview

- What is GDP?
- GDP's strengths and weaknesses
- Adjustments to GDP
  - Depletion
  - Degradation

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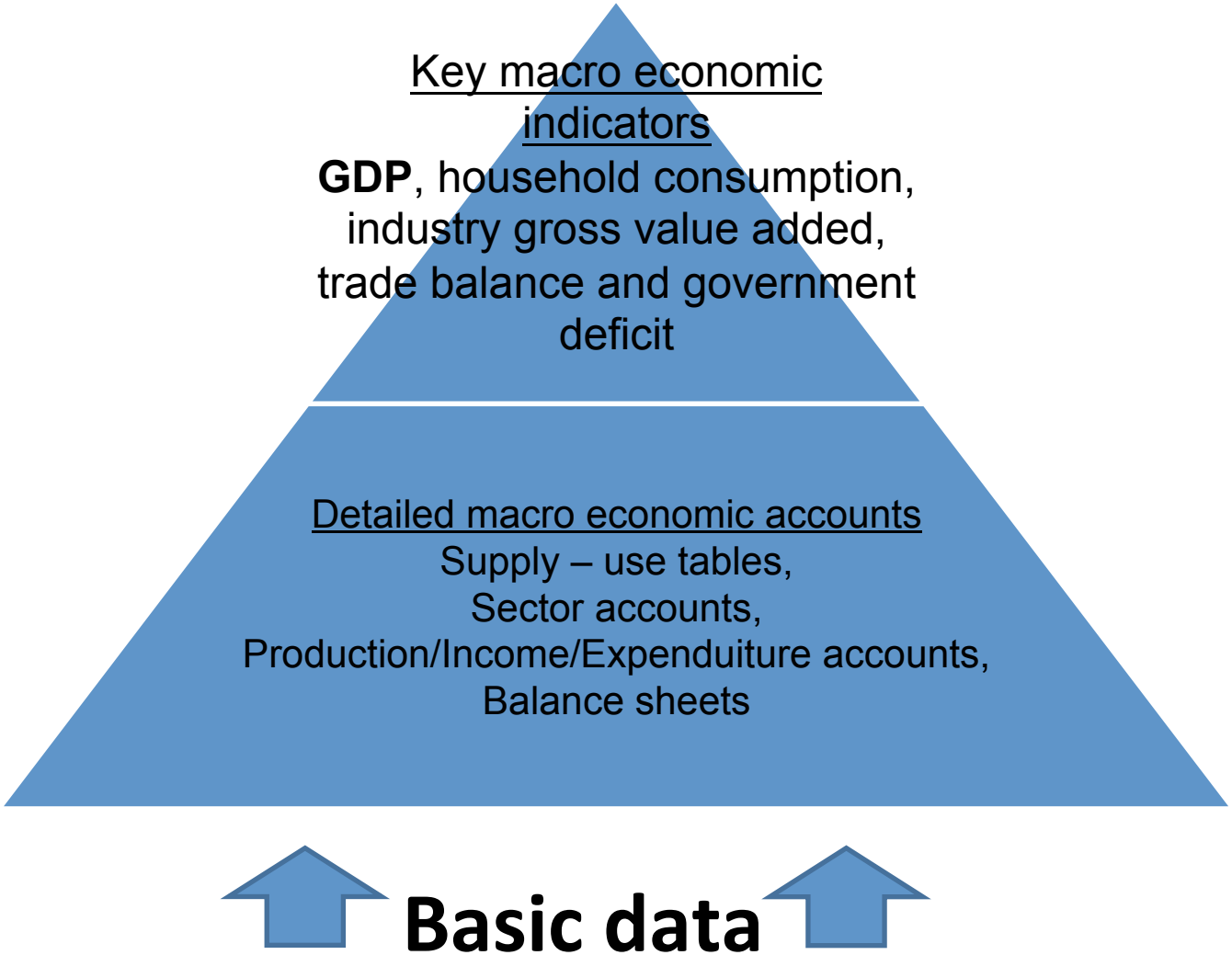
What is Gross Domestic Product (GDP)?

- GDP is an economic indicator of an economy's health, as measured by a given country's output
- Derived thought accounts contained in the SNA
- Takes an **economic** approach to measuring performance
- Internationally accepted, widely used system and ∴ highly comparable

A key economic indicator



Why adjust GDP?

- It has long been recognised that GDP and other income measures within the national accounts framework should not be considered measures of welfare or well-being
- Considerable research into ways to incorporate environmental factors

Issues with environmentally-modified GDP

- Some practitioners advocate measuring sustainability by revising conventional macroeconomic indicators
- However, questions over how do we calculate a measure of GDP that accounts for demands on environment?
- No consensus on how "green GDP" calculated
- Not even consensus on whether to attempt at all

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Defining Depletion

'… the reduction in the value of deposits of subsoil assets as a result of the physical removal and using up of assets.'

Source: SNA, 2008

Adjusting for depletion

- The using up (depletion) of natural capital (e.g. mineral resources, forests, fish stocks), is not regarded as a cost of production

- SEEA Central Framework, Chp. 6 touches on appropriate accounting for derivation of depletion adjusted GDP.

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Case Study: Nauru

- What do you think Nauru's national accounts might show in 1975 and 2005?
  - E.g. Production/GDP, income etc.
- Do you think accounting for the environment could have helped Nauru?

Worked Example Nauru I

Nauru National Accounts 1975 & 2005, (theoretical excerpt)

1. Production account

	1975	2005		1975	2005
Uses	$m	$m	Resources	$m	$m
Intermediate consumption	370	55	Output	665	120
Gross domestic product	*295*	*65*			
Consumption of fixed capital	10	2			
Net domestic product	*285*	*63*			

2. Generation of Income account

	1975	2005		1975	2005
Uses	$m	$m	Resources	$m	$m
Compensation of employees	205	45	*Net domestic product*	*285*	*63*
Net operating surplus	*80*	*18*			

3. Allocation/distribution of income account

	1975	2005		1975	2005
Uses	$m	$m	Resources	$m	$m
Interest paid to overseas	5	40	*Net operating surplus*	*80*	*18*
			Compensation of employees	*205*	*45*
			Interest received from overseas	75	10
			Current international cooperation	2	35
Net disposable income	*357*	*68*			

4. Use of income account

	1975	2005		1975	2005
Uses	$m	$m	Resources	$m	$m
Final consumption expenditure	305	110	*Net disposable income*	*357*	*68*
Saving	*52*	*-42*			

5. Capital account

	1975	2005		1975	2005
Changes in assets	$m	$m	Changes in liabilities and net worth	$m	$m
Gross fixed capital formation	35	5	*Saving*	*52*	*-42*
Net lending (+)/Net borrowing (-)	17	-47			

Worked Example: Nauru II

Nauru National Accounts 1975 & 2005, adjusted for depletion (theoretical excerpt)

1. Production account

	1975	2005		1975	2005
Uses	$m	$m	Resources	$m	$m
Intermediate consumption	370	55	Output	665	120
Gross domestic product	*295*	*65*			
Consumption of fixed capital	10	2			
Consumption of natural capital	**200**	**40**			
Adjusted net domestic product	*85*	*23*			

2. Generation of Income account

	1975	2005		1975	2005
Uses	$m	$m	Resources	$m	$m
Compensation of employees	205	45	*Adjusted net domestic product*	*85*	*23*
Adjusted net operating surplus	*-120*	*-22*			

3. Allocation/distribution of income account

	1975	2005		1975	2005
Uses	$m	$m	Resources	$m	$m
Interest paid to overseas	5	40	*Adjusted net operating surplus*	*-120*	*-22*
			Compensation of employees	*205*	*45*
			Interest received from overseas	75	10
			Current international cooperation	2	35
Adjusted net disposable income	*157*	*28*			

4. Use of income account

	1975	2005		1975	2005
Uses	$m	$m	Resources	$m	$m
Final consumption expenditure	305	110	*Adjusted net disposable income*	*157*	*28*
Adjusted saving	*-148*	*-82*			

5. Capital account

	1975	2005		1975	2005
Changes in assets	$m	$m	Changes in liabilities and net worth	$m	$m
Gross fixed capital formation	35	5	*Adjusted saving*	*-148*	*-82*
Adjusted Net lending (+)/Net borrowing (-)	-183	-87			

Incorporating depletion estimates into SEEA Tables

Table 6.5.1 Possible structure and typical content for combined presentations

	Industries (by ISIC categories)	Households	Government	Accumulation	Flows with the rest of the world	Total
Monetary supply and use: flows (currency units)						
Supply of products						
Intermediate consumption and final use of						
Gross value added						
Depletion adjusted value added						
Environmental taxes, subsidies and similar						
Physical supply and use:flows (physical units)						
Supply of:						
Natural inputs						
Products						
Residuals						
Use of:						
Natural inputs						
Products						
Residuals						
Asset stocks and flows						
Closing stocks of environmental assets (currency units and physical units)						
Depletion (currency units and physical units)						
Closing stocks of fixed assets (currency units)						
Gross fixed capital formation (currency units)						
Related socio-demographic data						
Employment						
Population						

Note: Dark grey cells are null by definition.

Source: SEEA Central Framework, p.237

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Degradation

‘Degradation considers changes in the capacity of environmental assets to deliver a broad range of ecosystem services and the extent to which this capacity may be reduced through the actions of economic units, including households.’

Source: SEEA, 2012, Experimental Ecosystem Accounting

The sequence of SNA accounts

- SNA describes a sequence of economic accounts
- Stocks and flows -- production; income and expenditure; accumulation… balance sheet
- SEEA Central Framework uses this sequence – adapted for certain environment-related items
  - adopt something similar for ecosystems-related matters?

‘Two options for recording ecosystem services in sequence of accounts’ (Edens, de Haan 2012)

- Option 1: Ecosystems as an asset and as a separate sector
- Option 2: Ecosystems as an asset

- A number of questions are raised in assessing these options…

‘Two options for recording ecosystem services in sequence of accounts’ (Edens, de Haan 2012), *cont’d…*

- Ecosystems as a separate sector **(<u>option1</u>)**:
  - ‘ecosystem products’ are a resource of ‘ecosystems’ sector (and a use by producers and consumers)
  - estimates of output, operating surplus, saving etc. are generated in respect of the ecosystems sector
  - ‘degradation’ is attributed to ecosystems sector as ‘owner’ of the asset (though the ecosystem is degraded by a different sector)

‘Two options for recording ecosystem services in sequence of accounts’ (Edens, de Haan 2012) *cont’d…*

- Ecosystems as an asset **(<u>option 2</u>)**:
  - The ecosystem is ‘owned’ by economic units – output of ecosystem services, and any degradation costs, are attributed to these units

‘Two options for recording ecosystem services in sequence of accounts’ (Edens, de Haan 2012) *cont’d…*

- Issues:
  - is it useful to view ecosystems as akin to group of institutional units?
  - is it logical to attribute production of ecosystem services to agriculture, government etc.?
    - such producing units may be unaware of the production of these services
  - to whom should we charge the cost of ecosystem degradation?

Is it useful to view ecosystems as akin to group of institutional units?

- Institutional sectors are identified so as to support a focus on the purpose, objectives and behaviours of these units
- Typically, institutional units are ‘transactors’ e.g. corporations, government agencies etc. - making decisions and undertaking actions affecting the economy (and environment)
  - i.e. they are not passive
- ecosystems may be dynamic and responsive, and might conceivably be viewed as akin to an institutional sector?
  - but is this a useful thing?

To whom should we charge the cost of ecosystem degradation?

- Charging degradation to the 'ecosystem' itself (option 1) fails to assign human responsibility for damage
  - e.g. if a farmer degrades an ecosystem, shouldn't degradation be recorded against the operating surplus of the farmer?
- SEEA Central Framework assigns natural resource depletion to the responsible institutional unit
- SNA likewise records consumption of fixed capital against the producing unit

Adjusting for degradation

Table A6.1 Simplified sequence of accounts for ecosystem accounting

	Model A				Model B		
	Farmer	Household	Ecosystem	Total	Farmer	Household	Total
Production and generation of income accounts							
Output – SNA	200			200	200		200
Output – non-SNA			110	110	30		30
Total Output	200		110	310	230		230
Int. consumption – SNA	0		0	0	0		0
Int. consumption – non-SNA	80		0	80	0		0
Gross value added	120		110	230	230		230
Less Consumption of fixed capital (SNA)	10			10	10		10
Less Ecosystem degradation (non-SNA)			15	15	15		15
Degradation adjusted Net Value Added	110		95	205	205		205
Less Compensation of employees - SNA	50			50	50		50
Degradation adj. Net Operating Surplus	**60**		**95**	**155**	**155**		**155**
Allocation and use of income accounts							
Degradation adj. Net Operating Surplus	60		95	155	155		155
Compensation of employees - SNA		50		50		50	50
Ecosystem transfers – non-SNA	80	30	-110	0	-30	30	0
Disposable income	140	80	-15	205	125	80	205
Less Final consumption - SNA		200		200		200	200
Final consumption – non-SNA		30		30		30	30
Degradation adjusted net saving	**140**	**-150**	**-15**	**-25**	**125**	**-150**	**-25**

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Any Questions?